

Full SAP Calculation Printout



Property Reference	House Type 1			Issued on Date	24/10/2025
Assessment Reference	Plot 1	Prop Type Ref			
Property					
SAP Rating	83 B	DER	4.26	TER	11.23
Environmental	96 A	% DER < TER			62.07
CO ₂ Emissions (t/year)	0.31	DFEE	29.21	TFEE	34.63
Compliance Check	See BREL	% DFEE < TFEE			15.64
% DPER < TPER	23.25	DPER	44.95	TPER	58.57
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

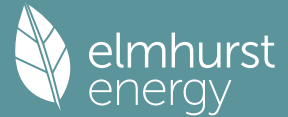
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			14.3500	1.3258	19.0246		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	14.3500	55.6500	0.2000	11.1300	190.0000	10573.5000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.3546		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15333.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.6687 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												
Point Thermal bridges										(36a) =	0.0000	3.9389 (36)
Total fabric heat loss										(33) + (36) + (36a) =	43.2936	(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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Average = Sum(39)m / 12 =	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936 (39)
	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936	76.2936 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537	0.9537 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4629	(42)
Hot water usage for mixer showers	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010	63.8010	(42a)
Hot water usage for baths	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436	27.6436	(42b)
Hot water usage for other uses	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	39.8522	(42c)
Average daily hot water use (litres/day)													120.7544	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	131.2967	(44)
Distribution loss (46)m = 0.15 x (45)m	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	192.8189	(45)
Water storage loss:														
Store volume	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228	28.9228	(46)
a) If manufacturer declared loss factor is known (kWh/day):														
Temperature factor from Table 2b														300.0000 (47)
Enter (49) or (54) in (55)														1.8000 (48)
Total storage loss														0.5400 (49)
If cylinder contains dedicated solar storage														0.9720 (55)
Primary loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(56)
Combi loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(57)
Total heat required for water heating calculated for each month	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
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	0.0000	(61)
PV diverter	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	246.2133	(62)
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	(63a)
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	(63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
12Total per year (kWh/year)	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	246.2133	(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														
	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278	106.8278	(65)

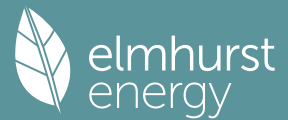
5. Internal gains (see Table 5 and 5a)

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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	113.1094	125.2282	113.1094	116.8797	113.1094	116.8797	113.1094	113.1094	116.8797	113.1094	116.8797	113.1094	113.1094	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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	0.0000	(70)
Water heating gains (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Total internal gains	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	143.5857	(72)
	536.3421	548.4531	526.3034	510.6843	485.7584	467.3261	447.9138	451.7601	464.1149	480.2832	508.7405	526.3963	526.3963	(73)

6. Solar gains

[Jan]														
	Area	Solar flux	g	FF	Access	Gains								
	m2	Table 6a	Specific data	Specific data	factor	W								
		W/m2	or Table 6b	or Table 6c	Table 6d									
Northeast	8.5000	11.2829	0.7600	0.0000	0.7700	56.1236	(75)							
Southwest	3.5000	36.7938	0.7600	0.0000	0.7700	75.3611	(79)							
Northwest	2.3500	11.2829	0.7600	0.0000	0.7700	15.5165	(81)							
Solar gains	147.0013	274.1934	438.3698	649.1049	823.7519	860.3301	811.7488	674.9515	510.3216	320.0843	180.4071	122.9984	(83)	
Total gains	683.3434	822.6465	964.6732	1159.7892	1309.5103	1327.6562	1259.6627	1126.7116	974.4365	800.3674	689.1476	649.3946	(84)	

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	55.8279	
alpha	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	4.7219	
util living area	0.9748	0.9447	0.8766	0.7201	0.5277	0.3657	0.2661	0.3106	0.5263	0.8216	0.9500	0.9797 (86)	
Living	20.1509	20.3530	20.5986	20.8211	20.9105	20.9309	20.9338	20.9332	20.9169	20.7594	20.4115	20.1025	
Non living	19.1371	19.3874	19.6825	19.9307	20.0189	20.0359	20.0378	20.0375	20.0263	19.8730	19.4639	19.0763	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5656	20.3530	20.5986	20.8211	20.9105	20.9309	20.9338	20.9332	20.9169	20.7594	20.4115	20.2280 (87)	
Th 2	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221	20.1221 (88)	
util rest of house	0.9693	0.9335	0.8545	0.6823	0.4819	0.3164	0.2132	0.2518	0.4642	0.7830	0.9379	0.9751 (89)	
MIT 2	19.7294	19.3874	19.6825	19.9307	20.0189	20.0359	20.0378	20.0375	20.0263	19.8730	19.4639	19.2648 (90)	
Living area fraction									fLA = Living area / (4) =				0.2250 (91)
MIT	19.9176	19.6047	19.8886	20.1310	20.2195	20.2373	20.2394	20.2390	20.2267	20.0724	19.6771	19.4815 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.9176	19.6047	19.8886	20.1310	20.2195	20.2373	20.2394	20.2390	20.2267	20.0724	19.6771	19.4815 (93)	

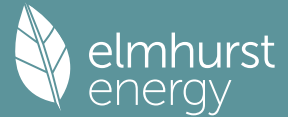
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9678	0.9258	0.8480	0.6827	0.4870	0.3229	0.2203	0.2596	0.4718	0.7806	0.9305	0.9710	(94)
Useful gains	661.3230	761.5891	818.0127	791.7470	637.7792	428.6663	277.4900	292.5178	459.7351	624.7914	641.2534	630.5837	(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	1191.5198	1121.8713	1021.4643	856.8552	649.9853	430.0878	277.6616	292.8922	467.4275	722.6868	959.5510	1165.8814	(97)
Space heating kWh	394.4665	242.1096	151.3680	46.8779	9.0813	0.0000	0.0000	0.0000	0.0000	72.8341	229.1743	398.2615	(98a)
Space heating requirement - total per year (kWh/year)												1544.1732	
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	394.4665	242.1096	151.3680	46.8779	9.0813	0.0000	0.0000	0.0000	0.0000	72.8341	229.1743	398.2615	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.1732	
Space heating per m2										(98c) / (4) =		19.3022	(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 %)													234.0743 (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	394.4665	242.1096	151.3680	46.8779	9.0813	0.0000	0.0000	0.0000	0.0000	72.8341	229.1743	398.2615 (98)	
Space heating efficiency (main heating system 1)	234.0743	234.0743	234.0743	234.0743	234.0743	0.0000	0.0000	0.0000	0.0000	234.0743	234.0743	234.0743 (210)	
Space heating fuel (main heating system)	168.5219	103.4328	64.6667	20.0269	3.8797	0.0000	0.0000	0.0000	0.0000	31.1158	97.9067	170.1432 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)	
Efficiency of water heater (217)m	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459	179.2459 (216)	
Fuel for water heating, kWh/month	137.6896	121.7884	129.4785	116.6359	113.3645	100.3939	96.3008	103.9447	104.0302	117.1382	124.5541	137.3606 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)	
Lighting	29.7688	23.8817	21.5028	15.7539	12.1687	9.9420	11.1007	14.4291	18.7420	24.5906	27.7750	30.5962 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													659.6937 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													179.2459
Water heating fuel used													1402.6793 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)													
mechanical ventilation fans (SFP = 0.1343)													32.7785 (230a)
Total electricity for the above, kWh/year													32.7785 (231)

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Electricity for lighting (calculated in Appendix L)	240.2515	(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	2335.4031	(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	659.6937	0.1577	104.0373	(261)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	1402.6793	0.1409	197.5812	(264)
Space and water heating			301.6185	(265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468	(267)
Energy for lighting	240.2515	0.1443	34.6757	(268)
Total CO2, kg/year			340.8410	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2600	(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	659.6937	1.5838	1044.7947	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1402.6793	1.5208	2133.2587	(278)
Space and water heating			3178.0534	(279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874	(281)
Energy for lighting	240.2515	1.5338	368.5058	(282)
Total Primary energy kWh/year			3596.1465	(286)
Dwelling Primary energy Rate (DPER)			44.9500	(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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)	
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e) ... (3n) =	200.0000	(5)

2. Ventilation rate

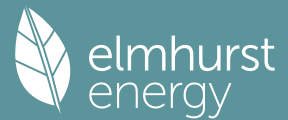
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4000	(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) =	0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995	(22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling			m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K				
TER Opening Type					14.3500	1.1450	16.4313			(27)			
Heatloss Floor 1					40.0000	0.1300	5.2000			(28a)			
External Wall 1	70.0000		14.3500		55.6500	0.1800	10.0170			(29a)			
External Roof 1	40.0000				40.0000	0.1100	4.4000			(30)			
Total net area of external elements Aum(A, m2)					150.0000					(31)			
Fabric heat loss, W/K = Sum (A x U)					(26)...	(30) + (32) =	36.0483			(33)			
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K									191.6687	(35)			
List of Thermal Bridges													
K1 Element						Length	Psi-value		Total				
E5 Ground floor (normal)						36.0000	0.1600		5.7600				
E6 Intermediate floor within a dwelling						36.0000	0.0000		0.0000				
E18 Party wall between dwellings						10.0000	0.0600		0.6000				
E2 Other lintels (including other steel lintels)						8.3500	0.0500		0.4175				
E3 Sill						5.5600	0.0500		0.2780				
E4 Jamb						20.4000	0.0500		1.0200				
E10 Eaves (insulation at ceiling level)						11.0000	0.0600		0.6600				
E12 Gable (insulation at ceiling level)						11.0000	0.0600		0.6600				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)									9.3955	(36)			
Point Thermal bridges								(36a) =	0.0000				
Total fabric heat loss								(33) + (36) + (36a) =	45.4438	(37)			
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Average = Sum(39)m / 12 =	84.6452	84.4044	84.1684	83.0597	82.8523	81.8867	81.8867	81.7078	82.2586	82.8523	83.2719	83.7106	(39)
												83.0587	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0581	1.0551	1.0521	1.0382	1.0357	1.0236	1.0236	1.0213	1.0282	1.0357	1.0409	1.0464	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

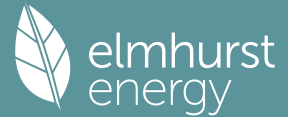
Assumed occupancy													2.4629	(42)
Hot water usage for mixer showers	65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)	
Hot water usage for baths	28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)	
Hot water usage for other uses	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)													122.8659	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	(44)	
Distribution loss (46)m = 0.15 x (45)m	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)	
Water storage loss:										Total = Sum(45)m =		2040.7768		
Store volume	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	(46)	
a) If manufacturer declared loss factor is known (kWh/day):														
Temperature factor from Table 2b													300.0000	(47)
Enter (49) or (54) in (55)													2.1127	(48)
Total storage loss													0.5400	(49)
	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(55)	
If cylinder contains dedicated solar storage														
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
WWHRS	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	(62)	
PV diverter	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
12Total per year (kWh/year)	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)	
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2452.7993	(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)	
Heat gains from water heating, kWh/month								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =				0.0000	(64a)	
	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091	(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	
123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
113.1094	125.2282	113.1094	116.8797	113.1094	116.8797	113.1094	113.1094	116.8797	113.1094	116.8797	113.1094	113.1094	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)													
157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	156.3294	(72)
Total internal gains	553.1399	565.0950	542.5359	523.7847	498.2815	477.9606	460.4554	461.5265	474.9606	493.7275	522.7974	542.1400	(73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Northeast				8.5000	11.2829		0.6300		0.7000	0.7700	29.3098 (75)
Southwest				3.5000	36.7938		0.6300		0.7000	0.7700	39.3564 (79)
Northwest				2.3500	11.2829		0.6300		0.7000	0.7700	8.1033 (81)

Solar gains	76.7695	143.1939	228.9329	338.9865	430.1936	449.2961	423.9252	352.4845	266.5087	167.1598	94.2152	64.2343 (83)
Total gains	629.9094	708.2889	771.4688	862.7712	928.4750	927.2567	884.3806	814.0110	741.4693	660.8873	617.0127	606.3742 (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	50.3195	50.4631	50.6046	51.2800	51.4084	52.0146	52.0146	52.1285	51.7795	51.4084	51.1494	50.8813
alpha	4.3546	4.3642	4.3736	4.4187	4.4272	4.4676	4.4676	4.4752	4.4520	4.4272	4.4100	4.3921
util living area	0.9834	0.9713	0.9459	0.8718	0.7327	0.5451	0.4030	0.4538	0.6943	0.9056	0.9699	0.9857 (86)
MIT	19.6679	19.8737	20.1758	20.5740	20.8479	20.9685	20.9934	20.9891	20.9108	20.5563	20.0585	19.6399 (87)
Th 2	20.0352	20.0377	20.0401	20.0516	20.0537	20.0637	20.0637	20.0656	20.0599	20.0537	20.0494	20.0449 (88)
util rest of house												
	0.9794	0.9646	0.9332	0.8432	0.6806	0.4727	0.3194	0.3653	0.6215	0.8777	0.9617	0.9823 (89)
MIT 2	18.4962	18.7572	19.1354	19.6218	19.9235	20.0440	20.0611	20.0609	19.9961	19.6141	19.0014	18.4677 (90)
Living area fraction												0.2250 (91)
MIT	18.7599	19.0084	19.3695	19.8360	20.1315	20.2520	20.2709	20.2697	20.2019	19.8261	19.2392	18.7315 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7599	19.0084	19.3695	19.8360	20.1315	20.2520	20.2709	20.2697	20.2019	19.8261	19.2392	18.7315 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9723	0.9553	0.9222	0.8358	0.6852	0.4877	0.3381	0.3850	0.6332	0.8698	0.9525	0.9759 (94)
Useful gains	612.4656	676.6079	711.4600	721.1080	636.1559	452.1900	298.9936	313.3621	469.5269	574.8250	587.7309	591.7398 (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	1223.9580	1190.8090	1083.2024	908.3421	698.5658	462.8242	300.5969	316.1865	501.9363	764.4049	1010.8579	1216.4387 (97)
Space heating kWh	454.9504	345.5431	276.5764	134.8086	46.4329	0.0000	0.0000	0.0000	0.0000	141.0474	304.6514	464.7760 (98a)
Space heating requirement - total per year (kWh/year)												2168.7862
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	454.9504	345.5431	276.5764	134.8086	46.4329	0.0000	0.0000	0.0000	0.0000	141.0474	304.6514	464.7760 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2168.7862
Space heating per m2										(98c) / (4) =		27.1098 (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	454.9504	345.5431	276.5764	134.8086	46.4329	0.0000	0.0000	0.0000	0.0000	141.0474	304.6514	464.7760 (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)	492.9040	374.3696	299.6494	146.0548	50.3065	0.0000	0.0000	0.0000	0.0000	152.8141	330.0666	503.5493 (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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Efficiency of water heater (217)m	85.4678	85.1410	84.5079	83.1861	81.3814	79.8000	79.8000	79.8000	79.8000	83.2528	84.8435	79.8000 (216)
Fuel for water heating, kWh/month	281.2370	249.8635	268.1378	241.4430	240.5286	222.4834	220.7394	228.7638	230.4292	244.5989	253.1361	278.2228 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.5019	18.8541	16.9760	12.4374	9.6070	7.8490	8.7638	11.3915	14.7965	19.4138	21.9278	24.1551 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-37.2727	-52.4706	-75.3160	-84.5634	-91.0870	-84.9819	-83.9227	-79.2677	-71.0477	-59.9309	-40.9460	-32.2328 (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	-21.2951	-44.7712	-88.9396	-133.5178	-176.4868	-177.3114	-175.2328	-148.4035	-108.8157	-64.0162	-28.4282	-16.8424 (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												2349.7142 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2959.5833	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	189.6737	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3607.8710	(238)

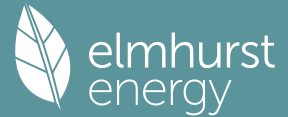
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2349.7142	0.2100	493.4400 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2959.5833	0.2100	621.5125 (264)
Space and water heating			1114.9525 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	189.6737	0.1443	27.3758 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0395	0.1346	-106.7566
PV Unit electricity exported	-1184.0608	0.1259	-149.0841
Total			-255.8407 (269)
Total CO2, kg/year			898.4169 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2349.7142	1.1300	2655.1770 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2959.5833	1.1300	3344.3292 (278)
Space and water heating			5999.5062 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	189.6737	1.5338	290.9279 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0395	1.4975	-1187.5951
PV Unit electricity exported	-1184.0608	0.4622	-547.2417
Total			-1734.8368 (283)
Total Primary energy kWh/year			4685.6980 (286)
Target Primary Energy Rate (TPER)			58.5700 (287)

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Property Reference	House Type 1			Issued on Date	24/10/2025
Assessment Reference	Plot 2	Prop Type Ref			
Property					
SAP Rating	83 B	DER	4.23	TER	11.06
Environmental	96 A	% DER < TER			61.75
CO ₂ Emissions (t/year)	0.31	DFEE	27.78	TFEE	33.54
Compliance Check	See BREL	% DFEE < TFEE			17.16
% DPER < TPER	22.65	DPER	44.64	TPER	57.71
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

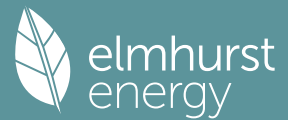
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			12.0000	1.3258	15.9091		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	12.0000	58.0000	0.2000	11.6000	190.0000	11020.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.7091		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15780.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							197.2500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														3.9389 (36)
Point Thermal bridges														0.0000
Total fabric heat loss														(33) + (36) + (36a) = 40.6480 (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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	(38)
Average = Sum(39)m / 12 =	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	(39)
														73.6480
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		0.9206
														31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4629	(42)
Hot water usage for mixer showers														
Hot water usage for baths														
Hot water usage for other uses														
Average daily hot water use (litres/day)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	(44)	
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	(45)	
Distribution loss (46)m = 0.15 x (45)m														
Water storage loss:														
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss														
If cylinder contains dedicated solar storage														
Primary loss														
Combi loss														
Total heat required for water heating calculated for each month														
WWHRS														
PV diverter														
Solar input														
FGHRS														
Output from w/h														
12Total per year (kWh/year)														
Electric shower(s)														
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														

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

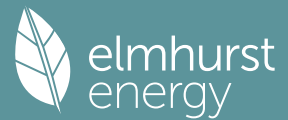
Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	117.0021	129.5381	117.0021	120.9022	117.0021	120.9022	117.0021	117.0021	120.9022	117.0021	120.9022	117.0021	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)	
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)	
Total internal gains	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	(72)	
	540.2349	552.7630	530.1962	514.7068	489.6512	471.3486	451.8066	455.6528	468.1374	484.1759	512.7630	530.2890	(73)	

6. Solar gains

[Jan]														
	Area													
	m2													
	Solar flux													
	Table 6a													
	W/m2													
	Specific data													
	or Table 6b													
	Specific data													
	or Table 6c													
	Access													
	factor													
	Table 6d													
	Gains													
	W													
Northeast	8.5000												56.1236	(75)
Southwest	3.5000												75.3611	(79)
Solar gains	131.4847	242.6091	381.4649	555.6507	698.1310	726.4050	686.4646	575.0735	440.9820	281.4857	160.8833	110.3268	(83)	
Total gains	671.7196	795.3721	911.6610	1070.3575	1187.7822	1197.7536	1138.2713	1030.7263	909.1194	765.6616	673.6463	640.6158	(84)	

7. Mean internal temperature (heating season)

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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	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173
alpha	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678
util living area	0.9769	0.9501	0.8909	0.7482	0.5602	0.3912	0.2843	0.3278	0.5448	0.8326	0.9534	0.9813 (86)
Living	20.2091	20.3916	20.6129	20.8230	20.9128	20.9341	20.9371	20.9365	20.9213	20.7745	20.4533	20.1648
Non living	19.2315	19.4579	19.7249	19.9609	20.0501	20.0679	20.0698	20.0695	20.0592	19.9161	19.5378	19.1758
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5954	20.3916	20.6129	20.8230	20.9128	20.9341	20.9371	20.9365	20.9213	20.7745	20.4533	20.2816 (87)
Th 2	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500 (88)
util rest of house	0.9717	0.9398	0.8704	0.7115	0.5137	0.3402	0.2296	0.2677	0.4828	0.7952	0.9418	0.9770 (89)
MIT 2	19.7838	19.4579	19.7249	19.9609	20.0501	20.0679	20.0698	20.0695	20.0592	19.9161	19.5378	19.3513 (90)
Living area fraction									FLA = Living area / (4) =			0.2250 (91)
MIT	19.9664	19.6680	19.9247	20.1549	20.2442	20.2628	20.2649	20.2646	20.2531	20.1092	19.7438	19.5607 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9664	19.6680	19.9247	20.1549	20.2442	20.2628	20.2649	20.2646	20.2531	20.1092	19.7438	19.5607 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9704	0.9329	0.8643	0.7117	0.5189	0.3470	0.2370	0.2758	0.4905	0.7933	0.9352	0.9734 (94)
Useful gains	651.8322	741.9702	787.9547	761.7934	616.3720	415.6127	269.7538	284.2761	445.9001	607.3719	630.0257	623.5656 (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	1153.8021	1087.6308	988.7007	828.8978	629.2668	417.0547	269.9155	284.6210	453.1668	700.3372	931.1887	1131.2820 (97)
Space heating kWh	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373	377.7410 (98a)
Space heating requirement - total per year (kWh/year)												1476.7579
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	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373	377.7410 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1476.7579
Space heating per m2										(98c) / (4) =		18.4595 (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 %)												232.1520 (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	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373	377.7410 (98)
Space heating efficiency (main heating system 1)	232.1520	232.1520	232.1520	232.1520	232.1520	0.0000	0.0000	0.0000	0.0000	232.1520	232.1520	232.1520 (210)
Space heating fuel (main heating system)	160.8712	100.0568	64.3350	20.8119	4.1325	0.0000	0.0000	0.0000	0.0000	29.7935	93.4032	162.7128 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577 (216)
Fuel for water heating, kWh/month	137.6806	121.7804	129.4701	116.6283	113.3571	100.3874	96.2945	103.9379	104.0234	117.1306	124.5460	137.3516 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Lighting	30.7934	24.7036	22.2428	16.2960	12.5875	10.2841	11.4828	14.9257	19.3871	25.4369	28.7309	31.6492 (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												636.1169 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2577
Water heating fuel used												1402.5877 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)
Electricity for lighting (calculated in Appendix L)												248.5200 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2320.0031 (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	636.1169	0.1576	100.2739 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1402.5877	0.1409	197.5683 (264)
Space and water heating			297.8422 (265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468 (267)
Energy for lighting	248.5200	0.1443	35.8691 (268)
Total CO2, kg/year			338.2581 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	636.1169	1.5835	1007.2935 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1402.5877	1.5208	2133.1193 (278)
Space and water heating			3140.4129 (279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874 (281)
Energy for lighting	248.5200	1.5338	381.1883 (282)
Total Primary energy kWh/year			3571.1885 (286)
Dwelling Primary energy Rate (DPER)			44.6400 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	200.0000 (5)

2. Ventilation rate

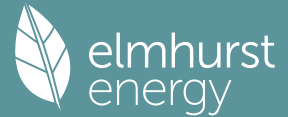
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4000 (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) = 0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995 (22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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							

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TER Opening Type			12.0000	1.1450	13.7405	(27)
Heatloss Floor 1			40.0000	0.1300	5.2000	(28a)
External Wall 1	70.0000	12.0000	58.0000	0.1800	10.4400	(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	(30)
Total net area of external elements Aum(A, m2)			150.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	33.7805		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 197.2500 (35)

List of Thermal Bridges												
K1 Element												
E5 Ground floor (normal)												
E6 Intermediate floor within a dwelling												
E18 Party wall between dwellings												
E2 Other lintels (including other steel lintels)												
E3 Sill												
E4 Jamb												
E10 Eaves (insulation at ceiling level)												
E12 Gable (insulation at ceiling level)												
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												9.3955 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 43.1760 (37)

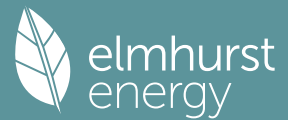
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668 (38)
Average = Sum(39)m / 12 =	82.3774	82.1366	81.9005	80.7919	80.5844	79.6188	79.6188	79.4400	79.9908	80.5844	81.0041	81.4428 (39)
												80.7909
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0297	1.0267	1.0238	1.0099	1.0073	0.9952	0.9952	0.9930	0.9999	1.0073	1.0126	1.0180 (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												2.4629 (42)
Hot water usage for mixer showers												
Hot water usage for baths	65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628 (42a)
Hot water usage for other uses	28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006 (42b)
Average daily hot water use (litres/day)	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522 (42c)
												122.8659 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156 (44)
Energy content (annual)	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400 (45)
Distribution loss (46)m = 0.15 x (45)m	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1127 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1409 (55)
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage												
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688 (62)
PV diverter	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Electric shower(s)												
Heat gains from water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091 (65)
												2452.7993 (64)
												2453 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	117.0021	129.5381	117.0021	120.9022	117.0021	120.9022	117.0021	117.0021	120.9022	117.0021	120.9022	117.0021 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Total internal gains	157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294 (72)
	557.0327	569.4049	546.4287	527.8072	502.1742	481.9831	464.3482	465.4193	478.9831	497.6203	526.8200	546.0327 (73)

6. Solar gains												
[Jan]		Area	Solar flux	g	FF	Access	Gains					

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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W
Northeast	8.5000	11.2829	0.6300	0.7000	0.7700	29.3098 (75)
Southwest	3.5000	36.7938	0.6300	0.7000	0.7700	39.3564 (79)

Solar gains	68.6662	126.6994	199.2150	290.1812	364.5897	379.3555	358.4971	300.3246	230.2971	147.0022	84.0192	57.6167 (83)
Total gains	625.6988	696.1043	745.6437	817.9885	866.7640	861.3386	822.8453	765.7438	709.2802	644.6225	610.8391	603.6494 (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	53.2104	53.3664	53.5202	54.2546	54.3943	55.0540	55.0540	55.1779	54.7980	54.3943	54.1125	53.8210
alpha	4.5474	4.5578	4.5680	4.6170	4.6263	4.6703	4.6703	4.6785	4.6532	4.6263	4.6075	4.5881
util living area	0.9846	0.9738	0.9520	0.8867	0.7578	0.5697	0.4212	0.4693	0.7073	0.9112	0.9718	0.9868 (86)
MIT	19.7454	19.9348	20.2099	20.5814	20.8462	20.9686	20.9937	20.9899	20.9164	20.5838	20.1173	19.7206 (87)
Th 2	20.0586	20.0611	20.0636	20.0751	20.0772	20.0873	20.0873	20.0892	20.0834	20.0772	20.0729	20.0683 (88)
util rest of house	0.9809	0.9676	0.9403	0.8600	0.7071	0.4965	0.3360	0.3801	0.6353	0.8842	0.9639	0.9836 (89)
MIT 2	18.6081	18.8486	19.1940	19.6506	19.9447	20.0676	20.0848	20.0848	20.0237	19.6646	19.0898	18.5838 (90)
Living area fraction	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (92)
MIT	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (93)

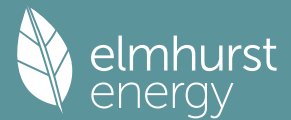
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9745	0.9593	0.9304	0.8529	0.7112	0.5116	0.3551	0.3999	0.6472	0.8771	0.9556	0.9778 (94)
Useful gains	609.7595	667.7472	693.7782	697.6823	616.4440	440.6693	292.1988	306.2482	459.0108	565.4050	583.7414	590.2270 (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	1199.7467	1165.7630	1058.3691	885.4825	680.7412	451.4621	293.7412	308.8993	489.9082	747.1310	989.9496	1192.2860 (97)
Space heating kWh	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319 (98a)
Space heating requirement - total per year (kWh/year)												2103.5318
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	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2103.5318
Space heating per m2										(98c) / (4) =		26.2941 (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	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319	(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)	475.5693	362.5857	293.8848	146.4963	51.8279	0.0000	0.0000	0.0000	0.0000	146.4833	316.8688	485.3000	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
Efficiency of water heater (217)m	85.3923	85.0713	84.4642	83.1925	81.4206	79.8000	79.8000	79.8000	79.8000	83.1632	84.7528	79.8000	(216)
Fuel for water heating, kWh/month	281.4855	250.0681	268.2763	241.4244	240.4128	222.4834	220.7394	228.7638	230.4292	244.8624	253.4070	278.4741	(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	24.3107	19.5030	17.5603	12.8654	9.9376	8.1191	9.0654	11.7836	15.3057	20.0819	22.6825	24.9864	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2965	-52.5113	-75.3782	-84.6319	-91.1550	-85.0423	-83.9902	-79.3452	-71.1260	-59.9917	-40.9785	-32.2532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2713	-44.7305	-88.8775	-133.4493	-176.4188	-177.2510	-175.1653	-148.3260	-108.7373	-63.9553	-28.3957	-16.8220	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2279.0161 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)

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Efficiency of water heater	79.8000	
Water heating fuel used	2960.8263	(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)	196.2015	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3544.9437	(238)

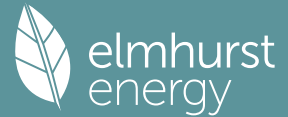
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2279.0161	0.2100	478.5934 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2960.8263	0.2100	621.7735 (264)
Space and water heating			1100.3669 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	196.2015	0.1443	28.3179 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	0.1346	-106.8447
PV Unit electricity exported	-1183.4002	0.1259	-148.9952
Total			-255.8399 (269)
Total CO2, kg/year			884.7742 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0600 (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	2279.0161	1.1300	2575.2881 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2960.8263	1.1300	3345.7337 (278)
Space and water heating			5921.0219 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	196.2015	1.5338	300.9405 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	1.4975	-1188.5815
PV Unit electricity exported	-1183.4002	0.4622	-546.9153
Total			-1735.4967 (283)
Total Primary energy kWh/year			4616.5664 (286)
Target Primary Energy Rate (TPER)			57.7100 (287)

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Property Reference	House Type 1				Issued on Date	24/10/2025
Assessment Reference	Plot 3		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.23	TER	11.06	
Environmental	96 A	% DER < TER				61.75
CO ₂ Emissions (t/year)	0.31	DFEE	27.78	TFEE	33.54	
Compliance Check	See BREL	% DFEE < TFEE				17.16
% DPER < TPER	22.65	DPER	44.64	TPER	57.71	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

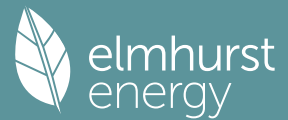
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			12.0000	1.3258	15.9091		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	12.0000	58.0000	0.2000	11.6000	190.0000	11020.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.7091		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15780.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							197.2500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600	0.0190	0.1056	
E4 Jamb									20.4000	0.0150	0.3060	
E10 Eaves (insulation at ceiling level)									11.0000	0.0520	0.5720	
E12 Gable (insulation at ceiling level)									11.0000	0.0450	0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												0.0000 (36a)
Total fabric heat loss												(33) + (36) + (36a) = 40.6480 (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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Average = Sum(39)m / 12 =	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480	73.6480 (39)
HLP												
HLP (average)	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206	0.9206 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

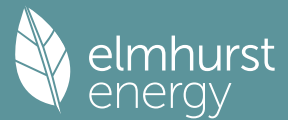
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.4629 (42)
Hot water usage for mixer showers												
Hot water usage for baths	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010 (42a)
Hot water usage for other uses	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436 (42b)
Average daily hot water use (litres/day)	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522 (42c)
	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	120.7544 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967 (44)
Distribution loss (46)m = 0.15 x (45)m	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189 (45)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
Primary loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (62)
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 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (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												
	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278 (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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	117.0021	129.5381	117.0021	120.9022	117.0021	120.9022	117.0021	117.0021	120.9022	117.0021	120.9022	117.0021 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Total internal gains	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857 (72)
	540.2349	552.7630	530.1962	514.7068	489.6512	471.3486	451.8066	455.6528	468.1374	484.1759	512.7630	530.2890 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	8.5000											56.1236 (75)
Southwest	3.5000											75.3611 (79)
Solar gains	131.4847	242.6091	381.4649	555.6507	698.1310	726.4050	686.4646	575.0735	440.9820	281.4857	160.8833	110.3268 (83)
Total gains	671.7196	795.3721	911.6610	1070.3575	1187.7822	1197.7536	1138.2713	1030.7263	909.1194	765.6616	673.6463	640.6158 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173	59.5173
alpha	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678	4.9678
util living area	0.9769	0.9501	0.8909	0.7482	0.5602	0.3912	0.2843	0.3278	0.5448	0.8326	0.9534
											0.9813 (86)
Living	20.2091	20.3916	20.6129	20.8230	20.9128	20.9341	20.9371	20.9365	20.9213	20.7745	20.4533
Non living	19.2315	19.4579	19.7249	19.9609	20.0501	20.0679	20.0698	20.0695	20.0592	19.9161	19.5378
24 / 16	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	10
MIT	20.5954	20.3916	20.6129	20.8230	20.9128	20.9341	20.9371	20.9365	20.9213	20.7745	20.4533
Th 2	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500	20.1500
util rest of house	0.9717	0.9398	0.8704	0.7115	0.5137	0.3402	0.2296	0.2677	0.4828	0.7952	0.9418
MIT 2	19.7838	19.4579	19.7249	19.9609	20.0501	20.0679	20.0698	20.0695	20.0592	19.9161	19.5378
Living area fraction									FLA = Living area / (4) =		0.2250 (91)
MIT	19.9664	19.6680	19.9247	20.1549	20.2442	20.2628	20.2649	20.2646	20.2531	20.1092	19.7438
Temperature adjustment											0.0000
adjusted MIT	19.9664	19.6680	19.9247	20.1549	20.2442	20.2628	20.2649	20.2646	20.2531	20.1092	19.7438
											19.5607 (93)

8. Space heating requirement											

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.9704	0.9329	0.8643	0.7117	0.5189	0.3470	0.2370	0.2758	0.4905	0.7933	0.9352
Useful gains	651.8322	741.9702	787.9547	761.7934	616.3720	415.6127	269.7538	284.2761	445.9001	607.3719	630.0257
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	1153.8021	1087.6308	988.7007	828.8978	629.2668	417.0547	269.9155	284.6210	453.1668	700.3372	931.1887
Space heating kWh	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373
Space heating requirement - total per year (kWh/year)											377.7410 (98a)
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
Solar heating contribution - total per year (kWh/year)											0.0000 (98b)
Space heating kWh	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373
Space heating requirement after solar contribution - total per year (kWh/year)											377.7410 (98c)
Space heating per m2										(98c) / (4) =	18.4595 (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 %)											232.1520 (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
Space heating requirement	373.4656	232.2839	149.3550	48.3151	9.5937	0.0000	0.0000	0.0000	0.0000	69.1662	216.8373
Space heating efficiency (main heating system 1)	232.1520	232.1520	232.1520	232.1520	232.1520	0.0000	0.0000	0.0000	0.0000	232.1520	232.1520
Space heating fuel (main heating system)	160.8712	100.0568	64.3350	20.8119	4.1325	0.0000	0.0000	0.0000	0.0000	29.7935	93.4032
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
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
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
Water heating											
Water heating requirement	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582
Efficiency of water heater	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577	179.2577
Fuel for water heating, kWh/month	137.6806	121.7804	129.4701	116.6283	113.3571	100.3874	96.2945	103.9379	104.0234	117.1306	124.5460
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
Pumps and Fa	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.6941	2.6941	2.7839	2.6941
Lighting	30.7934	24.7036	22.2428	16.2960	12.5875	10.2841	11.4828	14.9257	19.3871	25.4369	28.7309
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
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
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
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
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
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
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
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
Annual totals kWh/year											
Space heating fuel - main system 1											636.1169 (211)
Space heating fuel - main system 2											0.0000 (213)
Space heating fuel - secondary											0.0000 (215)
Efficiency of water heater											179.2577
Water heating fuel used											1402.5877 (219)
Space cooling fuel											0.0000 (221)
Electricity for pumps and fans:											
(MEVDecentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)											
mechanical ventilation fans (SFP = 0.1343)											
Total electricity for the above, kWh/year											32.7785 (230a)
Electricity for lighting (calculated in Appendix L)											32.7785 (231)
											248.5200 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2320.0031 (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	636.1169	0.1576	100.2739 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1402.5877	0.1409	197.5683 (264)
Space and water heating			297.8422 (265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468 (267)
Energy for lighting	248.5200	0.1443	35.8691 (268)
Total CO2, kg/year			338.2581 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	636.1169	1.5835	1007.2935 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1402.5877	1.5208	2133.1193 (278)
Space and water heating			3140.4129 (279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874 (281)
Energy for lighting	248.5200	1.5338	381.1883 (282)
Total Primary energy kWh/year			3571.1885 (286)
Dwelling Primary energy Rate (DPER)			44.6400 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	200.0000 (5)

2. Ventilation rate

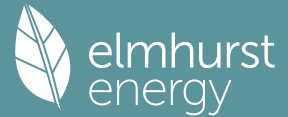
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4000 (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) = 0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995 (22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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							

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TER Opening Type			12.0000	1.1450	13.7405	(27)
Heatloss Floor 1			40.0000	0.1300	5.2000	(28a)
External Wall 1	70.0000	12.0000	58.0000	0.1800	10.4400	(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	(30)
Total net area of external elements Aum(A, m2)			150.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	33.7805		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 197.2500 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E5 Ground floor (normal)			36.0000	0.1600	5.7600	
E6 Intermediate floor within a dwelling			36.0000	0.0000	0.0000	
E18 Party wall between dwellings			10.0000	0.0600	0.6000	
E2 Other lintels (including other steel lintels)			8.3500	0.0500	0.4175	
E3 Sill			5.5600	0.0500	0.2780	
E4 Jamb			20.4000	0.0500	1.0200	
E10 Eaves (insulation at ceiling level)			11.0000	0.0600	0.6600	
E12 Gable (insulation at ceiling level)			11.0000	0.0600	0.6600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 43.1760 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heat transfer coeff 39.2014 38.9606 38.7246 37.6159 37.4085 36.4429 36.4429 36.2640 36.8148 37.4085 37.8281 38.2668 (38)
Average = Sum(39)m / 12 = 82.3774 82.1366 81.9005 80.7919 80.5844 79.6188 79.6188 79.4400 79.9908 80.5844 81.0041 81.4428 (39)
80.7909

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0297	1.0267	1.0238	1.0099	1.0073	0.9952	0.9952	0.9930	0.9999	1.0073	1.0126	1.0180 (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													2.4629 (42)
Hot water usage for mixer showers													
65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)	
Hot water usage for baths													
28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)	
Hot water usage for other uses													
39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)													122.8659 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156 (44)
Energy content (annual)	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =	2040.7768	
	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110 (46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (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												
	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688 (62)
WWHRS	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955 (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												
	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)

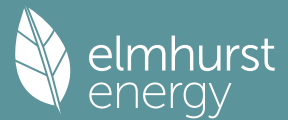
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.0021	129.5381	117.0021	120.9022	117.0021	120.9022	117.0021	117.0021	120.9022	117.0021	120.9022	117.0021 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)	157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294 (72)
Total internal gains	557.0327	569.4049	546.4287	527.8072	502.1742	481.9831	464.3482	465.4193	478.9831	497.6203	526.8200	546.0327 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W
Northeast	8.5000	11.2829	0.6300	0.7000	0.7700	29.3098 (75)
Southwest	3.5000	36.7938	0.6300	0.7000	0.7700	39.3564 (79)

Solar gains	68.6662	126.6994	199.2150	290.1812	364.5897	379.3555	358.4971	300.3246	230.2971	147.0022	84.0192	57.6167 (83)
Total gains	625.6988	696.1043	745.6437	817.9885	866.7640	861.3386	822.8453	765.7438	709.2802	644.6225	610.8391	603.6494 (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	53.2104	53.3664	53.5202	54.2546	54.3943	55.0540	55.0540	55.1779	54.7980	54.3943	54.1125	53.8210
alpha	4.5474	4.5578	4.5680	4.6170	4.6263	4.6703	4.6703	4.6785	4.6532	4.6263	4.6075	4.5881
util living area	0.9846	0.9738	0.9520	0.8867	0.7578	0.5697	0.4212	0.4693	0.7073	0.9112	0.9718	0.9868 (86)
MIT	19.7454	19.9348	20.2099	20.5814	20.8462	20.9686	20.9937	20.9899	20.9164	20.5838	20.1173	19.7206 (87)
Th 2	20.0586	20.0611	20.0636	20.0751	20.0772	20.0873	20.0873	20.0892	20.0834	20.0772	20.0729	20.0683 (88)
util rest of house	0.9809	0.9676	0.9403	0.8600	0.7071	0.4965	0.3360	0.3801	0.6353	0.8842	0.9639	0.9836 (89)
MIT 2	18.6081	18.8486	19.1940	19.6506	19.9447	20.0676	20.0848	20.0848	20.0237	19.6646	19.0898	18.5838 (90)
Living area fraction	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (92)
MIT	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (93)
Temperature adjustment												0.0000
adjusted MIT	18.8640	19.0930	19.4226	19.8600	20.1476	20.2703	20.2893	20.2885	20.2246	19.8714	19.3210	18.8396 (93)

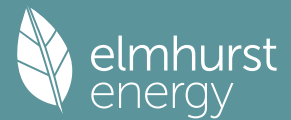
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9745	0.9593	0.9304	0.8529	0.7112	0.5116	0.3551	0.3999	0.6472	0.8771	0.9556	0.9778 (94)
Useful gains	609.7595	667.7472	693.7782	697.6823	616.4440	440.6693	292.1988	306.2482	459.0108	565.4050	583.7414	590.2270 (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	1199.7467	1165.7630	1058.3691	885.4825	680.7412	451.4621	293.7412	308.8993	489.9082	747.1310	989.9496	1192.2860 (97)
Space heating kWh	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319 (98a)
Space heating requirement - total per year (kWh/year)												2103.5318
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	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2103.5318
Space heating per m2										(98c) / (4) =		26.2941 (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	438.9505	334.6666	271.2556	135.2161	47.8371	0.0000	0.0000	0.0000	0.0000	135.2041	292.4699	447.9319	(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)	475.5693	362.5857	293.8848	146.4963	51.8279	0.0000	0.0000	0.0000	0.0000	146.4833	316.8688	485.3000	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
Efficiency of water heater (217)m	85.3923	85.0713	84.4642	83.1925	81.4206	79.8000	79.8000	79.8000	79.8000	83.1632	84.7528	79.8000	(216)
Fuel for water heating, kWh/month	281.4855	250.0681	268.2763	241.4244	240.4128	222.4834	220.7394	228.7638	230.4292	244.8624	253.4070	278.4741	(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	24.3107	19.5030	17.5603	12.8654	9.9376	8.1191	9.0654	11.7836	15.3057	20.0819	22.6825	24.9864	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2965	-52.5113	-75.3782	-84.6319	-91.1550	-85.0423	-83.9902	-79.3452	-71.1260	-59.9917	-40.9785	-32.2532	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2713	-44.7305	-88.8775	-133.4493	-176.4188	-177.2510	-175.1653	-148.3260	-108.7373	-63.9553	-28.3957	-16.8220	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2279.0161 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)

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Efficiency of water heater	79.8000	
Water heating fuel used	2960.8263	(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)	196.2015	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3544.9437	(238)

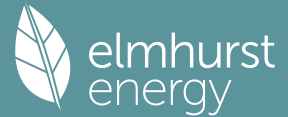
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2279.0161	0.2100	478.5934 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2960.8263	0.2100	621.7735 (264)
Space and water heating			1100.3669 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	196.2015	0.1443	28.3179 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	0.1346	-106.8447
PV Unit electricity exported	-1183.4002	0.1259	-148.9952
Total			-255.8399 (269)
Total CO2, kg/year			884.7742 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0600 (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	2279.0161	1.1300	2575.2881 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2960.8263	1.1300	3345.7337 (278)
Space and water heating			5921.0219 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	196.2015	1.5338	300.9405 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	1.4975	-1188.5815
PV Unit electricity exported	-1183.4002	0.4622	-546.9153
Total			-1735.4967 (283)
Total Primary energy kWh/year			4616.5664 (286)
Target Primary Energy Rate (TPER)			57.7100 (287)

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Property Reference	House Type 1				Issued on Date	24/10/2025
Assessment Reference	Plot 4		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.08	TER	10.95	
Environmental	97 A	% DER < TER				62.74
CO ₂ Emissions (t/year)	0.3	DFEE	28.88	TFEE	34.02	
Compliance Check	See BREL	% DFEE < TFEE				15.11
% DPER < TPER	24.51	DPER	43.07	TPER	57.05	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

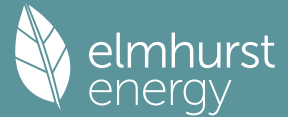
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			20.5000	1.3258	27.1780		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	20.5000	49.5000	0.2000	9.9000	190.0000	9405.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.2780		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14165.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							177.0625 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600	0.0190	0.1056	
E4 Jamb									20.4000	0.0150	0.3060	
E10 Eaves (insulation at ceiling level)									11.0000	0.0520	0.5720	
E12 Gable (insulation at ceiling level)									11.0000	0.0450	0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 50.2170 (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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Average = Sum(39)m / 12 =	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170	83.2170 (39)
												83.2170
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402	1.0402 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

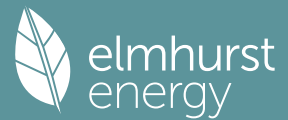
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.4629 (42)
Hot water usage for mixer showers	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010 (42a)
Hot water usage for baths	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436 (42b)
Hot water usage for other uses	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522 (42c)
Average daily hot water use (litres/day)												120.7544 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967 (44)
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189 (45)
Distribution loss (46)m = 0.15 x (45)m	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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												
	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Total per year (kWh/year) = Sum(64)m =												2514.2458 (64)
12Total per year (kWh/year)												2514 (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												
	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278 (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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.6826	122.5414	110.6826	114.3720	110.6826	114.3720	110.6826	110.6826	114.3720	110.6826	114.3720	110.6826 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857 (72)
Total internal gains	533.9153	545.7663	523.8766	508.1766	483.3316	464.8184	445.4870	449.3333	461.6072	477.8564	506.2328	523.9695 (73)

6. Solar gains													
[Jan]				Area	Solar flux		g		FF		Access	Gains	
				m2	Table 6a		Specific data		Specific data		factor	W	
					W/m2		or Table 6b		or Table 6c		Table 6d		
Northeast				8.5000	11.2829		0.7600		0.0000		0.7700	56.1236 (75)	
Southeast				8.5000	36.7938		0.7600		0.0000		0.7700	183.0199 (77)	
Southwest				3.5000	36.7938		0.7600		0.0000		0.7700	75.3611 (79)	
Solar gains	314.5046	554.3597	808.0156	1084.1677	1290.1141	1314.1072	1253.0723	1094.3326	902.8462	626.0365	380.0989	266.9537	(83)
Total gains	848.4199	1100.1260	1331.8922	1592.3443	1773.4458	1778.9256	1698.5593	1543.6658	1364.4534	1103.8928	886.3317	790.9231	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827	47.2827
alpha	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522	4.1522
util living area	0.9455	0.8763	0.7642	0.5941	0.4284	0.2980	0.2153	0.2474	0.4140	0.6977	0.8963	0.9569 (86)
Living	20.1377	20.4216	20.6724	20.8439	20.9066	20.9222	20.9249	20.9244	20.9132	20.7979	20.4397	20.0657
Non living	19.0643	19.4066	19.6956	19.8791	19.9395	19.9525	19.9542	19.9540	19.9464	19.8392	19.4357	18.9755
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5589	20.4216	20.6724	20.8439	20.9066	20.9222	20.9249	20.9244	20.9132	20.7979	20.4397	20.1964 (87)
Th 2	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500	20.0500 (88)
util rest of house	0.9351	0.8566	0.7337	0.5552	0.3869	0.2543	0.1689	0.1966	0.3594	0.6517	0.8758	0.9484 (89)
MIT 2	19.6570	19.4066	19.6956	19.8791	19.9395	19.9525	19.9542	19.9540	19.9464	19.8392	19.4357	19.1691 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.8599	19.6350	19.9154	20.0961	20.1571	20.1707	20.1726	20.1723	20.1639	20.0549	19.6616	19.4003 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8599	19.6350	19.9154	20.0961	20.1571	20.1707	20.1726	20.1723	20.1639	20.0549	19.6616	19.4003 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9328	0.8470	0.7291	0.5571	0.3916	0.2599	0.1749	0.2031	0.3661	0.6519	0.8661	0.9415 (94)
Useful gains	791.4082	931.7802	971.0490	887.1313	694.5498	462.2861	297.1277	313.5870	499.4762	719.6802	767.6672	744.6241 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1294.8507	1226.1995	1116.3898	931.7088	703.7750	463.5755	297.3043	313.9227	504.6202	786.8078	1045.3413	1264.9210 (97)
Space heating kWh	374.5612	197.8498	108.1335	32.0958	6.8636	0.0000	0.0000	0.0000	0.0000	49.9429	199.9253	387.1009 (98a)
Space heating requirement - total per year (kWh/year)	1356.4730											
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	374.5612	197.8498	108.1335	32.0958	6.8636	0.0000	0.0000	0.0000	0.0000	49.9429	199.9253	387.1009 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1356.4730											
Space heating per m2	(98c) / (4) = 16.9559 (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 %)	238.6470 (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	374.5612	197.8498	108.1335	32.0958	6.8636	0.0000	0.0000	0.0000	0.0000	49.9429	199.9253	387.1009 (98)
Space heating efficiency (main heating system 1)	238.6470	238.6470	238.6470	238.6470	238.6470	0.0000	0.0000	0.0000	0.0000	238.6470	238.6470	238.6470 (210)
Space heating fuel (main heating system)	156.9520	82.9048	45.3111	13.4491	2.8760	0.0000	0.0000	0.0000	0.0000	20.9275	83.7745	162.2065 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188	179.2188 (216)
Fuel for water heating, kWh/month	137.7104	121.8068	129.4981	116.6535	113.3816	100.4091	96.3153	103.9605	104.0459	117.1559	124.5730	137.3814 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Pumps and Fa	29.1301	23.3693	21.0414	15.4159	11.9077	9.7287	10.8626	14.1196	18.3399	24.0630	27.1791	29.9397 (232)
Lighting	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 PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	568.4014 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	179.2188											
Water heating fuel used	1402.8915 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												
Total electricity for the above, kWh/year	32.7785 (230a)											
	32.7785 (231)											

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Electricity for lighting (calculated in Appendix L)	235.0968	(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	2239.1683	(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	568.4014	0.1584	90.0191	(261)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	1402.8915	0.1409	197.6111	(264)
Space and water heating			287.6302	(265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468	(267)
Energy for lighting	235.0968	0.1443	33.9317	(268)
Total CO2, kg/year			326.1087	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	568.4014	1.5862	901.5807	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1402.8915	1.5208	2133.5814	(278)
Space and water heating			3035.1622	(279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874	(281)
Energy for lighting	235.0968	1.5338	360.5993	(282)
Total Primary energy kWh/year			3445.3489	(286)
Dwelling Primary energy Rate (DPER)			43.0700	(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	40.0000 (1b)	x	2.3000 (2b)	=	92.0000 (1b) - (3b)	
First floor	40.0000 (1c)	x	2.7000 (2c)	=	108.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	200.0000	(5)

2. Ventilation rate

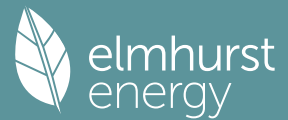
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4000	(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) =	0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995	(22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			19.9900	1.1450	22.8893			(27)
Heatloss Floor 1			40.0000	0.1300	5.2000			(28a)
External Wall 1	70.0000	19.9900	50.0100	0.1800	9.0018			(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000			(30)
Total net area of external elements Aum(A, m2)			150.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		41.4911			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 177.0625 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element				
E5 Ground floor (normal)	36.0000	0.1600	5.7600	
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000	
E18 Party wall between dwellings	10.0000	0.0600	0.6000	
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175	
E3 Sill	5.5600	0.0500	0.2780	
E4 Jamb	20.4000	0.0500	1.0200	
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600	
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 50.8866 (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	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Heat transfer coeff	90.0880	89.8472	89.6112	88.5025	88.2951	87.3295	87.3295	87.1507	87.7014	88.2951	88.7147	89.1534	(39)
Average = Sum(39)m / 12 =												88.5015	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1261	1.1231	1.1201	1.1063	1.1037	1.0916	1.0916	1.0894	1.0963	1.1037	1.1089	1.1144	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4629 (42)
Hot water usage for mixer showers													
65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	65.2628	(42a)
Hot water usage for baths													
28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	28.2006	(42b)
Hot water usage for other uses													
39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	39.8522	(42c)
Average daily hot water use (litres/day)												122.8659	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	133.3156	(44)
Energy content (annual)	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)
Distribution loss (46)m = 0.15 x (45)m													
31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	31.3110	(46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss

35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	(56)
If cylinder contains dedicated solar storage													
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	267.3688	(62)
WWHRS	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
Total per year (kWh/year)												2452.7993	(64)

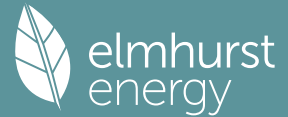
Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
Heat gains from water heating, kWh/month 117.2894 104.2986 111.9752 100.9431 99.6114 91.6476 91.6874 94.1784 93.9668 102.5460 106.3510 116.3091 (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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
110.6826	122.5414	110.6826	114.3720	110.6826	114.3720	110.6826	110.6826	110.6826	114.3720	110.6826	114.3720	110.6826	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)													
157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	156.3294	(72)
Total internal gains	550.7131	562.4082	540.1091	521.2770	495.8547	475.4529	458.0286	459.0997	472.4529	491.3007	520.2897	539.7131	(73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast	8.2900				11.2829	0.6300		0.7000		0.7700		28.5857 (75)
Southeast	8.2900				36.7938	0.6300		0.7000		0.7700		93.2183 (77)
Southwest	3.4100				36.7938	0.6300		0.7000		0.7700		38.3443 (79)
Solar gains	160.1484	282.2869	411.4577	552.0894	656.9713	669.1927	638.1101	557.2688	459.7506	318.7873	193.5500	135.9348 (83)
Total gains	710.8615	844.6951	951.5669	1073.3664	1152.8260	1144.6456	1096.1387	1016.3685	932.2035	810.0880	713.8397	675.6479 (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	43.6764	43.7935	43.9088	44.4589	44.5633	45.0561	45.0561	45.1485	44.8650	44.5633	44.3525	44.1343
alpha	3.9118	3.9196	3.9273	3.9639	3.9709	4.0037	4.0037	4.0099	3.9910	3.9709	3.9568	3.9423
util living area	0.9712	0.9456	0.8996	0.7976	0.6469	0.4737	0.3471	0.3887	0.6032	0.8456	0.9481	0.9757 (86)
MIT	19.5741	19.8646	20.2224	20.6221	20.8673	20.9705	20.9933	20.9896	20.9245	20.5892	20.0216	19.5272 (87)
Th 2	19.9796	19.9820	19.9844	19.9957	19.9978	20.0077	20.0077	20.0095	20.0039	19.9978	19.9935	19.9891 (88)
util rest of house	0.9649	0.9345	0.8798	0.7616	0.5927	0.4055	0.2704	0.3076	0.5305	0.8083	0.9356	0.9704 (89)
MIT 2	18.3465	18.7097	19.1490	19.6241	19.8864	19.9893	20.0050	20.0050	19.9512	19.6024	18.9193	18.2942 (90)
Living area fraction	fLA = Living area / (4) =											0.2250 (91)
MIT	18.6227	18.9695	19.3905	19.8486	20.1071	20.2101	20.2274	20.2266	20.1702	19.8244	19.1673	18.5716 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6227	18.9695	19.3905	19.8486	20.1071	20.2101	20.2274	20.2266	20.1702	19.8244	19.1673	18.5716 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9539	0.9208	0.8662	0.7558	0.5989	0.4197	0.2876	0.3256	0.5432	0.8010	0.9226	0.9604 (94)
Useful gains	678.1124	777.7680	824.2744	811.2355	690.4671	480.4148	315.2115	330.9092	506.3688	648.8636	658.5765	648.8928 (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	1290.3026	1264.1080	1155.1349	968.9819	742.3033	489.9261	316.7784	333.4875	532.3662	814.4732	1070.5494	1281.2787 (97)
Space heating kWh	455.4695	326.8205	246.1602	113.5774	38.5661	0.0000	0.0000	0.0000	0.0000	123.2135	296.6205	470.4951 (98a)
Space heating requirement - total per year (kWh/year)												2070.9228
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	455.4695	326.8205	246.1602	113.5774	38.5661	0.0000	0.0000	0.0000	0.0000	123.2135	296.6205	470.4951 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2070.9228
Space heating per m2	(98c) / (4) =											25.8865 (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	455.4695	326.8205	246.1602	113.5774	38.5661	0.0000	0.0000	0.0000	0.0000	123.2135	296.6205	470.4951 (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)	493.4664	354.0850	266.6958	123.0524	41.7835	0.0000	0.0000	0.0000	0.0000	133.4924	321.3657	509.7455 (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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.4702	85.0194	84.2459	82.8325	81.1538	79.8000	79.8000	79.8000	79.8000	82.9700	84.7842	85.5588 (217)
Fuel for water heating, kWh/month	281.2291	250.2207	268.9716	242.4736	241.2033	222.4834	220.7394	228.7638	230.4292	245.4326	253.3133	278.1402 (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	22.9976	18.4496	16.6118	12.1705	9.4009	7.6806	8.5758	11.1471	14.4790	18.9972	21.4573	23.6368 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-37.2579	-52.4452	-75.2772	-84.5206	-91.0446	-84.9442	-83.8806	-79.2193	-70.9988	-59.8928	-40.9257	-32.2200 (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	-21.3100	-44.7966	-88.9785	-133.5606	-176.5292	-177.3491	-175.2749	-148.4519	-108.8646	-64.0542	-28.4485	-16.8552 (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												2243.6867 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2963.4001	(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)	185.6042	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3501.5908	(238)

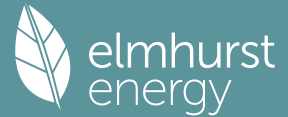
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2243.6867	0.2100	471.1742 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2963.4001	0.2100	622.3140 (264)
Space and water heating			1093.4882 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	185.6042	0.1443	26.7884 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6269	0.1346	-106.7015
PV Unit electricity exported	-1184.4733	0.1259	-149.1396
Total			-255.8411 (269)
Total CO2, kg/year			876.3648 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.9500 (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	2243.6867	1.1300	2535.3660 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2963.4001	1.1300	3348.6421 (278)
Space and water heating			5884.0081 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	185.6042	1.5338	284.6859 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6269	1.4975	-1186.9792
PV Unit electricity exported	-1184.4733	0.4622	-547.4456
Total			-1734.4248 (283)
Total Primary energy kWh/year			4564.3701 (286)
Target Primary Energy Rate (TPER)			57.0500 (287)

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Property Reference	House Type 2				Issued on Date	24/10/2025
Assessment Reference	Plot 5		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.11	TER	10.99	
Environmental	97 A	% DER < TER				62.60
CO ₂ Emissions (t/year)	0.3	DFEE	28.13	TFEE	33.80	
Compliance Check	See BREL	% DFEE < TFEE				16.79
% DPER < TPER	24.07	DPER	43.46	TPER	57.24	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

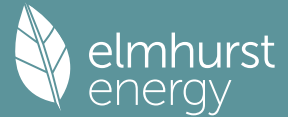
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			17.0000	1.3258	22.5379		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	17.0000	53.0000	0.2000	10.6000	190.0000	10070.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.3379		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14830.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							185.3750 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill					5.5600		0.0190		0.1056			
E4 Jamb					20.4000		0.0150		0.3060			
E10 Eaves (insulation at ceiling level)					11.0000		0.0520		0.5720			
E12 Gable (insulation at ceiling level)					11.0000		0.0450		0.4950			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											3.9389	(36)
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	46.2768	(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
	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Heat transfer coeff	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768 (39)
Average = Sum(39)m / 12 =												79.2768
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910 (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												2.4629 (42)
Hot water usage for mixer showers												
	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010 (42a)
Hot water usage for baths												
	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436 (42b)
Hot water usage for other uses												
	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522 (42c)
Average daily hot water use (litres/day)												120.7544 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967 (44)
Energy content (annual)												
	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1885.5698
	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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												
	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (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												
	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Total per year (kWh/year) = Sum(64)m =												2514.2458 (64)
12Total per year (kWh/year)												2514 (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												
	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278 (65)

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

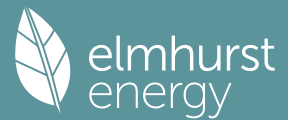
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	110.9000	122.7822	110.9000	114.5967	110.9000	114.5967	110.9000	110.9000	114.5967	110.9000	114.5967	110.9000 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)												
	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857 (72)
Total internal gains												
	534.1328	546.0070	524.0940	508.4013	483.5491	465.0431	445.7045	449.5507	461.8319	478.0738	506.4575	524.1869 (73)

6. Solar gains

[Jan]												
			Area	Solar flux	g	FF		Access		Gains		
			m2	Table 6a	Specific data	Specific data		factor		W		
				W/m2	or Table 6b	or Table 6c		Table 6d				
Northeast			8.5000	11.2829	0.7600	0.0000		0.7700		56.1236	(75)	
Southwest			8.5000	36.7938	0.7600	0.0000		0.7700		183.0199	(79)	
Solar gains	239.1435	425.9918	632.3771	866.5430	1046.3564	1072.1122	1019.7633	880.5200	712.6669	484.1626	289.8337	202.4602 (83)
Total gains	773.2762	971.9988	1156.4711	1374.9444	1529.9055	1537.1553	1465.4678	1330.0707	1174.4988	962.2365	796.2912	726.6472 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628
alpha	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642
util living area	0.9602	0.9087	0.8145	0.6485	0.4721	0.3285	0.2377	0.2736	0.4574	0.7489	0.9217
											0.9685 (86)
Living	20.1686	20.4155	20.6587	20.8421	20.9111	20.9276	20.9301	20.9296	20.9179	20.7946	20.4483
Non living	19.1346	19.4357	19.7205	19.9196	19.9865	20.0001	20.0018	20.0015	19.9936	19.8775	19.4814
24 / 16	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	10
MIT	20.5747	20.4155	20.6587	20.8421	20.9111	20.9276	20.9301	20.9296	20.9179	20.7946	20.4483
Th 2	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909
util rest of house	0.9520	0.8926	0.7870	0.6096	0.4288	0.2825	0.1888	0.2198	0.4001	0.7050	0.9047
MIT 2	19.7097	19.4357	19.7205	19.9196	19.9865	20.0001	20.0018	20.0015	19.9936	19.8775	19.4814
Living area fraction									fLA = Living area / (4) =		
MIT	19.9043	19.6561	19.9316	20.1272	20.1945	20.2088	20.2106	20.2104	20.2015	20.0838	19.6990
Temperature adjustment											0.0000
adjusted MIT	19.9043	19.6561	19.9316	20.1272	20.1945	20.2088	20.2106	20.2104	20.2015	20.0838	19.6990
											19.4668 (93)

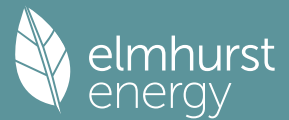
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9502	0.8838	0.7817	0.6112	0.4338	0.2885	0.1952	0.2269	0.4072	0.7046	0.8962	0.9563 (94)
Useful gains	734.7292	859.0717	904.0640	840.3973	663.6377	443.4002	286.0832	301.7607	478.2450	678.0352	713.6074	694.9205 (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	1237.0579	1169.8180	1064.8124	890.0530	673.4174	444.6457	286.2403	302.0730	483.7101	751.8470	998.8069	1210.3048 (97)
Space heating kWh	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98a)
Space heating requirement - total per year (kWh/year)												1388.8846
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	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1388.8846
Space heating per m2										(98c) / (4) =		17.3611 (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 %)												236.1225 (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	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98)
Space heating efficiency (main heating system 1)	236.1225	236.1225	236.1225	236.1225	236.1225	0.0000	0.0000	0.0000	0.0000	236.1225	236.1225	236.1225 (210)
Space heating fuel (main heating system)	158.2791	88.4378	50.6503	15.1413	3.0815	0.0000	0.0000	0.0000	0.0000	23.2574	86.9649	162.3928 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater												179.2337 (216)
(217)m	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337 (217)
Fuel for water heating, kWh/month	137.6990	121.7967	129.4874	116.6439	113.3722	100.4008	96.3073	103.9518	104.0373	117.1462	124.5627	137.3700 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Lighting	29.1874	23.4152	21.0828	15.4461	11.9310	9.7478	10.8839	14.1473	18.3760	24.1102	27.2325	29.9986 (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												588.2052 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2337
Water heating fuel used												1402.7753 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)
Electricity for lighting (calculated in Appendix L)												235.5587 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2259.3178 (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	588.2052	0.1582	93.0358 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1402.7753	0.1409	197.5947 (264)
Space and water heating			290.6305 (265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468 (267)
Energy for lighting	235.5587	0.1443	33.9984 (268)
Total CO2, kg/year			329.1756 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1100 (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	588.2052	1.5854	932.5612 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1402.7753	1.5208	2133.4047 (278)
Space and water heating			3065.9659 (279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874 (281)
Energy for lighting	235.5587	1.5338	361.3078 (282)
Total Primary energy kWh/year			3476.8611 (286)
Dwelling Primary energy Rate (DPER)			43.4600 (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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

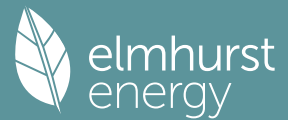
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4000 (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) = 0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995 (22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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							

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TER Opening Type			17.0000	1.1450	19.4656	(27)
Heatloss Floor 1			40.0000	0.1300	5.2000	(28a)
External Wall 1	70.0000	17.0000	53.0000	0.1800	9.5400	(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	(30)
Total net area of external elements Aum(A, m2)			150.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	38.6056		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 185.3750 (35)

List of Thermal Bridges													
K1 Element													
E5 Ground floor (normal)													
E6 Intermediate floor within a dwelling													
E18 Party wall between dwellings													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E10 Eaves (insulation at ceiling level)													
E12 Gable (insulation at ceiling level)													

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 48.0011 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Average = Sum(39)m / 12 =	87.2026	86.9618	86.7257	85.6171	85.4096	84.4440	84.4440	84.2652	84.8159	85.4096	85.8293	86.2680	(39)
												85.6161	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0900	1.0870	1.0841	1.0702	1.0676	1.0556	1.0556	1.0533	1.0602	1.0676	1.0729	1.0783	(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													2.4629 (42)
Hot water usage for mixer showers													
Hot water usage for baths	65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)
Hot water usage for other uses	28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)
Average daily hot water use (litres/day)	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)
												122.8659	(43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	(44)
Energy content (annual)	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)
Distribution loss (46)m = 0.15 x (45)m													
	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	(46)

Water storage loss:

Store volume 300.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	(62)
PV diverter	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)

Heat gains from water heating, kWh/month

117.2894 104.2986 111.9752 100.9431 99.6114 91.6476 91.6874 94.1784 93.9668 102.5460 106.3510 116.3091 (65)

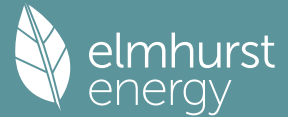
5. Internal gains (see Table 5 and 5a)

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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.9000	122.7822	110.9000	114.5967	110.9000	114.5967	110.9000	110.9000	114.5967	110.9000	114.5967	110.9000	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Total internal gains	157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	(72)
	550.9306	562.6490	540.3266	521.5017	496.0721	475.6776	458.2461	459.3172	472.6776	491.5182	520.5144	539.9306	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	8.5000		11.2829		0.6300		0.7000		0.7700		29.3098	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	124.8895	222.4686	330.2506	452.5407	546.4459	559.8965	532.5579	459.8400	372.1809	252.8476	151.3618	105.7322	(83)
Total gains	675.8201	785.1176	870.5772	974.0424	1042.5180	1035.5741	990.8040	919.1572	844.8585	744.3657	671.8763	645.6628	(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	47.2399	47.3707	47.4997	48.1148	48.2316	48.7831	48.7831	48.8867	48.5692	48.2316	47.9958	47.7517	
alpha	4.1493	4.1580	4.1666	4.2077	4.2154	4.2522	4.2522	4.2591	4.2379	4.2154	4.1997	4.1834	
util living area	0.9774	0.9582	0.9218	0.8320	0.6858	0.5056	0.3714	0.4155	0.6401	0.8723	0.9587	0.9809	(86)
MIT	19.6412	19.8932	20.2220	20.6131	20.8639	20.9710	20.9938	20.9901	20.9236	20.5898	20.0590	19.6029	(87)
Th 2	20.0090	20.0114	20.0139	20.0252	20.0274	20.0373	20.0373	20.0391	20.0335	20.0274	20.0231	20.0186	(88)
util rest of house	0.9723	0.9492	0.9050	0.7988	0.6322	0.4355	0.2918	0.3315	0.5670	0.8386	0.9482	0.9765	(89)
MIT 2	18.4472	18.7640	19.1711	19.6413	19.9124	20.0193	20.0348	20.0349	19.9800	19.6288	18.9844	18.4056	(90)
Living area fraction	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(91)
MIT	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(93)

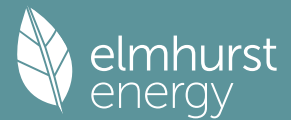
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9633	0.9376	0.8928	0.7926	0.6379	0.4501	0.3096	0.3502	0.5796	0.8313	0.9371	0.9684	(94)
Useful gains	651.0120	736.1306	777.2172	772.0304	665.0581	466.1362	306.7863	321.9104	489.6824	618.8124	629.6408	625.2471	(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	1257.0983	1227.7316	1119.4180	938.3602	719.7029	475.7091	308.2720	324.4076	516.7219	789.6138	1040.7823	1248.7260	(97)
Space heating kWh	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(98a)
Space heating requirement - total per year (kWh/year)												2083.2611	
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	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2083.2611	
Space heating per m2										(98c) / (4) =		26.0408	(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	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(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)	488.5463	357.9154	275.8368	129.7481	44.0473	0.0000	0.0000	0.0000	0.0000	137.6774	320.7171	502.5659	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
Efficiency of water heater	85.4491	85.0430	84.3217	82.9400	81.2156	79.8000	79.8000	79.8000	79.8000	83.0337	84.7797	79.8000	(216)
Fuel for water heating, kWh/month	281.2984	250.1514	268.7297	242.1595	241.0197	222.4834	220.7394	228.7638	230.4292	245.2444	253.3267	278.2360	(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	7.0685	7.3041	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	23.0428	18.4858	16.6444	12.1944	9.4193	7.6957	8.5926	11.1690	14.5074	19.0346	21.4995	23.6833	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2592	-52.4475	-75.2806	-84.5244	-91.0484	-84.9475	-83.8844	-79.2237	-71.0032	-59.8963	-40.9275	-32.2212	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3087	-44.7943	-88.9750	-133.5568	-176.5254	-177.3457	-175.2711	-148.4476	-108.8602	-64.0508	-28.4467	-16.8540	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2257.0543	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	2962.5815	(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)	185.9689	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3514.5045	(238)

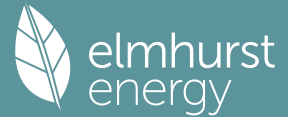
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2257.0543	0.2100	473.9814 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2962.5815	0.2100	622.1421 (264)
Space and water heating			1096.1235 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	185.9689	0.1443	26.8411 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6639	0.1346	-106.7065
PV Unit electricity exported	-1184.4363	0.1259	-149.1346
Total			-255.8411 (269)
Total CO2, kg/year			879.0528 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.9900 (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	2257.0543	1.1300	2550.4714 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2962.5815	1.1300	3347.7171 (278)
Space and water heating			5898.1885 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	185.9689	1.5338	285.2453 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6639	1.4975	-1187.0344
PV Unit electricity exported	-1184.4363	0.4622	-547.4273
Total			-1734.4617 (283)
Total Primary energy kWh/year			4579.0729 (286)
Target Primary Energy Rate (TPER)			57.2400 (287)

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Property Reference	House Type 2				Issued on Date	24/10/2025
Assessment Reference	Plot 6		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.09	TER	10.33	
Environmental	97 A	% DER < TER				60.41
CO ₂ Emissions (t/year)	0.31	DFEE	25.00	TFEE	29.78	
Compliance Check	See BREL	% DFEE < TFEE				16.03
% DPER < TPER	19.43	DPER	43.32	TPER	53.77	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

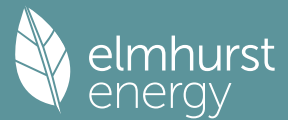
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			12.0000	1.3258	15.9091		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	35.0000	12.0000	23.0000	0.2000	4.6000	190.0000	4370.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			115.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.7091		(33)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =		9130.0000 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K						114.1250 (35)	
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														3.9389 (36)
Point Thermal bridges														0.0000 (36a)
Total fabric heat loss														(33) + (36) + (36a) = 33.6480 (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		
	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	(38)
Heat transfer coeff	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	66.6480	(39)
Average = Sum(39)m / 12 = 66.6480														
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	0.8331	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy	2.4629 (42)												
Hot water usage for mixer showers													
63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010	(42a)	
Hot water usage for baths													
27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436	(42b)	
Hot water usage for other uses													
39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)	120.7544 (43)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	(44)
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	(45)
Distribution loss (46)m = 0.15 x (45)m	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228	(46)
Water storage loss:													
Store volume	300.0000 (47)												
a) If manufacturer declared loss factor is known (kWh/day):	1.8000 (48)												
Temperature factor from Table 2b	0.5400 (49)												
Enter (49) or (54) in (55)	0.9720 (55)												
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	(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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	(64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2514.2458 (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	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278	(65)

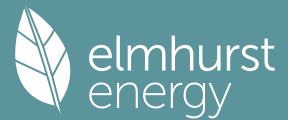
5. Internal gains (see Table 5 and 5a)													

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.0021	129.5381	117.0021	120.9022	117.0021	120.9022	117.0021	117.0021	120.9022	117.0021	120.9022	117.0021	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	(72)
Total internal gains	540.2349	552.7630	530.1962	514.7068	489.6512	471.3486	451.8066	455.6528	468.1374	484.1759	512.7630	530.2890	(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					8.5000		11.2829	0.7600	0.0000	0.7700		56.1236	(75)
Southwest					3.5000		36.7938	0.7600	0.0000	0.7700		75.3611	(79)
Solar gains	131.4847	242.6091	381.4649	555.6507		698.1310	726.4050	686.4646	575.0735	440.9820	281.4857	160.8833	110.3268 (83)
Total gains	671.7196	795.3721	911.6610	1070.3575		1187.7822	1197.7536	1138.2713	1030.7263	909.1194	765.6616	673.6463	640.6158 (84)

7. Mean internal temperature (heating season)

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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	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523	38.0523
alpha	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368	3.5368
util living area	0.9261	0.8792	0.8017	0.6591	0.4954	0.3501	0.2560	0.2946	0.4823	0.7393	0.8843	0.9355 (86)
Living	19.9504	20.1802	20.4512	20.7149	20.8514	20.8988	20.9094	20.9071	20.8710	20.6637	20.2646	19.8927
Non living	18.9921	19.2750	19.6027	19.9083	20.0560	20.1023	20.1110	20.1095	20.0787	19.8594	19.3843	18.9205
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4631	20.1802	20.4512	20.7149	20.8514	20.8988	20.9094	20.9071	20.8710	20.6637	20.2646	20.0476 (87)
Th 2	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247	20.2247 (88)
util rest of house	0.9168	0.8653	0.7809	0.6291	0.4593	0.3094	0.2115	0.2460	0.4340	0.7061	0.8686	0.9272 (89)
MIT 2	19.7333	19.2750	19.6027	19.9083	20.0560	20.1023	20.1110	20.1095	20.0787	19.8594	19.3843	19.1555 (90)
Living area fraction									fLA = Living area / (4) =			0.2250 (91)
MIT	19.8975	19.4787	19.7936	20.0898	20.2350	20.2815	20.2906	20.2890	20.2570	20.0404	19.5824	19.3562 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8975	19.4787	19.7936	20.0898	20.2350	20.2815	20.2906	20.2890	20.2570	20.0404	19.5824	19.3562 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9124	0.8502	0.7683	0.6237	0.4598	0.3124	0.2153	0.2500	0.4361	0.6977	0.8536	0.9163 (94)
Useful gains	612.8822	676.2523	700.4461	667.5884	546.1064	374.2261	245.1161	257.7184	396.4676	534.1901	575.0317	587.0157 (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	1039.5441	971.6399	885.9954	745.7754	568.8409	378.6595	245.9718	259.1916	410.3515	629.1814	831.9275	1010.1316 (97)
Space heating kWh	317.4365	198.5005	138.0487	56.2947	16.9145	0.0000	0.0000	0.0000	0.0000	70.6735	184.9650	314.7982 (98a)
Space heating requirement - total per year (kWh/year)												1297.6315
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	317.4365	198.5005	138.0487	56.2947	16.9145	0.0000	0.0000	0.0000	0.0000	70.6735	184.9650	314.7982 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1297.6315
Space heating per m2										(98c) / (4) =		16.2204 (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 %)													226.5115 (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	317.4365	198.5005	138.0487	56.2947	16.9145	0.0000	0.0000	0.0000	0.0000	70.6735	184.9650	314.7982 (98)	
Space heating efficiency (main heating system 1)	226.5115	226.5115	226.5115	226.5115	226.5115	0.0000	0.0000	0.0000	0.0000	226.5115	226.5115	226.5115 (210)	
Space heating fuel (main heating system)	140.1415	87.6337	60.9456	24.8529	7.4674	0.0000	0.0000	0.0000	0.0000	31.2009	81.6581	138.9767 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)	
Efficiency of water heater												179.6059 (216)	
(217)m	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059	179.6059 (217)	
Fuel for water heating, kWh/month	137.4136	121.5443	129.2190	116.4021	113.1373	100.1927	96.1078	103.7364	103.8217	116.9035	124.3045	137.0853 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)	
Lighting	30.7934	24.7036	22.2428	16.2960	12.5875	10.2841	11.4828	14.9257	19.3871	25.4369	28.7309	31.6492 (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													572.8767 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													179.6059
Water heating fuel used													1399.8682 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)													
mechanical ventilation fans (SFP = 0.1343)													32.7785 (230a)
Total electricity for the above, kWh/year													32.7785 (231)
Electricity for lighting (calculated in Appendix L)													248.5200 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2254.0435 (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	572.8767	0.1570	89.9557 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1399.8682	0.1409	197.1852 (264)
Space and water heating			287.1409 (265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468 (267)
Energy for lighting	248.5200	0.1443	35.8691 (268)
Total CO2, kg/year			327.5568 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0900 (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	572.8767	1.5813	905.8668 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1399.8682	1.5208	2128.9834 (278)
Space and water heating			3034.8503 (279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874 (281)
Energy for lighting	248.5200	1.5338	381.1883 (282)
Total Primary energy kWh/year			3465.6259 (286)
Dwelling Primary energy Rate (DPER)			43.3200 (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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (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) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4000 (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) = 0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995 (22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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							

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TER Opening Type			12.0000	1.1450	13.7405	(27)
Heatloss Floor 1			40.0000	0.1300	5.2000	(28a)
External Wall 1	35.0000	12.0000	23.0000	0.1800	4.1400	(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	(30)
Total net area of external elements Aum(A, m2)			115.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	27.4805		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 114.1250 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E5 Ground floor (normal)			36.0000	0.1600	5.7600	
E6 Intermediate floor within a dwelling			36.0000	0.0000	0.0000	
E18 Party wall between dwellings			10.0000	0.0600	0.6000	
E2 Other lintels (including other steel lintels)			8.3500	0.0500	0.4175	
E3 Sill			5.5600	0.0500	0.2780	
E4 Jamb			20.4000	0.0500	1.0200	
E10 Eaves (insulation at ceiling level)			11.0000	0.0600	0.6600	
E12 Gable (insulation at ceiling level)			11.0000	0.0600	0.6600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 36.8760 (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	
	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Heat transfer coeff	76.0774	75.8366	75.6005	74.4919	74.2844	73.3188	73.3188	73.1400	73.6908	74.2844	74.7041	75.1428	(39)
Average = Sum(39)m / 12 =												74.4909	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9510	0.9480	0.9450	0.9311	0.9286	0.9165	0.9165	0.9142	0.9211	0.9286	0.9338	0.9393	(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 2.4629 (42)

Hot water usage for mixer showers 65.5138 64.5292 63.0946 60.3496 58.3238 56.0648 54.7807 56.2045 57.7653 60.1909 62.9948 65.2628 (42a)

Hot water usage for baths 28.2963 27.8761 27.2843 26.1931 25.3761 24.4701 23.9808 24.5684 25.2083 26.1777 27.2913 28.2006 (42b)

Hot water usage for other uses 39.8522 38.4030 36.9538 35.5047 34.0555 32.6063 32.6063 34.0555 35.5047 36.9538 38.4030 39.8522 (42c)

Average daily hot water use (litres/day) 122.8659 (43)

Daily hot water use

Energy conte 133.6623 130.8083 127.3327 122.0474 117.7554 113.1412 111.3678 114.8284 118.4782 123.3223 128.6891 133.3156 (44)

Energy content (annual) 211.6883 186.2693 195.7056 167.0767 158.5214 139.1203 134.6897 142.1816 146.0955 167.3473 183.3412 208.7400 (45)

Distribution loss (46)m = 0.15 x (45)m 2040.7768

Water storage loss: 31.7533 27.9404 29.3558 25.0615 23.7782 20.8680 20.2035 21.3272 21.9143 25.1021 27.5012 31.3110 (46)

Store volume 300.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)

If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (57)

Primary loss 23.2624 21.0112 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 22.5120 23.2624 23.2624 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month 270.3171 239.2243 254.3344 223.8143 217.1502 195.8579 193.3185 200.8104 202.8330 225.9761 240.0788 267.3688 (62)

WWHRS -29.9502 -26.4882 -27.7369 -22.9672 -21.4046 -18.3161 -17.1684 -18.2569 -18.9505 -22.3406 -25.3092 -29.3955 (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 240.3670 212.7362 226.5975 200.8471 195.7456 177.5418 176.1501 182.5535 183.8825 203.6355 214.7696 237.9733 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 2452.7993 (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 117.2894 104.2986 111.9752 100.9431 99.6114 91.6476 91.6874 94.1784 93.9668 102.5460 106.3510 116.3091 (65)

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

Metabolic gains (Table 5), Watts

(66)m 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 123.1431 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 117.0021 129.5381 117.0021 120.9022 117.0021 120.9022 117.0021 117.0021 120.9022 117.0021 120.9022 117.0021 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 219.4405 221.7177 215.9794 203.7634 188.3429 173.8497 164.1674 161.8903 167.6286 179.8446 195.2651 209.7582 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 35.3143 (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) -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 -98.5144 (71)

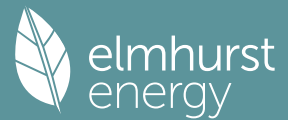
Water heating gains (Table 5) 157.6471 155.2062 150.5042 140.1987 133.8863 127.2883 123.2357 126.5839 130.5094 137.8307 147.7097 156.3294 (72)

Total internal gains 557.0327 569.4049 546.4287 527.8072 502.1742 481.9831 464.3482 465.4193 478.9831 497.6203 526.8200 546.0327 (73)

6. Solar gains

[Jan] Area Solar flux g FF Access Gains

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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	8.5000		11.2829		0.6300		0.7000		0.7700		29.3098 (75)	
Southwest	3.5000		36.7938		0.6300		0.7000		0.7700		39.3564 (79)	
Solar gains	68.6662	126.6994	199.2150	290.1812	364.5897	379.3555	358.4971	300.3246	230.2971	147.0022	84.0192	57.6167 (83)
Total gains	625.6988	696.1043	745.6437	817.9885	866.7640	861.3386	822.8453	765.7438	709.2802	644.6225	610.8391	603.6494 (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	33.3359	33.4418	33.5462	34.0455	34.1405	34.5902	34.5902	34.6748	34.4156	34.1405	33.9488	33.7506
alpha	3.2224	3.2295	3.2364	3.2697	3.2760	3.3060	3.3060	3.3117	3.2944	3.2760	3.2633	3.2500
util living area	0.9455	0.9228	0.8858	0.8015	0.6731	0.5089	0.3811	0.4227	0.6277	0.8302	0.9186	0.9504 (86)
MIT	19.2967	19.5469	19.9046	20.3793	20.7285	20.9214	20.9771	20.9676	20.8397	20.3998	19.7956	19.2653 (87)
Th 2	20.1244	20.1269	20.1294	20.1411	20.1433	20.1535	20.1535	20.1554	20.1496	20.1433	20.1389	20.1342 (88)
util rest of house	0.9378	0.9122	0.8699	0.7747	0.6311	0.4509	0.3118	0.3509	0.5700	0.8012	0.9058	0.9434 (89)
MIT 2	18.1377	18.4519	18.8980	19.4809	19.8832	20.0923	20.1405	20.1359	20.0145	19.5189	18.7763	18.1048 (90)
Living area fraction	18.3985	18.6983	19.1245	19.6830	20.0734	20.2789	20.3287	20.3230	FLA = Living area / (4) =			0.2250 (91)
MIT	18.3985	18.6983	19.1245	19.6830	20.0734	20.2789	20.3287	20.3230	20.2002	19.7171	19.0056	18.3659 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3985	18.6983	19.1245	19.6830	20.0734	20.2789	20.3287	20.3230	20.2002	19.7171	19.0056	18.3659 (93)
8. Space heating requirement												
Utilisation	0.9182	0.8908	0.8483	0.7588	0.6275	0.4598	0.3264	0.3655	0.5736	0.7847	0.8849	0.9247 (94)
Useful gains	574.5354	620.0671	632.5242	620.6742	543.8724	396.0290	268.5633	279.8776	406.8656	505.8294	540.5266	558.2153 (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	1072.5754	1046.4144	954.4193	803.2475	622.0120	416.3691	273.3840	286.9316	449.5296	677.2584	889.3989	1064.4657 (97)
Space heating kWh	370.5418	286.5054	239.4900	131.4528	58.1358	0.0000	0.0000	0.0000	0.0000	127.5431	251.1881	376.6503 (98a)
Space heating requirement - total per year (kWh/year)												1841.5072
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	370.5418	286.5054	239.4900	131.4528	58.1358	0.0000	0.0000	0.0000	0.0000	127.5431	251.1881	376.6503 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1841.5072
Space heating per m2										(98c) / (4) =		23.0188 (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	370.5418	286.5054	239.4900	131.4528	58.1358	0.0000	0.0000	0.0000	0.0000	127.5431	251.1881	376.6503 (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)	401.4537	310.4067	259.4691	142.4191	62.9857	0.0000	0.0000	0.0000	0.0000	138.1832	272.1431	408.0718 (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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Efficiency of water heater (217)m	85.0269	84.7281	84.1841	83.1331	81.6960	79.8000	79.8000	79.8000	79.8000	83.0413	84.4120	79.8000 (216)
Fuel for water heating, kWh/month	282.6951	251.0810	269.1690	241.5971	239.6024	222.4834	220.7394	228.7638	230.4292	245.2219	254.4302	279.6903 (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	24.3107	19.5030	17.5603	12.8654	9.9376	8.1191	9.0654	11.7836	15.3057	20.0819	22.6825	24.9864 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2965	-52.5113	-75.3782	-84.6319	-91.1550	-85.0423	-83.9902	-79.3452	-71.1260	-59.9917	-40.9785	-32.2532 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2713	-44.7305	-88.8775	-133.4493	-176.4188	-177.2510	-175.1653	-148.3260	-108.7373	-63.9553	-28.3957	-16.8220 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1995.1324 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	79.8000	
Water heating fuel used	2965.9028	(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)	196.2015	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3266.1365	(238)

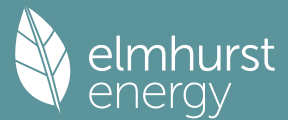
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1995.1324	0.2100	418.9778 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2965.9028	0.2100	622.8396 (264)
Space and water heating			1041.8174 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	196.2015	0.1443	28.3179 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	0.1346	-106.8447
PV Unit electricity exported	-1183.4002	0.1259	-148.9952
Total			-255.8399 (269)
Total CO2, kg/year			826.2246 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3300 (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	1995.1324	1.1300	2254.4997 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2965.9028	1.1300	3351.4701 (278)
Space and water heating			5605.9698 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	196.2015	1.5338	300.9405 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.7000	1.4975	-1188.5815
PV Unit electricity exported	-1183.4002	0.4622	-546.9153
Total			-1735.4967 (283)
Total Primary energy kWh/year			4301.5143 (286)
Target Primary Energy Rate (TPER)			53.7700 (287)

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Property Reference	House Type 2			Issued on Date	24/10/2025
Assessment Reference	Plot 7	Prop Type Ref			
Property					
SAP Rating	83 B	DER	4.11	TER	10.99
Environmental	97 A	% DER < TER			62.60
CO ₂ Emissions (t/year)	0.3	DFEE	28.13	TFEE	33.80
Compliance Check	See BREL	% DFEE < TFEE			16.79
% DPER < TPER	24.07	DPER	43.46	TPER	57.24
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

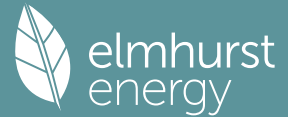
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			17.0000	1.3258	22.5379		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	17.0000	53.0000	0.2000	10.6000	190.0000	10070.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.3379		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	14830.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							185.3750 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill					5.5600		0.0190		0.1056			
E4 Jamb					20.4000		0.0150		0.3060			
E10 Eaves (insulation at ceiling level)					11.0000		0.0520		0.5720			
E12 Gable (insulation at ceiling level)					11.0000		0.0450		0.4950			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											3.9389	(36)
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	46.2768	(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
	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Heat transfer coeff	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768	79.2768 (39)
Average = Sum(39)m / 12 =											79.2768	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910	0.9910 (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												2.4629 (42)
Hot water usage for mixer showers												
	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010 (42a)
Hot water usage for baths												
	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436 (42b)
Hot water usage for other uses												
	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522 (42c)
Average daily hot water use (litres/day)												120.7544 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967 (44)
Energy content (annual)												
	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1885.5698
	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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												
	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (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												
	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2514.2458 (64)
Electric shower(s)												2514 (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												
	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278 (65)

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

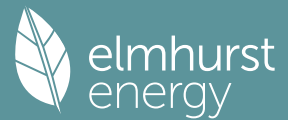
Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	110.9000	122.7822	110.9000	114.5967	110.9000	114.5967	110.9000	110.9000	114.5967	110.9000	114.5967	110.9000 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)												
	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857 (72)
Total internal gains												
	534.1328	546.0070	524.0940	508.4013	483.5491	465.0431	445.7045	449.5507	461.8319	478.0738	506.4575	524.1869 (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											
Northeast	8.5000											56.1236 (75)
Southwest	8.5000											183.0199 (79)
Solar gains	239.1435	425.9918	632.3771	866.5430	1046.3564	1072.1122	1019.7633	880.5200	712.6669	484.1626	289.8337	202.4602 (83)
Total gains	773.2762	971.9988	1156.4711	1374.9444	1529.9055	1537.1553	1465.4678	1330.0707	1174.4988	962.2365	796.2912	726.6472 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628	51.9628
alpha	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642	4.4642
util living area	0.9602	0.9087	0.8145	0.6485	0.4721	0.3285	0.2377	0.2736	0.4574	0.7489	0.9217
											0.9685 (86)
Living	20.1686	20.4155	20.6587	20.8421	20.9111	20.9276	20.9301	20.9296	20.9179	20.7946	20.4483
Non living	19.1346	19.4357	19.7205	19.9196	19.9865	20.0001	20.0018	20.0015	19.9936	19.8775	19.4814
24 / 16	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	10
MIT	20.5747	20.4155	20.6587	20.8421	20.9111	20.9276	20.9301	20.9296	20.9179	20.7946	20.4483
Th 2	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909	20.0909
util rest of house	0.9520	0.8926	0.7870	0.6096	0.4288	0.2825	0.1888	0.2198	0.4001	0.7050	0.9047
MIT 2	19.7097	19.4357	19.7205	19.9196	19.9865	20.0001	20.0018	20.0015	19.9936	19.8775	19.4814
Living area fraction									fLA = Living area / (4) =		
MIT	19.9043	19.6561	19.9316	20.1272	20.1945	20.2088	20.2106	20.2104	20.2015	20.0838	19.6990
Temperature adjustment											0.0000
adjusted MIT	19.9043	19.6561	19.9316	20.1272	20.1945	20.2088	20.2106	20.2104	20.2015	20.0838	19.6990
											19.4668 (93)

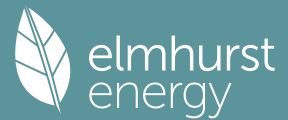
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9502	0.8838	0.7817	0.6112	0.4338	0.2885	0.1952	0.2269	0.4072	0.7046	0.8962	0.9563 (94)
Useful gains	734.7292	859.0717	904.0640	840.3973	663.6377	443.4002	286.0832	301.7607	478.2450	678.0352	713.6074	694.9205 (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	1237.0579	1169.8180	1064.8124	890.0530	673.4174	444.6457	286.2403	302.0730	483.7101	751.8470	998.8069	1210.3048 (97)
Space heating kWh	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98a)
Space heating requirement - total per year (kWh/year)												1388.8846
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	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1388.8846
Space heating per m2										(98c) / (4) =		17.3611 (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 %)												236.1225 (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	373.7326	208.8215	119.5968	35.7521	7.2761	0.0000	0.0000	0.0000	0.0000	54.9160	205.3436	383.4460 (98)
Space heating efficiency (main heating system 1)	236.1225	236.1225	236.1225	236.1225	236.1225	0.0000	0.0000	0.0000	0.0000	236.1225	236.1225	236.1225 (210)
Space heating fuel (main heating system)	158.2791	88.4378	50.6503	15.1413	3.0815	0.0000	0.0000	0.0000	0.0000	23.2574	86.9649	162.3928 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337	179.2337 (216)
Fuel for water heating, kWh/month	137.6990	121.7967	129.4874	116.6439	113.3722	100.4008	96.3073	103.9518	104.0373	117.1462	124.5627	137.3700 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Lighting	29.1874	23.4152	21.0828	15.4461	11.9310	9.7478	10.8839	14.1473	18.3760	24.1102	27.2325	29.9986 (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												588.2052 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2337
Water heating fuel used												1402.7753 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)
Electricity for lighting (calculated in Appendix L)												235.5587 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2259.3178 (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	588.2052	0.1582	93.0358 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1402.7753	0.1409	197.5947 (264)
Space and water heating			290.6305 (265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468 (267)
Energy for lighting	235.5587	0.1443	33.9984 (268)
Total CO2, kg/year			329.1756 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1100 (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	588.2052	1.5854	932.5612 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1402.7753	1.5208	2133.4047 (278)
Space and water heating			3065.9659 (279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874 (281)
Energy for lighting	235.5587	1.5338	361.3078 (282)
Total Primary energy kWh/year			3476.8611 (286)
Dwelling Primary energy Rate (DPER)			43.4600 (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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

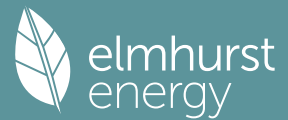
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1500 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4000 (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) = 0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995 (22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798 (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							

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TER Opening Type			17.0000	1.1450	19.4656	(27)
Heatloss Floor 1			40.0000	0.1300	5.2000	(28a)
External Wall 1	70.0000	17.0000	53.0000	0.1800	9.5400	(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	(30)
Total net area of external elements Aum(A, m2)			150.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	38.6056		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 185.3750 (35)

List of Thermal Bridges												
K1 Element												
E5 Ground floor (normal)												
E6 Intermediate floor within a dwelling												
E18 Party wall between dwellings												
E2 Other lintels (including other steel lintels)												
E3 Sill												
E4 Jamb												
E10 Eaves (insulation at ceiling level)												
E12 Gable (insulation at ceiling level)												

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 48.0011 (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
	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668

Heat transfer coeff 87.2026 86.9618 86.7257 85.6171 85.4096 84.4440 84.4440 84.2652 84.8159 85.4096 85.8293 86.2680 (39)

Average = Sum(39)m / 12 = 85.6161

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0900	1.0870	1.0841	1.0702	1.0676	1.0556	1.0556	1.0533	1.0602	1.0676	1.0729	1.0783 (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													2.4629 (42)
Hot water usage for mixer showers													
65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)	
Hot water usage for baths													
28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)	
Hot water usage for other uses													
39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)													122.8659 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156 (44)
Energy conte	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	31.3110 (46)

Water storage loss:

Store volume 300.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(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													
	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	(62)
WWHRS	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(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													
	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)

Heat gains from water heating, kWh/month	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091 (65)
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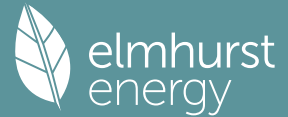
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.9000	122.7822	110.9000	114.5967	110.9000	114.5967	110.9000	110.9000	114.5967	110.9000	114.5967	110.9000 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144 (71)
Water heating gains (Table 5)	157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294 (72)
Total internal gains	550.9306	562.6490	540.3266	521.5017	496.0721	475.6776	458.2461	459.3172	472.6776	491.5182	520.5144	539.9306 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	8.5000		11.2829		0.6300		0.7000		0.7700		29.3098	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	124.8895	222.4686	330.2506	452.5407	546.4459	559.8965	532.5579	459.8400	372.1809	252.8476	151.3618	105.7322	(83)
Total gains	675.8201	785.1176	870.5772	974.0424	1042.5180	1035.5741	990.8040	919.1572	844.8585	744.3657	671.8763	645.6628	(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	47.2399	47.3707	47.4997	48.1148	48.2316	48.7831	48.7831	48.8867	48.5692	48.2316	47.9958	47.7517	
alpha	4.1493	4.1580	4.1666	4.2077	4.2154	4.2522	4.2522	4.2591	4.2379	4.2154	4.1997	4.1834	
util living area	0.9774	0.9582	0.9218	0.8320	0.6858	0.5056	0.3714	0.4155	0.6401	0.8723	0.9587	0.9809	(86)
MIT	19.6412	19.8932	20.2220	20.6131	20.8639	20.9710	20.9938	20.9901	20.9236	20.5898	20.0590	19.6029	(87)
Th 2	20.0090	20.0114	20.0139	20.0252	20.0274	20.0373	20.0373	20.0391	20.0335	20.0274	20.0231	20.0186	(88)
util rest of house	0.9723	0.9492	0.9050	0.7988	0.6322	0.4355	0.2918	0.3315	0.5670	0.8386	0.9482	0.9765	(89)
MIT 2	18.4472	18.7640	19.1711	19.6413	19.9124	20.0193	20.0348	20.0349	19.9800	19.6288	18.9844	18.4056	(90)
Living area fraction	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(91)
MIT	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7158	19.0181	19.4076	19.8600	20.1265	20.2334	20.2506	20.2498	20.1923	19.8450	19.2262	18.6750	(93)

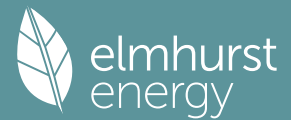
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9633	0.9376	0.8928	0.7926	0.6379	0.4501	0.3096	0.3502	0.5796	0.8313	0.9371	0.9684	(94)
Useful gains	651.0120	736.1306	777.2172	772.0304	665.0581	466.1362	306.7863	321.9104	489.6824	618.8124	629.6408	625.2471	(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	1257.0983	1227.7316	1119.4180	938.3602	719.7029	475.7091	308.2720	324.4076	516.7219	789.6138	1040.7823	1248.7260	(97)
Space heating kWh	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(98a)
Space heating requirement - total per year (kWh/year)												2083.2611	
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	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2083.2611	
Space heating per m2										(98c) / (4) =		26.0408	(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	450.9282	330.3559	254.5974	119.7575	40.6557	0.0000	0.0000	0.0000	0.0000	127.0762	296.0219	463.8683	(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)	488.5463	357.9154	275.8368	129.7481	44.0473	0.0000	0.0000	0.0000	0.0000	137.6774	320.7171	502.5659	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)	
Efficiency of water heater	85.4491	85.0430	84.3217	82.9400	81.2156	79.8000	79.8000	79.8000	79.8000	83.0337	84.7797	79.8000	(216)	
Fuel for water heating, kWh/month	281.2984	250.1514	268.7297	242.1595	241.0197	222.4834	220.7394	228.7638	230.4292	245.2444	253.3267	278.2360	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	23.0428	18.4858	16.6444	12.1944	9.4193	7.6957	8.5926	11.1690	14.5074	19.0346	21.4995	23.6833	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2592	-52.4475	-75.2806	-84.5244	-91.0484	-84.9475	-83.8844	-79.2237	-71.0032	-59.8963	-40.9275	-32.2212	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-21.3087	-44.7943	-88.9750	-133.5568	-176.5254	-177.3457	-175.2711	-148.4476	-108.8602	-64.0508	-28.4467	-16.8540	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2257.0543	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	2962.5815	(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)	185.9689	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3514.5045	(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	2257.0543	0.2100	473.9814 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2962.5815	0.2100	622.1421 (264)
Space and water heating			1096.1235 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	185.9689	0.1443	26.8411 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6639	0.1346	-106.7065
PV Unit electricity exported	-1184.4363	0.1259	-149.1346
Total			-255.8411 (269)
Total CO2, kg/year			879.0528 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.9900 (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	2257.0543	1.1300	2550.4714 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2962.5815	1.1300	3347.7171 (278)
Space and water heating			5898.1885 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	185.9689	1.5338	285.2453 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-792.6639	1.4975	-1187.0344
PV Unit electricity exported	-1184.4363	0.4622	-547.4273
Total			-1734.4617 (283)
Total Primary energy kWh/year			4579.0729 (286)
Target Primary Energy Rate (TPER)			57.2400 (287)

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Property Reference	North Block			Issued on Date	24/10/2025
Assessment Reference	Plot 8	Prop Type Ref			
Property					
SAP Rating	83 B	DER	5.44	TER	17.07
Environmental	97 A	% DER < TER			68.13
CO ₂ Emissions (t/year)	0.21	DFEE	27.02	TFEE	42.18
Compliance Check	See BREL	% DFEE < TFEE			35.94
% DPER < TPER	35.80	DPER	58.08	TPER	90.46
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(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) =	0.1487 (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	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

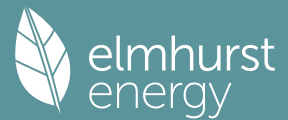
3. Heat losses and heat loss parameter

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							
Opening Type 1			4.6000	1.3258	6.0985		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998 (29a)
Total net area of external elements Aum(A, m ²)			90.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0985		(33)
Main dwelling							
Party Ceiling 1			40.0000			20.0000	800.0000 (32b)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13939.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							348.5000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

elmhurst
energy

7. Mean internal temperature (heating season)	
Temperature during heating periods in the living area from Table 9, T_{hi} (°C)	21.0000 (85)

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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	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988
alpha	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666
util living area	0.9854	0.9620	0.9062	0.7645	0.5768	0.4029	0.2894	0.3208	0.5137	0.8119	0.9599	0.9889 (86)
Living	20.6144	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.5857
Non living	19.6902	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.6546
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.8027	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.6436 (87)
Th 2	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220 (88)
util rest of house	0.9799	0.9493	0.8797	0.7190	0.5239	0.3477	0.2317	0.2596	0.4491	0.7605	0.9442	0.9846 (89)
MIT 2	19.9499	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.7388 (90)
Living area fraction									FLA = Living area / (4) =			0.7000 (91)
MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9828	0.9545	0.8941	0.7476	0.5582	0.3836	0.2693	0.2994	0.4911	0.7928	0.9515	0.9860 (94)
Useful gains	416.6935	461.9723	471.1630	433.2993	341.2739	232.3654	156.1503	163.7744	250.9743	363.9720	401.6343	402.2095 (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	619.8256	593.4539	536.9936	448.8667	342.9757	232.4496	156.1546	163.7842	251.4939	383.7194	511.0465	616.9763 (97)
Space heating kWh	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98a)
Space heating requirement - total per year (kWh/year)												554.1939
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	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												554.1939
Space heating per m2										(98c) / (4) =		13.8548 (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 %)												263.3026 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98)
Space heating efficiency (main heating system 1)	263.3026	263.3026	263.3026	263.3026	263.3026	0.0000	0.0000	0.0000	0.0000	263.3026	263.3026	263.3026 (210)
Space heating fuel (main heating system)	57.3980	33.5567	18.6014	4.2569	0.4809	0.0000	0.0000	0.0000	0.0000	5.5799	29.9187	60.6855 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258 (216)
Fuel for water heating, kWh/month	112.3397	99.5228	106.1390	96.1699	93.9683	83.9022	81.0788	86.8524	86.6474	96.8172	102.1495	112.0912 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												210.4780 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.1258
Water heating fuel used												1157.6783 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1517.7337 (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	210.4780	0.1587	33.4115 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1157.6783	0.1407	162.8594 (264)
Space and water heating			196.2709 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			217.7748 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.4400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	210.4780	1.5876	334.1476 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1157.6783	1.5202	1759.8596 (278)
Space and water heating			2094.0072 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2323.1168 (286)
Dwelling Primary energy Rate (DPER)			58.0800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
Heatloss Floor 1			40.0000	0.1300	5.2000		(28a)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 18.7472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 358.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 29.3427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
Heat transfer coeff 48.4175 48.2663 48.1180 47.4217 47.2915 46.6850 46.6850 46.5727 46.9186 47.2915 47.5550 47.8305 (39)
Average = Sum(39)m / 12 = 47.4211

HLP Jan 1.2104 Feb 1.2067 Mar 1.2030 Apr 1.1855 May 1.1823 Jun 1.1671 Jul 1.1671 Aug 1.1643 Sep 1.1730 Oct 1.1823 Nov 1.1889 Dec 1.1958 (40)
HLP (average) 1.1855
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)
Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)
Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)
Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)
Average daily hot water use (litres/day) 89.6342 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 97.5097 95.4285 92.8936 89.0378 85.9070 82.5410 81.2465 83.7705 86.4325 89.9664 93.8817 97.2566 (44)
Energy content (annual) 154.4315 135.8890 142.7740 121.8882 115.6473 101.4938 98.2606 103.7254 106.5799 122.0835 133.7517 152.2804 (45)
Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1488.8053
Water storage loss: 23.1647 20.3833 21.4161 18.2832 17.3471 15.2241 14.7391 15.5588 15.9870 18.3125 20.0627 22.8421 (46)
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)
If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 213.0603 188.8440 201.4028 178.6258 174.2761 158.2313 156.8894 162.3542 163.3175 180.7123 190.4892 210.9092 (62)
WWHRS -21.8517 -19.3258 -20.2369 -16.7570 -15.6169 -13.3635 -12.5261 -13.3203 -13.8264 -16.2998 -18.4657 -21.4471 (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 191.2086 169.5182 181.1659 161.8688 158.6592 144.8678 144.3633 149.0339 149.4911 164.4126 172.0236 189.4622 (64)
Total per year (kWh/year) = Sum(64)m = 1976.0753 (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 98.2515 87.5471 94.3754 85.9179 85.3558 79.1367 79.5747 81.3917 80.8279 87.4958 89.8625 97.5363 (65)

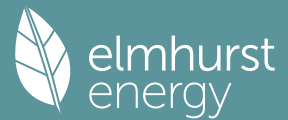
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(66)m 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 68.6826 76.0415 68.6826 70.9720 68.6826 70.9720 68.6826 68.6826 70.9720 68.6826 70.9720 68.6826 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 121.5334 122.7946 119.6165 112.8509 104.3105 96.2837 90.9213 89.6602 92.8382 99.6039 108.1443 116.1710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 (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) -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 (71)
Water heating gains (Table 5) 132.0585 130.2785 126.8487 119.3304 114.7255 109.9121 106.9552 109.3975 112.2609 117.6019 124.8090 131.0972 (72)
Total internal gains 369.3696 376.2095 362.2429 350.2484 334.8137 321.2629 310.6542 311.8354 320.1663 332.9834 351.0203 363.0459 (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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	82.2705	82.5283	82.7825	83.9981	84.2295	85.3236	85.3236	85.5294	84.8988	84.2295	83.7627	83.2801
alpha	6.4847	6.5019	6.5188	6.5999	6.6153	6.6882	6.6882	6.7020	6.6599	6.6153	6.5842	6.5520
util living area	0.9943	0.9891	0.9775	0.9344	0.8224	0.6186	0.4484	0.4858	0.7282	0.9366	0.9862	0.9952 (86)
MIT	20.1977	20.3231	20.5002	20.7442	20.9190	20.9897	20.9989	20.9982	20.9713	20.7768	20.4606	20.1835 (87)
Th 2	19.9117	19.9147	19.9176	19.9316	19.9342	19.9464	19.9464	19.9487	19.9417	19.9342	19.9289	19.9234 (88)
util rest of house	0.9918	0.9843	0.9673	0.9055	0.7570	0.5224	0.3418	0.3760	0.6324	0.9028	0.9792	0.9931 (89)
MIT 2	19.0134	19.1739	19.3968	19.6973	19.8779	19.9423	19.9462	19.9483	19.9278	19.7414	19.3594	19.0046 (90)
Living area fraction	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (91)
MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9846	0.9700	0.9203	0.8000	0.5897	0.4165	0.4530	0.6989	0.9214	0.9807	0.9929 (94)
Useful gains	402.0762	433.2878	442.0144	438.2338	388.1586	279.9177	190.2981	198.9309	296.8824	373.3435	387.1122	390.8854 (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	752.5243	727.7754	657.7341	546.7782	421.2084	283.6343	190.6197	199.4816	307.7045	466.5873	619.6545	747.5832 (97)
Space heating kWh	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98a)
Space heating requirement - total per year (kWh/year)												1224.0525
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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1224.0525
Space heating per m2										(98c) / (4) =		30.6013 (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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (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)	282.4847	214.4049	173.8845	84.6716	26.6404	0.0000	0.0000	0.0000	0.0000	75.1608	181.3980	287.5224 (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												
	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.7558	84.4078	83.7892	82.5233	80.9002	79.8000	79.8000	79.8000	79.8000	82.2744	83.9991	79.8000 (216)
Fuel for water heating, kWh/month	225.5995	200.8324	216.2164	196.1492	196.1172	181.5386	180.9064	186.7593	187.3323	199.8344	204.7921	223.3815 (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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1326.1674 (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												2399.4592 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2938.2508 (238)

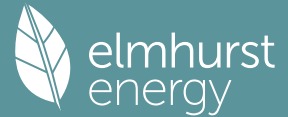
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1326.1674	0.2100	278.4952 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4592	0.2100	503.8864 (264)
Space and water heating			782.3816 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			682.9408 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.0700 (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	1326.1674	1.1300	1498.5692 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4592	1.1300	2711.3889 (278)
Space and water heating			4209.9581 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3618.4935 (286)
Target Primary Energy Rate (TPER)			90.4600 (287)

Full SAP Calculation Printout



Property Reference	North Block				Issued on Date	24/10/2025
Assessment Reference	Plot 9		Prop Type Ref			
Property						
SAP Rating	83 B	DER	5.44	TER	17.07	
Environmental	97 A	% DER < TER				68.13
CO ₂ Emissions (t/year)	0.21	DFEE	27.02	TFEE	42.18	
Compliance Check	See BREL	% DFEE < TFEE				35.94
% DPER < TPER	35.80	DPER	58.08	TPER	90.46	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b)	- (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)	

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	2	(19)

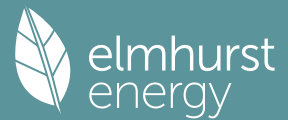
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748	(22b)
Mechanical extract ventilation - decentralised													
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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								
Opening Type 1			4.6000	1.3258	6.0985			(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000	(28a)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998	(29a)
Total net area of external elements Aum(A, m ²)			90.6000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0985			(33)
Main dwelling								
Party Ceiling 1			40.0000			20.0000	800.0000	(32b)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13939.9998	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							348.5000	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E5 Ground floor (normal)				36.0000	0.0540	1.9440		
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360		
E18 Party wall between dwellings				10.0000	0.0330	0.3300		
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503		

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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	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988
alpha	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666
util living area	0.9854	0.9620	0.9062	0.7645	0.5768	0.4029	0.2894	0.3208	0.5137	0.8119	0.9599	0.9889 (86)
Living	20.6144	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.5857
Non living	19.6902	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.6546
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.8027	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.6436 (87)
Th 2	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220 (88)
util rest of house	0.9799	0.9493	0.8797	0.7190	0.5239	0.3477	0.2317	0.2596	0.4491	0.7605	0.9442	0.9846 (89)
MIT 2	19.9499	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.7388 (90)
Living area fraction									FLA = Living area / (4) =			0.7000 (91)
MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9828	0.9545	0.8941	0.7476	0.5582	0.3836	0.2693	0.2994	0.4911	0.7928	0.9515	0.9860 (94)
Useful gains	416.6935	461.9723	471.1630	433.2993	341.2739	232.3654	156.1503	163.7744	250.9743	363.9720	401.6343	402.2095 (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	619.8256	593.4539	536.9936	448.8667	342.9757	232.4496	156.1546	163.7842	251.4939	383.7194	511.0465	616.9763 (97)
Space heating kWh	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98a)
Space heating requirement - total per year (kWh/year)												554.1939
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	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												554.1939
Space heating per m2										(98c) / (4) =		13.8548 (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 %)												263.3026 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98)
Space heating efficiency (main heating system 1)	263.3026	263.3026	263.3026	263.3026	263.3026	0.0000	0.0000	0.0000	0.0000	263.3026	263.3026	263.3026 (210)
Space heating fuel (main heating system)	57.3980	33.5567	18.6014	4.2569	0.4809	0.0000	0.0000	0.0000	0.0000	5.5799	29.9187	60.6855 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258 (216)
Fuel for water heating, kWh/month	112.3397	99.5228	106.1390	96.1699	93.9683	83.9022	81.0788	86.8524	86.6474	96.8172	102.1495	112.0912 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												210.4780 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.1258
Water heating fuel used												1157.6783 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1517.7337 (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	210.4780	0.1587	33.4115 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1157.6783	0.1407	162.8594 (264)
Space and water heating			196.2709 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			217.7748 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.4400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	210.4780	1.5876	334.1476 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1157.6783	1.5202	1759.8596 (278)
Space and water heating			2094.0072 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2323.1168 (286)
Dwelling Primary energy Rate (DPER)			58.0800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
Heatloss Floor 1			40.0000	0.1300	5.2000		(28a)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 18.7472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 358.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 29.3427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
Heat transfer coeff 48.4175 48.2663 48.1180 47.4217 47.2915 46.6850 46.6850 46.5727 46.9186 47.2915 47.5550 47.8305 (39)
Average = Sum(39)m / 12 = 47.4211

HLP Jan 1.2104 Feb 1.2067 Mar 1.2030 Apr 1.1855 May 1.1823 Jun 1.1671 Jul 1.1671 Aug 1.1643 Sep 1.1730 Oct 1.1823 Nov 1.1889 Dec 1.1958 (40)
HLP (average) 1.1855
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)
Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)
Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)
Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)
Average daily hot water use (litres/day) 89.6342 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 97.5097 95.4285 92.8936 89.0378 85.9070 82.5410 81.2465 83.7705 86.4325 89.9664 93.8817 97.2566 (44)
Energy content (annual) 154.4315 135.8890 142.7740 121.8882 115.6473 101.4938 98.2606 103.7254 106.5799 122.0835 133.7517 152.2804 (45)
Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1488.8053
Water storage loss: 23.1647 20.3833 21.4161 18.2832 17.3471 15.2241 14.7391 15.5588 15.9870 18.3125 20.0627 22.8421 (46)
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)
If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 213.0603 188.8440 201.4028 178.6258 174.2761 158.2313 156.8894 162.3542 163.3175 180.7123 190.4892 210.9092 (62)
WWHRS -21.8517 -19.3258 -20.2369 -16.7570 -15.6169 -13.3635 -12.5261 -13.3203 -13.8264 -16.2998 -18.4657 -21.4471 (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 191.2086 169.5182 181.1659 161.8688 158.6592 144.8678 144.3633 149.0339 149.4911 164.4126 172.0236 189.4622 (64)
Total per year (kWh/year) = Sum(64)m = 1976.0753 (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 98.2515 87.5471 94.3754 85.9179 85.3558 79.1367 79.5747 81.3917 80.8279 87.4958 89.8625 97.5363 (65)

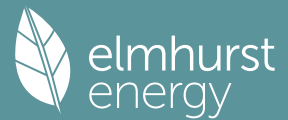
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(66)m 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 68.6826 76.0415 68.6826 70.9720 68.6826 70.9720 68.6826 68.6826 70.9720 68.6826 70.9720 68.6826 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 121.5334 122.7946 119.6165 112.8509 104.3105 96.2837 90.9213 89.6602 92.8382 99.6039 108.1443 116.1710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 (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) -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 (71)
Water heating gains (Table 5) 132.0585 130.2785 126.8487 119.3304 114.7255 109.9121 106.9552 109.3975 112.2609 117.6019 124.8090 131.0972 (72)
Total internal gains 369.3696 376.2095 362.2429 350.2484 334.8137 321.2629 310.6542 311.8354 320.1663 332.9834 351.0203 363.0459 (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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	82.2705	82.5283	82.7825	83.9981	84.2295	85.3236	85.3236	85.5294	84.8988	84.2295	83.7627	83.2801
alpha	6.4847	6.5019	6.5188	6.5999	6.6153	6.6882	6.6882	6.7020	6.6599	6.6153	6.5842	6.5520
util living area	0.9943	0.9891	0.9775	0.9344	0.8224	0.6186	0.4484	0.4858	0.7282	0.9366	0.9862	0.9952 (86)
MIT	20.1977	20.3231	20.5002	20.7442	20.9190	20.9897	20.9989	20.9982	20.9713	20.7768	20.4606	20.1835 (87)
Th 2	19.9117	19.9147	19.9176	19.9316	19.9342	19.9464	19.9464	19.9487	19.9417	19.9342	19.9289	19.9234 (88)
util rest of house	0.9918	0.9843	0.9673	0.9055	0.7570	0.5224	0.3418	0.3760	0.6324	0.9028	0.9792	0.9931 (89)
MIT 2	19.0134	19.1739	19.3968	19.6973	19.8779	19.9423	19.9462	19.9483	19.9278	19.7414	19.3594	19.0046 (90)
Living area fraction	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	fLA = Living area / (4) =	20.1303	0.7000 (91)
MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9846	0.9700	0.9203	0.8000	0.5897	0.4165	0.4530	0.6989	0.9214	0.9807	0.9929 (94)
Useful gains	402.0762	433.2878	442.0144	438.2338	388.1586	279.9177	190.2981	198.9309	296.8824	373.3435	387.1122	390.8854 (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	752.5243	727.7754	657.7341	546.7782	421.2084	283.6343	190.6197	199.4816	307.7045	466.5873	619.6545	747.5832 (97)
Space heating kWh	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98a)
Space heating requirement - total per year (kWh/year)												1224.0525
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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1224.0525
Space heating per m2										(98c) / (4) =		30.6013 (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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (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)	282.4847	214.4049	173.8845	84.6716	26.6404	0.0000	0.0000	0.0000	0.0000	75.1608	181.3980	287.5224 (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												
	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.7558	84.4078	83.7892	82.5233	80.9002	79.8000	79.8000	79.8000	79.8000	82.2744	83.9991	79.8000 (216)
Fuel for water heating, kWh/month	225.5995	200.8324	216.2164	196.1492	196.1172	181.5386	180.9064	186.7593	187.3323	199.8344	204.7921	223.3815 (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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1326.1674 (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												2399.4592 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

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Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2938.2508 (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	1326.1674	0.2100	278.4952 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4592	0.2100	503.8864 (264)
Space and water heating			782.3816 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			682.9408 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.0700 (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	1326.1674	1.1300	1498.5692 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4592	1.1300	2711.3889 (278)
Space and water heating			4209.9581 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3618.4935 (286)
Target Primary Energy Rate (TPER)			90.4600 (287)

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Property Reference	North Block			Issued on Date	24/10/2025
Assessment Reference	Plot 10	Prop Type Ref			
Property					
SAP Rating	83 B	DER	5.44	TER	17.07
Environmental	97 A	% DER < TER			68.13
CO ₂ Emissions (t/year)	0.21	DFEE	27.02	TFEE	42.18
Compliance Check	See BREL	% DFEE < TFEE			35.94
% DPER < TPER	35.80	DPER	58.08	TPER	90.46
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	2	(19)

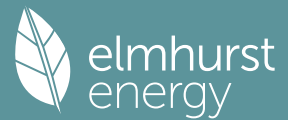
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487 (21)

	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	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			4.6000	1.3258	6.0985		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998 (29a)
Total net area of external elements Aum(A, m ²)			90.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.0985		(33)
Main dwelling							
Party Ceiling 1			40.0000			20.0000	800.0000 (32b)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13939.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							348.5000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill													
E4 Jamb													
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													
Point Thermal bridges													
Total fabric heat loss													
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	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	15.1800	(38)
Average = Sum(39)m / 12 =	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	38.1504	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	0.9538	(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												1.4063 (42)	
Hot water usage for mixer showers													
46.5914	45.8781	44.8269	43.2097	41.7608	39.7338	38.1305	40.0048	40.9475	42.9552	45.0460	46.5494	(42a)	
Hot water usage for baths													
20.2174	19.9122	19.4780	18.8278	18.2419	17.4352	16.8232	17.5716	17.9643	18.7636	19.5946	20.2014	(42b)	
Hot water usage for other uses													
29.0323	27.9766	26.9208	25.8651	24.8094	23.7537	23.7537	24.8094	25.8651	26.9208	27.9766	29.0323	(42c)	
Average daily hot water use (litres/day)												88.0930 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	95.8411	93.7669	91.2258	87.9027	84.8121	80.9227	78.7074	82.3858	84.7769	88.6396	92.6172	95.7830	(44)
Energy content	141.0946	124.0725	130.3597	114.8229	109.2889	93.5844	86.9740	96.9696	98.3370	114.2211	125.1752	140.6644	(45)
Energy content (annual)	Total = Sum(45)m =											1375.5644	
Distribution loss (46)m = 0.15 x (45)m													
21.1642	18.6109	19.5540	17.2234	16.3933	14.0377	13.0461	14.5454	14.7506	17.1332	18.7763	21.0997	(46)	
Water storage loss:													
Store volume												300.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.9720 (55)	
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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													
	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588	(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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588	(64)
Total per year (kWh/year) = Sum(64)m =												2004.2404 (64)	
12Total per year (kWh/year)												2004 (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													
	89.6295	79.8359	86.0601	79.5162	79.0541	72.4544	71.6344	74.9579	74.0347	80.6940	82.9584	89.4864	(65)

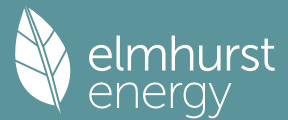
5. Internal gains (see Table 5 and 5a)												

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	68.6826	76.0415	68.6826	70.9720	68.6826	70.9720	68.6826	68.6826	70.9720	68.6826	70.9720	68.6826 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	121.5334	122.7946	119.6165	112.8509	104.3105	96.2837	90.9213	89.6602	92.8382	99.6039	108.1443	116.1710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317 (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)												
	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534 (71)
Water heating gains (Table 5)												
	120.4697	118.8034	115.6722	110.4392	106.2555	100.6311	96.2828	100.7499	102.8259	108.4597	115.2199	120.2775 (72)
Total internal gains												
	354.7808	361.7344	348.0664	338.3571	323.3436	311.9819	299.9818	303.1877	310.7312	320.8413	338.4313	349.2262 (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		
Southwest					2.6000	36.7938	0.7600		0.0000	0.7700	55.9826 (79)		
Northwest					2.0000	11.2829	0.7600		0.0000	0.7700	13.2056 (81)		
Solar gains	69.1881	122.2393	178.9041	241.1996		287.9885	293.7466	279.9401	243.8348	200.2885	138.2418	83.6702	58.6937 (83)
Total gains	423.9689	483.9737	526.9705	579.5567		611.3322	605.7285	579.9219	547.0225	511.0197	459.0831	422.1015	407.9199 (84)

7. Mean internal temperature (heating season)												
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)

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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	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988	101.4988
alpha	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666	7.7666
util living area	0.9854	0.9620	0.9062	0.7645	0.5768	0.4029	0.2894	0.3208	0.5137	0.8119	0.9599	0.9889 (86)
Living	20.6144	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.5857
Non living	19.6902	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.6546
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.8027	20.7257	20.8408	20.9307	20.9565	20.9597	20.9599	20.9599	20.9588	20.9221	20.7628	20.6436 (87)
Th 2	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220	20.1220 (88)
util rest of house	0.9799	0.9493	0.8797	0.7190	0.5239	0.3477	0.2317	0.2596	0.4491	0.7605	0.9442	0.9846 (89)
MIT 2	19.9499	19.8254	19.9572	20.0475	20.0685	20.0705	20.0706	20.0706	20.0701	20.0421	19.8720	19.7388 (90)
Living area fraction									FLA = Living area / (4) =			0.7000 (91)
MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5469	20.4556	20.5757	20.6657	20.6901	20.6930	20.6931	20.6931	20.6922	20.6581	20.4956	20.3722 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9828	0.9545	0.8941	0.7476	0.5582	0.3836	0.2693	0.2994	0.4911	0.7928	0.9515	0.9860 (94)
Useful gains	416.6935	461.9723	471.1630	433.2993	341.2739	232.3654	156.1503	163.7744	250.9743	363.9720	401.6343	402.2095 (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	619.8256	593.4539	536.9936	448.8667	342.9757	232.4496	156.1546	163.7842	251.4939	383.7194	511.0465	616.9763 (97)
Space heating kWh	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98a)
Space heating requirement - total per year (kWh/year)												554.1939
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	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												554.1939
Space heating per m2										(98c) / (4) =		13.8548 (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 %)												263.3026 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	151.1303	88.3556	48.9779	11.2085	1.2662	0.0000	0.0000	0.0000	0.0000	14.6921	78.7768	159.7865 (98)
Space heating efficiency (main heating system 1)	263.3026	263.3026	263.3026	263.3026	263.3026	0.0000	0.0000	0.0000	0.0000	263.3026	263.3026	263.3026 (210)
Space heating fuel (main heating system)	57.3980	33.5567	18.6014	4.2569	0.4809	0.0000	0.0000	0.0000	0.0000	5.5799	29.9187	60.6855 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258	173.1258 (216)
Fuel for water heating, kWh/month	112.3397	99.5228	106.1390	96.1699	93.9683	83.9022	81.0788	86.8524	86.6474	96.8172	102.1495	112.0912 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												210.4780 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.1258
Water heating fuel used												1157.6783 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1517.7337 (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	210.4780	0.1587	33.4115 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1157.6783	0.1407	162.8594 (264)
Space and water heating			196.2709 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			217.7748 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.4400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	210.4780	1.5876	334.1476 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1157.6783	1.5202	1759.8596 (278)
Space and water heating			2094.0072 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2323.1168 (286)
Dwelling Primary energy Rate (DPER)			58.0800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
Heatloss Floor 1			40.0000	0.1300	5.2000		(28a)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 18.7472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 358.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 29.3427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
Heat transfer coeff 48.4175 48.2663 48.1180 47.4217 47.2915 46.6850 46.6850 46.5727 46.9186 47.2915 47.5550 47.8305 (39)
Average = Sum(39)m / 12 = 47.4211

HLP Jan 1.2104 Feb 1.2067 Mar 1.2030 Apr 1.1855 May 1.1823 Jun 1.1671 Jul 1.1671 Aug 1.1643 Sep 1.1730 Oct 1.1823 Nov 1.1889 Dec 1.1958 (40)
HLP (average) 1.1855
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)
Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)
Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)
Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)
Average daily hot water use (litres/day) 89.6342 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 97.5097 95.4285 92.8936 89.0378 85.9070 82.5410 81.2465 83.7705 86.4325 89.9664 93.8817 97.2566 (44)
Energy content (annual) 154.4315 135.8890 142.7740 121.8882 115.6473 101.4938 98.2606 103.7254 106.5799 122.0835 133.7517 152.2804 (45)
Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1488.8053
Water storage loss: 23.1647 20.3833 21.4161 18.2832 17.3471 15.2241 14.7391 15.5588 15.9870 18.3125 20.0627 22.8421 (46)
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)
If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 213.0603 188.8440 201.4028 178.6258 174.2761 158.2313 156.8894 162.3542 163.3175 180.7123 190.4892 210.9092 (62)
WWHRS -21.8517 -19.3258 -20.2369 -16.7570 -15.6169 -13.3635 -12.5261 -13.3203 -13.8264 -16.2998 -18.4657 -21.4471 (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 191.2086 169.5182 181.1659 161.8688 158.6592 144.8678 144.3633 149.0339 149.4911 164.4126 172.0236 189.4622 (64)
Total per year (kWh/year) = Sum(64)m = 1976.0753 (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 98.2515 87.5471 94.3754 85.9179 85.3558 79.1367 79.5747 81.3917 80.8279 87.4958 89.8625 97.5363 (65)

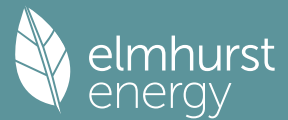
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
(66)m 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 68.6826 76.0415 68.6826 70.9720 68.6826 70.9720 68.6826 68.6826 70.9720 68.6826 70.9720 68.6826 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 121.5334 122.7946 119.6165 112.8509 104.3105 96.2837 90.9213 89.6602 92.8382 99.6039 108.1443 116.1710 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 (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) -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 (71)
Water heating gains (Table 5) 132.0585 130.2785 126.8487 119.3304 114.7255 109.9121 106.9552 109.3975 112.2609 117.6019 124.8090 131.0972 (72)
Total internal gains 369.3696 376.2095 362.2429 350.2484 334.8137 321.2629 310.6542 311.8354 320.1663 332.9834 351.0203 363.0459 (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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	82.2705	82.5283	82.7825	83.9981	84.2295	85.3236	85.3236	85.5294	84.8988	84.2295	83.7627	83.2801
alpha	6.4847	6.5019	6.5188	6.5999	6.6153	6.6882	6.6882	6.7020	6.6599	6.6153	6.5842	6.5520
util living area	0.9943	0.9891	0.9775	0.9344	0.8224	0.6186	0.4484	0.4858	0.7282	0.9366	0.9862	0.9952 (86)
MIT	20.1977	20.3231	20.5002	20.7442	20.9190	20.9897	20.9989	20.9982	20.9713	20.7768	20.4606	20.1835 (87)
Th 2	19.9117	19.9147	19.9176	19.9316	19.9342	19.9464	19.9464	19.9487	19.9417	19.9342	19.9289	19.9234 (88)
util rest of house	0.9918	0.9843	0.9673	0.9055	0.7570	0.5224	0.3418	0.3760	0.6324	0.9028	0.9792	0.9931 (89)
MIT 2	19.0134	19.1739	19.3968	19.6973	19.8779	19.9423	19.9462	19.9483	19.9278	19.7414	19.3594	19.0046 (90)
Living area fraction	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	fLA = Living area / (4) =	20.1303	0.7000 (91)
MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8424	19.9783	20.1692	20.4301	20.6066	20.6755	20.6831	20.6832	20.6583	20.4662	20.1303	19.8298 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9916	0.9846	0.9700	0.9203	0.8000	0.5897	0.4165	0.4530	0.6989	0.9214	0.9807	0.9929 (94)
Useful gains	402.0762	433.2878	442.0144	438.2338	388.1586	279.9177	190.2981	198.9309	296.8824	373.3435	387.1122	390.8854 (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	752.5243	727.7754	657.7341	546.7782	421.2084	283.6343	190.6197	199.4816	307.7045	466.5873	619.6545	747.5832 (97)
Space heating kWh	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98a)
Space heating requirement - total per year (kWh/year)												1224.0525
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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1224.0525
Space heating per m2										(98c) / (4) =		30.6013 (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	260.7334	197.8957	160.4954	78.1519	24.5891	0.0000	0.0000	0.0000	0.0000	69.3734	167.4304	265.3832 (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)	282.4847	214.4049	173.8845	84.6716	26.6404	0.0000	0.0000	0.0000	0.0000	75.1608	181.3980	287.5224 (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												
	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.7558	84.4078	83.7892	82.5233	80.9002	79.8000	79.8000	79.8000	79.8000	82.2744	83.9991	79.8000 (216)
Fuel for water heating, kWh/month	225.5995	200.8324	216.2164	196.1492	196.1172	181.5386	180.9064	186.7593	187.3323	199.8344	204.7921	223.3815 (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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1326.1674 (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												2399.4592 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

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Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2938.2508 (238)

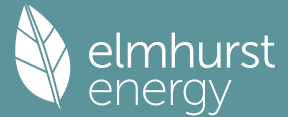
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1326.1674	0.2100	278.4952 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4592	0.2100	503.8864 (264)
Space and water heating			782.3816 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			682.9408 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.0700 (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	1326.1674	1.1300	1498.5692 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4592	1.1300	2711.3889 (278)
Space and water heating			4209.9581 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3618.4935 (286)
Target Primary Energy Rate (TPER)			90.4600 (287)

Full SAP Calculation Printout



Property Reference	North Block			Issued on Date	24/10/2025
Assessment Reference	Plot 11	Prop Type Ref			
Property					
SAP Rating	83 B	DER	5.59	TER	16.91
Environmental	97 A	% DER < TER			66.94
CO ₂ Emissions (t/year)	0.21	DFEE	29.14	TFEE	40.68
Compliance Check	See BREL	% DFEE < TFEE			28.36
% DPER < TPER	33.50	DPER	59.58	TPER	89.59
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(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) =	0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

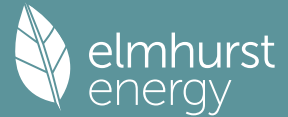
3. Heat losses and heat loss parameter

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							
Opening Type 1			4.6000	1.3258	6.0985		(27)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998 (29a)
External Roof 1	40.0000		40.0000	0.1500	6.0000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			90.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.2985		(33)
Main dwelling							
Party Floor 1			40.0000			30.0000	1200.0000 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10299.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							257.5000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

elmhurst
energy

7. Mean internal temperature (heating season)	
Temperature during heating periods in the living area from Table 9, T_{hi} (C)	21.0000 (85)

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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	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085
alpha	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472
util living area	0.9712	0.9419	0.8856	0.7588	0.5863	0.4143	0.2984	0.3306	0.5251	0.8007	0.9396	0.9764 (86)
Living	20.4504	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4152
Non living	19.4754	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.4318
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.7189	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4970 (87)
Th 2	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969 (88)
util rest of house	0.9634	0.9277	0.8604	0.7169	0.5336	0.3565	0.2372	0.2659	0.4591	0.7539	0.9223	0.9698 (89)
MIT 2	19.8491	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.5517 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9668	0.9312	0.8711	0.7408	0.5666	0.3933	0.2761	0.3070	0.5009	0.7804	0.9279	0.9708 (94)
Useful gains	409.8801	450.6877	459.0505	429.3443	346.3767	238.2284	160.1453	167.9553	255.9793	358.2824	391.6421	395.9990 (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	635.8219	606.1449	549.3621	460.4148	352.4823	238.8564	160.2080	168.0727	258.3698	393.1493	521.9201	630.1345 (97)
Space heating kWh	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98a)
Space heating requirement - total per year (kWh/year)												660.6058
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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												660.6058
Space heating per m2										(98c) / (4) =		16.5151 (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 %)												262.6293 (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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98)
Space heating efficiency (main heating system 1)	262.6293	262.6293	262.6293	262.6293	262.6293	0.0000	0.0000	0.0000	0.0000	262.6293	262.6293	262.6293 (210)
Space heating fuel (main heating system)	64.0068	39.7774	25.5843	8.5180	1.7296	0.0000	0.0000	0.0000	0.0000	9.8774	35.7139	66.3280 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589 (216)
Fuel for water heating, kWh/month	112.0594	99.2745	105.8742	95.9299	93.7338	83.6928	80.8765	86.6357	86.4312	96.5756	101.8946	111.8115 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (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												251.5354 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.5589
Water heating fuel used												1154.7899 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1555.9027 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	251.5354	0.1579	39.7059 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1154.7899	0.1407	162.4531 (264)
Space and water heating			202.1590 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			223.6629 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.5900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	251.5354	1.5843	398.5129 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1154.7899	1.5202	1755.4687 (278)
Space and water heating			2153.9817 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2383.0913 (286)
Dwelling Primary energy Rate (DPER)			59.5800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000		(30)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
 Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 17.9472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 257.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 28.5427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
 Heat transfer coeff 47.6175 47.4663 47.3180 46.6217 46.4915 45.8850 45.8850 45.7727 46.1186 46.4915 46.7550 47.0305 (39)
 Average = Sum(39)m / 12 = 46.6211

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1904	1.1867	1.1830	1.1655	1.1623	1.1471	1.1471	1.1443	1.1530	1.1623	1.1689	1.1758
HLP (average)												1.1655
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)

Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)

Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)

Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)

Average daily hot water use (litres/day) 89.6342 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	97.5097	95.4285	92.8936	89.0378	85.9070	82.5410	81.2465	83.7705	86.4325	89.9664	93.8817	97.2566
Energy conte	154.4315	135.8890	142.7740	121.8882	115.6473	101.4938	98.2606	103.7254	106.5799	122.0835	133.7517	152.2804
Energy content (annual)										Total = Sum(45)m =		1488.8053
Distribution loss (46)m = 0.15 x (45)m	23.1647	20.3833	21.4161	18.2832	17.3471	15.2241	14.7391	15.5588	15.9870	18.3125	20.0627	22.8421
Water storage loss:												300.0000
Store volume												2.1127
a) If manufacturer declared loss factor is known (kWh/day):												0.5400
Temperature factor from Table 2b												1.1409
Enter (49) or (54) in (55)												
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
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
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
Total heat required for water heating calculated for each month	213.0603	188.8440	201.4028	178.6258	174.2761	158.2313	156.8894	162.3542	163.3175	180.7123	190.4892	210.9092
WWHRS	-21.8517	-19.3258	-20.2369	-16.7570	-15.6169	-13.3635	-12.5261	-13.3203	-13.8264	-16.2998	-18.4657	-21.4471
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
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	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622
12Total per year (kWh/year)												1976.0753
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	98.2515	87.5471	94.3754	85.9179	85.3558	79.1367	79.5747	81.3917	80.8279	87.4958	89.8625	97.5363

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

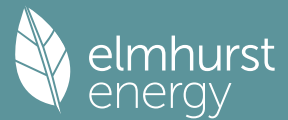
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	68.6826	76.0415	68.6826	70.9720	68.6826	70.9720	68.6826	68.6826	70.9720	68.6826	70.9720	68.6826
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	121.5334	122.7946	119.6165	112.8509	104.3105	96.2837	90.9213	89.6602	92.8382	99.6039	108.1443	116.1710
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317
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
Losses e.g. evaporation (negative values) (Table 5)	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534
Water heating gains (Table 5)	132.0585	130.2785	126.8487	119.3304	114.7255	109.9121	106.9552	109.3975	112.2609	117.6019	124.8090	131.0972
Total internal gains	369.3696	376.2095	362.2429	350.2484	334.8137	321.2629	310.6542	311.8354	320.1663	332.9834	351.0203	363.0459

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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	60.0852	60.2767	60.4655	61.3686	61.5406	62.3540	62.3540	62.5070	62.0381	61.5406	61.1937	60.8352
alpha	5.0057	5.0184	5.0310	5.0912	5.1027	5.1569	5.1569	5.1671	5.1359	5.1027	5.0796	5.0557
util living area	0.9829	0.9724	0.9532	0.8978	0.7844	0.5978	0.4382	0.4738	0.6978	0.9004	0.9672	0.9850 (86)
MIT	19.9690	20.1253	20.3447	20.6434	20.8648	20.9740	20.9956	20.9935	20.9429	20.6899	20.3005	19.9515 (87)
Th 2	19.9277	19.9307	19.9337	19.9477	19.9503	19.9625	19.9625	19.9648	19.9578	19.9503	19.9450	19.9394 (88)
util rest of house	0.9776	0.9641	0.9387	0.8668	0.7250	0.5098	0.3369	0.3701	0.6119	0.8641	0.9559	0.9803 (89)
MIT 2	18.7679	18.9656	19.2393	19.6050	19.8437	19.9488	19.9613	19.9627	19.9234	19.6667	19.1975	18.7548 (90)
Living area fraction	fLA = Living area / (4) =											0.7000 (91)
MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9757	0.9627	0.9400	0.8791	0.7609	0.5704	0.4079	0.4427	0.6694	0.8804	0.9562	0.9785 (94)
Useful gains	395.6593	423.6494	428.3107	418.6222	369.1787	270.7309	186.3311	194.4068	284.3455	356.7248	377.4347	385.2272 (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	728.9627	706.1752	639.4146	532.9755	411.8447	278.3589	187.4537	196.1023	301.4792	454.8249	601.7178	723.9183 (97)
Space heating kWh	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98a)
Space heating requirement - total per year (kWh/year)												1195.4308
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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1195.4308
Space heating per m2												(98c) / (4) = 29.8858 (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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (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)	268.6649	205.6960	170.1639	89.2030	34.3917	0.0000	0.0000	0.0000	0.0000	79.0753	174.9554	273.0078 (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	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.6438	84.3145	83.7412	82.6233	81.1716	79.8000	79.8000	79.8000	79.8000	82.3665	83.9182	79.8000 (216)
Fuel for water heating, kWh/month	225.8979	201.0546	216.3402	195.9118	195.4616	181.5386	180.9064	186.7593	187.3323	199.6109	204.9895	223.6857 (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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (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	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (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												1295.1579 (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												2399.4888 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

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Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2907.2709 (238)

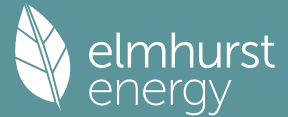
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1295.1579	0.2100	271.9832 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4888	0.2100	503.8926 (264)
Space and water heating			775.8758 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			676.4350 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.9100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1295.1579	1.1300	1463.5285 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4888	1.1300	2711.4223 (278)
Space and water heating			4174.9508 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3583.4862 (286)
Target Primary Energy Rate (TPER)			89.5900 (287)

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Property Reference	North Block			Issued on Date	24/10/2025
Assessment Reference	Plot 12	Prop Type Ref			
Property					
SAP Rating	83 B	DER	5.59	TER	16.91
Environmental	97 A	% DER < TER			66.94
CO ₂ Emissions (t/year)	0.21	DFEE	29.14	TFEE	40.68
Compliance Check	See BREL	% DFEE < TFEE			28.36
% DPER < TPER	33.50	DPER	59.58	TPER	89.59
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

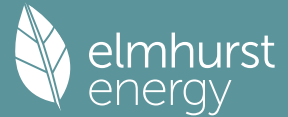
3. Heat losses and heat loss parameter

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							
Opening Type 1			4.6000	1.3258	6.0985		(27)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998 (29a)
External Roof 1	40.0000		40.0000	0.1500	6.0000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			90.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.2985		(33)
Main dwelling							
Party Floor 1			40.0000			30.0000	1200.0000 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10299.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							257.5000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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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	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085
alpha	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472
util living area	0.9712	0.9419	0.8856	0.7588	0.5863	0.4143	0.2984	0.3306	0.5251	0.8007	0.9396	0.9764 (86)
Living	20.4504	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4152
Non living	19.4754	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.4318
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.7189	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4970 (87)
Th 2	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969 (88)
util rest of house	0.9634	0.9277	0.8604	0.7169	0.5336	0.3565	0.2372	0.2659	0.4591	0.7539	0.9223	0.9698 (89)
MIT 2	19.8491	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.5517 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9668	0.9312	0.8711	0.7408	0.5666	0.3933	0.2761	0.3070	0.5009	0.7804	0.9279	0.9708 (94)
Useful gains	409.8801	450.6877	459.0505	429.3443	346.3767	238.2284	160.1453	167.9553	255.9793	358.2824	391.6421	395.9990 (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	635.8219	606.1449	549.3621	460.4148	352.4823	238.8564	160.2080	168.0727	258.3698	393.1493	521.9201	630.1345 (97)
Space heating kWh	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98a)
Space heating requirement - total per year (kWh/year)												660.6058
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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												660.6058
Space heating per m2										(98c) / (4) =		16.5151 (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 %)												262.6293 (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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98)
Space heating efficiency (main heating system 1)	262.6293	262.6293	262.6293	262.6293	262.6293	0.0000	0.0000	0.0000	0.0000	262.6293	262.6293	262.6293 (210)
Space heating fuel (main heating system)	64.0068	39.7774	25.5843	8.5180	1.7296	0.0000	0.0000	0.0000	0.0000	9.8774	35.7139	66.3280 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589 (216)
Fuel for water heating, kWh/month	112.0594	99.2745	105.8742	95.9299	93.7338	83.6928	80.8765	86.6357	86.4312	96.5756	101.8946	111.8115 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (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												251.5354 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.5589
Water heating fuel used												1154.7899 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1555.9027 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	251.5354	0.1579	39.7059 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1154.7899	0.1407	162.4531 (264)
Space and water heating			202.1590 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			223.6629 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.5900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	251.5354	1.5843	398.5129 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1154.7899	1.5202	1755.4687 (278)
Space and water heating			2153.9817 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2383.0913 (286)
Dwelling Primary energy Rate (DPER)			59.5800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000		(30)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
 Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 17.9472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 257.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 28.5427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
 Heat transfer coeff 47.6175 47.4663 47.3180 46.6217 46.4915 45.8850 45.8850 45.7727 46.1186 46.4915 46.7550 47.0305 (39)
 Average = Sum(39)m / 12 = 46.6211

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1904	1.1867	1.1830	1.1655	1.1623	1.1471	1.1471	1.1443	1.1530	1.1623	1.1689	1.1758
HLP (average)												1.1655
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)

Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)

Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)

Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)

Average daily hot water use (litres/day) 89.6342 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	97.5097	95.4285	92.8936	89.0378	85.9070	82.5410	81.2465	83.7705	86.4325	89.9664	93.8817	97.2566
Energy conte	154.4315	135.8890	142.7740	121.8882	115.6473	101.4938	98.2606	103.7254	106.5799	122.0835	133.7517	152.2804
Energy content (annual)										Total = Sum(45)m =		1488.8053
Distribution loss (46)m = 0.15 x (45)m	23.1647	20.3833	21.4161	18.2832	17.3471	15.2241	14.7391	15.5588	15.9870	18.3125	20.0627	22.8421
Water storage loss:												300.0000
Store volume												2.1127
a) If manufacturer declared loss factor is known (kWh/day):												0.5400
Temperature factor from Table 2b												1.1409
Enter (49) or (54) in (55)												
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
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
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
Total heat required for water heating calculated for each month	213.0603	188.8440	201.4028	178.6258	174.2761	158.2313	156.8894	162.3542	163.3175	180.7123	190.4892	210.9092
WWHRS	-21.8517	-19.3258	-20.2369	-16.7570	-15.6169	-13.3635	-12.5261	-13.3203	-13.8264	-16.2998	-18.4657	-21.4471
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
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	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622
12Total per year (kWh/year)												1976.0753
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000
Heat gains from water heating, kWh/month	98.2515	87.5471	94.3754	85.9179	85.3558	79.1367	79.5747	81.3917	80.8279	87.4958	89.8625	97.5363

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

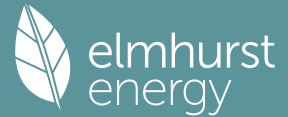
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168	70.3168
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	68.6826	76.0415	68.6826	70.9720	68.6826	70.9720	68.6826	68.6826	70.9720	68.6826	70.9720	68.6826
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	121.5334	122.7946	119.6165	112.8509	104.3105	96.2837	90.9213	89.6602	92.8382	99.6039	108.1443	116.1710
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317	30.0317
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
Losses e.g. evaporation (negative values) (Table 5)	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534	-56.2534
Water heating gains (Table 5)	132.0585	130.2785	126.8487	119.3304	114.7255	109.9121	106.9552	109.3975	112.2609	117.6019	124.8090	131.0972
Total internal gains	369.3696	376.2095	362.2429	350.2484	334.8137	321.2629	310.6542	311.8354	320.1663	332.9834	351.0203	363.0459

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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	60.0852	60.2767	60.4655	61.3686	61.5406	62.3540	62.3540	62.5070	62.0381	61.5406	61.1937	60.8352	
alpha	5.0057	5.0184	5.0310	5.0912	5.1027	5.1569	5.1569	5.1671	5.1359	5.1027	5.0796	5.0557	
util living area	0.9829	0.9724	0.9532	0.8978	0.7844	0.5978	0.4382	0.4738	0.6978	0.9004	0.9672	0.9850 (86)	
MIT	19.9690	20.1253	20.3447	20.6434	20.8648	20.9740	20.9956	20.9935	20.9429	20.6899	20.3005	19.9515 (87)	
Th 2	19.9277	19.9307	19.9337	19.9477	19.9503	19.9625	19.9625	19.9648	19.9578	19.9503	19.9450	19.9394 (88)	
util rest of house	0.9776	0.9641	0.9387	0.8668	0.7250	0.5098	0.3369	0.3701	0.6119	0.8641	0.9559	0.9803 (89)	
MIT 2	18.7679	18.9656	19.2393	19.6050	19.8437	19.9488	19.9613	19.9627	19.9234	19.6667	19.1975	18.7548 (90)	
Living area fraction	fLA = Living area / (4) =												0.7000 (91)
MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9757	0.9627	0.9400	0.8791	0.7609	0.5704	0.4079	0.4427	0.6694	0.8804	0.9562	0.9785 (94)
Useful gains	395.6593	423.6494	428.3107	418.6222	369.1787	270.7309	186.3311	194.4068	284.3455	356.7248	377.4347	385.2272 (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	728.9627	706.1752	639.4146	532.9755	411.8447	278.3589	187.4537	196.1023	301.4792	454.8249	601.7178	723.9183 (97)
Space heating kWh	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98a)
Space heating requirement - total per year (kWh/year)												1195.4308
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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1195.4308
Space heating per m2												(98c) / (4) = 29.8858 (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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (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)	268.6649	205.6960	170.1639	89.2030	34.3917	0.0000	0.0000	0.0000	0.0000	79.0753	174.9554	273.0078 (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	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.6438	84.3145	83.7412	82.6233	81.1716	79.8000	79.8000	79.8000	79.8000	82.3665	83.9182	79.8000 (216)
Fuel for water heating, kWh/month	225.8979	201.0546	216.3402	195.9118	195.4616	181.5386	180.9064	186.7593	187.3323	199.6109	204.9895	223.6857 (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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (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	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (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												1295.1579 (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												2399.4888 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2907.2709 (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	1295.1579	0.2100	271.9832 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4888	0.2100	503.8926 (264)
Space and water heating			775.8758 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			676.4350 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.9100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1295.1579	1.1300	1463.5285 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4888	1.1300	2711.4223 (278)
Space and water heating			4174.9508 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3583.4862 (286)
Target Primary Energy Rate (TPER)			89.5900 (287)

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Property Reference	North Block				Issued on Date	24/10/2025	
Assessment Reference	Plot 13			Prop Type Ref			
Property							
SAP Rating	83 B		DER	5.59	TER	16.91	
Environmental	97 A		% DER < TER				66.94
CO ₂ Emissions (t/year)	0.21		DFEE	29.14	TFEE	40.68	
Compliance Check	See BREL		% DFEE < TFEE				28.36
% DPER < TPER	33.50		DPER	59.58	TPER	89.59	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(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) =	0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

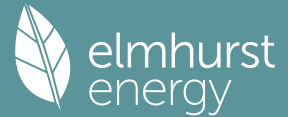
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Opening Type 1			4.6000	1.3258	6.0985		(27)
External Wall 1	50.6000	4.6000	46.0000	0.2000	9.2000	190.0000	8739.9998 (29a)
External Roof 1	40.0000		40.0000	0.1500	6.0000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			90.6000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.2985		(33)
Main dwelling							
Party Floor 1			40.0000			30.0000	1200.0000 (32d)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10299.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							257.5000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E7 Party floor between dwellings (in blocks of flats)				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

elmhurst
energy

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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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	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085	72.7085
alpha	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472	5.8472
util living area	0.9712	0.9419	0.8856	0.7588	0.5863	0.4143	0.2984	0.3306	0.5251	0.8007	0.9396	0.9764 (86)
Living	20.4504	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4152
Non living	19.4754	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.4318
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.7189	20.5874	20.7368	20.8733	20.9317	20.9452	20.9467	20.9465	20.9405	20.8627	20.6427	20.4970 (87)
Th 2	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969	20.0969 (88)
util rest of house	0.9634	0.9277	0.8604	0.7169	0.5336	0.3565	0.2372	0.2659	0.4591	0.7539	0.9223	0.9698 (89)
MIT 2	19.8491	19.6419	19.8168	19.9636	20.0178	20.0279	20.0287	20.0287	20.0252	19.9571	19.7117	19.5517 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (92)
Temperature adjustment												0.0000
adjusted MIT	20.4579	20.3038	20.4608	20.6004	20.6575	20.6700	20.6713	20.6712	20.6659	20.5910	20.3634	20.2134 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9668	0.9312	0.8711	0.7408	0.5666	0.3933	0.2761	0.3070	0.5009	0.7804	0.9279	0.9708 (94)
Useful gains	409.8801	450.6877	459.0505	429.3443	346.3767	238.2284	160.1453	167.9553	255.9793	358.2824	391.6421	395.9990 (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	635.8219	606.1449	549.3621	460.4148	352.4823	238.8564	160.2080	168.0727	258.3698	393.1493	521.9201	630.1345 (97)
Space heating kWh	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98a)
Space heating requirement - total per year (kWh/year)												660.6058
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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												660.6058
Space heating per m2										(98c) / (4) =		16.5151 (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 %)												262.6293 (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	168.1006	104.4672	67.1918	22.3707	4.5425	0.0000	0.0000	0.0000	0.0000	25.9410	93.7951	174.1969 (98)
Space heating efficiency (main heating system 1)	262.6293	262.6293	262.6293	262.6293	262.6293	0.0000	0.0000	0.0000	0.0000	262.6293	262.6293	262.6293 (210)
Space heating fuel (main heating system)	64.0068	39.7774	25.5843	8.5180	1.7296	0.0000	0.0000	0.0000	0.0000	9.8774	35.7139	66.3280 (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	194.4890	172.2997	183.7541	166.4949	162.6833	145.2564	140.3684	150.3640	150.0090	167.6155	176.8472	194.0588 (64)
Efficiency of water heater	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589	173.5589 (216)
Fuel for water heating, kWh/month	112.0594	99.2745	105.8742	95.9299	93.7338	83.6928	80.8765	86.6357	86.4312	96.5756	101.8946	111.8115 (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	1.2806	1.1567	1.2806	1.2393	1.2806	1.2393	1.2806	1.2806	1.2393	1.2806	1.2393	1.2806 (231)
Lighting	16.6654	13.3696	12.0378	8.8194	6.8124	5.5658	6.2145	8.0778	10.4923	13.7665	15.5492	17.1286 (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												251.5354 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												173.5589
Water heating fuel used												1154.7899 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												15.0781 (230a)
Total electricity for the above, kWh/year												15.0781 (231)
Electricity for lighting (calculated in Appendix L)												134.4992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	1555.9027 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	251.5354	0.1579	39.7059 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1154.7899	0.1407	162.4531 (264)
Space and water heating			202.1590 (265)
Pumps, fans and electric keep-hot	15.0781	0.1387	2.0915 (267)
Energy for lighting	134.4992	0.1443	19.4124 (268)
Total CO2, kg/year			223.6629 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.5900 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	251.5354	1.5843	398.5129 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1154.7899	1.5202	1755.4687 (278)
Space and water heating			2153.9817 (279)
Pumps, fans and electric keep-hot	15.0781	1.5128	22.8102 (281)
Energy for lighting	134.4992	1.5338	206.2994 (282)
Total Primary energy kWh/year			2383.0913 (286)
Dwelling Primary energy Rate (DPER)			59.5800 (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	40.0000 (1b)	2.3000 (2b)	92.0000 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	40.0000		92.0000 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	92.0000 (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) = 0.2174 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4674 (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) = 0.3973 (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	0.5065	0.4966	0.4867	0.4370	0.4271	0.3774	0.3774	0.3675	0.3973	0.4271	0.4469	0.4668 (22b)
Effective ac	0.6283	0.6233	0.6184	0.5955	0.5912	0.5712	0.5712	0.5675	0.5789	0.5912	0.5999	0.6090 (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			4.6000	1.1450	5.2672		(27)
External Wall 1	50.6000	4.6000	46.0000	0.1800	8.2800		(29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000		(30)

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Total net area of external elements Aum(A, m2) 90.6000 (31)
 Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 17.9472 (33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 257.5000 (35)

List of Thermal Bridges			
K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E7 Party floor between dwellings (in blocks of flats)	36.0000	0.0700	2.5200
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5955 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 28.5427 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan 19.0749 Feb 18.9236 Mar 18.7754 Apr 18.0791 May 17.9488 Jun 17.3423 Jul 17.3423 Aug 17.2300 Sep 17.5759 Oct 17.9488 Nov 18.2123 Dec 18.4879 (38)
 Heat transfer coeff 47.6175 47.4663 47.3180 46.6217 46.4915 45.8850 45.8850 45.7727 46.1186 46.4915 46.7550 47.0305 (39)
 Average = Sum(39)m / 12 = 46.6211

HLP Jan 1.1904 Feb 1.1867 Mar 1.1830 Apr 1.1655 May 1.1623 Jun 1.1471 Jul 1.1471 Aug 1.1443 Sep 1.1530 Oct 1.1623 Nov 1.1689 Dec 1.1758 (40)
 HLP (average) 1.1655
 Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4063 (42)
 Hot water usage for mixer showers 47.7990 47.0807 46.0340 44.0312 42.5532 40.9050 39.9681 41.0070 42.1457 43.9154 45.9612 47.6159 (42a)
 Hot water usage for baths 20.6784 20.3713 19.9388 19.1414 18.5443 17.8823 17.5247 17.9541 18.4217 19.1301 19.9439 20.6085 (42b)
 Hot water usage for other uses 29.0323 27.9766 26.9208 25.8651 24.8094 23.7537 23.7537 24.8094 25.8651 26.9208 27.9766 29.0323 (42c)
 Average daily hot water use (litres/day) 89.6342 (43)
 Daily hot water use Jan 97.5097 Feb 95.4285 Mar 92.8936 Apr 89.0378 May 85.9070 Jun 82.5410 Jul 81.2465 Aug 83.7705 Sep 86.4325 Oct 89.9664 Nov 93.8817 Dec 97.2566 (44)
 Energy conte 154.4315 135.8890 142.7740 121.8882 115.6473 101.4938 98.2606 103.7254 106.5799 122.0835 133.7517 152.2804 (45)
 Energy content (annual) Total = Sum(45)m = 1488.8053
 Distribution loss (46)m = 0.15 x (45)m 23.1647 20.3833 21.4161 18.2832 17.3471 15.2241 14.7391 15.5588 15.9870 18.3125 20.0627 22.8421 (46)
 Water storage loss:
 Store volume 300.0000 (47)
 a) If manufacturer declared loss factor is known (kWh/day):
 Temperature factor from Table 2b 2.1127 (48)
 Enter (49) or (54) in (55) 0.5400 (49)
 Total storage loss 1.1409 (55)
 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)
 If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 213.0603 188.8440 201.4028 178.6258 174.2761 158.2313 156.8894 162.3542 163.3175 180.7123 190.4892 210.9092 (62)
 WWHRS -21.8517 -19.3258 -20.2369 -16.7570 -15.6169 -13.3635 -12.5261 -13.3203 -13.8264 -16.2998 -18.4657 -21.4471 (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 191.2086 169.5182 181.1659 161.8688 158.6592 144.8678 144.3633 149.0339 149.4911 164.4126 172.0236 189.4622 (64)
 Total per year (kWh/year) = Sum(64)m = 1976.0753 (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 98.2515 87.5471 94.3754 85.9179 85.3558 79.1367 79.5747 81.3917 80.8279 87.4958 89.8625 97.5363 (65)

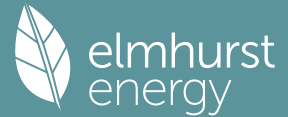
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 (66)m 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 70.3168 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 68.6826 76.0415 68.6826 70.9720 68.6826 70.9720 68.6826 68.6826 70.9720 68.6826 70.9720 68.6826 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 121.5334 122.7946 119.6165 112.8509 104.3105 96.2837 90.9213 89.6602 92.8382 99.6039 108.1443 116.1710 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 30.0317 (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) -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 -56.2534 (71)
 Water heating gains (Table 5) 132.0585 130.2785 126.8487 119.3304 114.7255 109.9121 106.9552 109.3975 112.2609 117.6019 124.8090 131.0972 (72)
 Total internal gains 369.3696 376.2095 362.2429 350.2484 334.8137 321.2629 310.6542 311.8354 320.1663 332.9834 351.0203 363.0459 (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
Southwest	2.6000	36.7938	0.6300	0.7000	0.7700	29.2362 (79)
Northwest	2.0000	11.2829	0.6300	0.7000	0.7700	6.8964 (81)

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Solar gains	36.1326	63.8379	93.4303	125.9633	150.3982	153.4053	146.1950	127.3395	104.5980	72.1950	43.6957	30.6520 (83)
Total gains	405.5022	440.0474	455.6732	476.2117	485.2119	474.6682	456.8493	439.1748	424.7643	405.1784	394.7160	393.6979 (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	60.0852	60.2767	60.4655	61.3686	61.5406	62.3540	62.3540	62.5070	62.0381	61.5406	61.1937	60.8352
alpha	5.0057	5.0184	5.0310	5.0912	5.1027	5.1569	5.1569	5.1671	5.1359	5.1027	5.0796	5.0557
util living area	0.9829	0.9724	0.9532	0.8978	0.7844	0.5978	0.4382	0.4738	0.6978	0.9004	0.9672	0.9850 (86)
MIT	19.9690	20.1253	20.3447	20.6434	20.8648	20.9740	20.9956	20.9935	20.9429	20.6899	20.3005	19.9515 (87)
Th 2	19.9277	19.9307	19.9337	19.9477	19.9503	19.9625	19.9625	19.9648	19.9578	19.9503	19.9450	19.9394 (88)
util rest of house	0.9776	0.9641	0.9387	0.8668	0.7250	0.5098	0.3369	0.3701	0.6119	0.8641	0.9559	0.9803 (89)
MIT 2	18.7679	18.9656	19.2393	19.6050	19.8437	19.9488	19.9613	19.9627	19.9234	19.6667	19.1975	18.7548 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6087	19.7774	20.0131	20.3319	20.5585	20.6664	20.6853	20.6843	20.6370	20.3830	19.9696	19.5925 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9757	0.9627	0.9400	0.8791	0.7609	0.5704	0.4079	0.4427	0.6694	0.8804	0.9562	0.9785 (94)
Useful gains	395.6593	423.6494	428.3107	418.6222	369.1787	270.7309	186.3311	194.4068	284.3455	356.7248	377.4347	385.2272 (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	728.9627	706.1752	639.4146	532.9755	411.8447	278.3589	187.4537	196.1023	301.4792	454.8249	601.7178	723.9183 (97)
Space heating kWh	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98a)
Space heating requirement - total per year (kWh/year)												1195.4308
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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1195.4308
Space heating per m2												(98c) / (4) = 29.8858 (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	247.9777	189.8574	157.0613	82.3344	31.7435	0.0000	0.0000	0.0000	0.0000	72.9865	161.4838	251.9862 (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)	268.6649	205.6960	170.1639	89.2030	34.3917	0.0000	0.0000	0.0000	0.0000	79.0753	174.9554	273.0078 (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	191.2086	169.5182	181.1659	161.8688	158.6592	144.8678	144.3633	149.0339	149.4911	164.4126	172.0236	189.4622 (64)
Efficiency of water heater	84.6438	84.3145	83.7412	82.6233	81.1716	79.8000	79.8000	79.8000	79.8000	82.3665	83.9182	79.8000 (216)
Fuel for water heating, kWh/month	225.8979	201.0546	216.3402	195.9118	195.4616	181.5386	180.9064	186.7593	187.3323	199.6109	204.9895	84.7002 (217)
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	223.6857 (219)
(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	14.2709	11.4486	10.3082	7.5523	5.8336	4.7661	5.3216	6.9172	8.9848	11.7885	13.3151	14.6675 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.3149	-27.5415	-40.0549	-45.6226	-49.7535	-46.7136	-46.2164	-43.4054	-38.4551	-31.8445	-21.3755	-16.6690 (233a)
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-9.9690	-21.0794	-42.0729	-63.4180	-84.0334	-84.4330	-83.3614	-70.4303	-51.4766	-30.1290	-13.3116	-7.8686 (233b)
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1295.1579 (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												2399.4888 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)

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Electricity for lighting (calculated in Appendix L)	115.1743 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-988.5501 (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	2907.2709 (238)

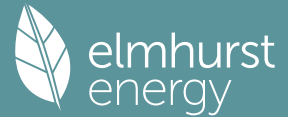
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1295.1579	0.2100	271.9832 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2399.4888	0.2100	503.8926 (264)
Space and water heating			775.8758 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	115.1743	0.1443	16.6232 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	0.1343	-57.3390
PV Unit electricity exported	-561.5832	0.1258	-70.6542
Total			-127.9932 (269)
Total CO2, kg/year			676.4350 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.9100 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1295.1579	1.1300	1463.5285 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2399.4888	1.1300	2711.4223 (278)
Space and water heating			4174.9508 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	115.1743	1.5338	176.6581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-426.9669	1.4963	-638.8751
PV Unit electricity exported	-561.5832	0.4618	-259.3484
Total			-898.2236 (283)
Total Primary energy kWh/year			3583.4862 (286)
Target Primary Energy Rate (TPER)			89.5900 (287)

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Property Reference	House Type 3				Issued on Date	24/10/2025
Assessment Reference	Plot 14		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.17	TER	11.04	
Environmental	97 A	% DER < TER				62.23
CO ₂ Emissions (t/year)	0.31	DFEE	27.97	TFEE	33.74	
Compliance Check	See BREL	% DFEE < TFEE				17.11
% DPER < TPER	23.44	DPER	44.07	TPER	57.56	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

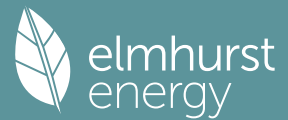
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			14.4000	1.3258	19.0909		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	14.4000	55.6000	0.2000	11.1200	190.0000	10564.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.4109		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15324.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.5500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600	0.0190	0.1056	
E4 Jamb									20.4000	0.0150	0.3060	
E10 Eaves (insulation at ceiling level)									11.0000	0.0520	0.5720	
E12 Gable (insulation at ceiling level)									11.0000	0.0450	0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 43.3498 (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
	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000 (38)
Heat transfer coeff	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498 (39)
Average = Sum(39)m / 12 = 76.3498												
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544 (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													2.4629	(42)
Hot water usage for mixer showers														
Hot water usage for baths	63.8586	62.8809	61.4401	59.2236	57.2377	54.4595	52.2620	54.8310	56.1230	58.8748	61.7405	63.8010	63.8010	(42a)
Hot water usage for other uses	27.6655	27.2479	26.6538	25.7640	24.9622	23.8583	23.0209	24.0449	24.5824	25.6761	26.8133	27.6436	27.6436	(42b)
Average daily hot water use (litres/day)	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	39.8522	(42c)
	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	120.7544	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	131.2967	(44)
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	192.8189	(45)
Distribution loss (46)m = 0.15 x (45)m													1885.5698	
Water storage loss:	29.0113	25.5110	26.8036	23.6090	22.4710	19.2420	17.8831	19.9383	20.2197	23.4857	25.7379	28.9228	28.9228	(46)
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	246.2133	(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	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	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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133	246.2133	(64)
12Total per year (kWh/year)													2514.2458	(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	107.0239	95.1312	102.1301	93.6708	92.5263	83.9907	82.3564	86.9122	86.1579	94.7754	98.3900	106.8278	106.8278	(65)

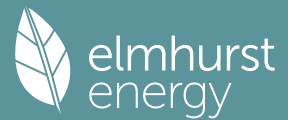
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
(66)m	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	143.5857	(72)
Total internal gains	536.2790	548.3833	526.2403	510.6191	485.6954	467.2609	447.8508	451.6970	464.0497	480.2201	508.6753	526.3332	526.3332	(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			
Southeast					5.0000	36.7938		0.7600	0.0000		0.7700		107.6588 (77)			
Southwest					0.6500	36.7938		0.7600	0.0000		0.7700		13.9956 (79)			
Northwest					8.7500	11.2829		0.7600	0.0000		0.7700		57.7743 (81)			
Solar gains					179.4287	324.8237	495.4108	699.2763	861.2318	889.3065	843.1112	717.0408	565.1830	372.7430	218.4089	151.2922 (83)
Total gains					715.7077	873.2070	1021.6511	1209.8954	1346.9272	1356.5674	1290.9619	1168.7378	1029.2327	852.9631	727.0843	677.6254 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	
alpha	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	
util living area	0.9701	0.9328	0.8565	0.6992	0.5147	0.3583	0.2599	0.2998	0.5010	0.7943	0.9402	0.9761 (86)	
Living	20.1857	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.1335	
Non living	19.1800	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.1147	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5834	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.2547 (87)	
Th 2	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215 (88)	
util rest of house	0.9637	0.9198	0.8323	0.6610	0.4696	0.3099	0.2082	0.2429	0.4411	0.7534	0.9263	0.9709 (89)	
MIT 2	19.7462	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.2961 (90)	
Living area fraction									fLA = Living area / (4) =				0.2250 (91)
MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9621	0.9119	0.8265	0.6620	0.4748	0.3163	0.2151	0.2505	0.4485	0.7522	0.9187	0.9664 (94)
Useful gains	688.5838	796.2608	844.4326	800.9402	639.5337	429.0691	277.6718	292.7519	461.6504	641.5672	667.9656	654.8680 (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	1193.6958	1126.8177	1025.2811	858.4374	650.5712	430.3782	277.8273	293.0742	467.9151	725.1110	963.4156	1169.0543 (97)
Space heating kWh	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98a)
Space heating requirement - total per year (kWh/year)												1439.5340
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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1439.5340
Space heating per m2										(98c) / (4) =		17.9942 (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 %)												234.1140 (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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98)
Space heating efficiency (main heating system 1)	234.1140	234.1140	234.1140	234.1140	234.1140	0.0000	0.0000	0.0000	0.0000	234.1140	234.1140	234.1140 (210)
Space heating fuel (main heating system)	160.5215	94.8829	57.4725	17.6829	3.5076	0.0000	0.0000	0.0000	0.0000	26.5497	90.8634	163.4053 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457 (216)
Fuel for water heating, kWh/month	137.6897	121.7886	129.4787	116.6360	113.3646	100.3941	96.3009	103.9449	104.0303	117.1384	124.5543	137.3608 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Pumps and Fa	29.7522	23.8683	21.4908	15.7451	12.1620	9.9364	11.0945	14.4211	18.7316	24.5769	27.7595	30.5791 (232)
Lighting	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 PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												614.8858 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2457
Water heating fuel used												1402.6812 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)

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Electricity for lighting (calculated in Appendix L)	240.1175	(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	2290.4631	(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	614.8858	0.1579	97.0974	(261)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	1402.6812	0.1409	197.5815	(264)
Space and water heating			294.6789	(265)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468	(267)
Energy for lighting	240.1175	0.1443	34.6564	(268)
Total CO2, kg/year			333.8820	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1700	(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	614.8858	1.5845	974.2894	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1402.6812	1.5208	2133.2615	(278)
Space and water heating			3107.5510	(279)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874	(281)
Energy for lighting	240.1175	1.5338	368.3003	(282)
Total Primary energy kWh/year			3525.4386	(286)
Dwelling Primary energy Rate (DPER)			44.0700	(287)

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

1. Overall dwelling characteristics

		Area	Storey height	Volume
		(m2)	(m)	(m3)
Main dwelling				
Ground floor		40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor		40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	200.0000 (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) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4000	(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) =	0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995	(22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798	(25)

3. Heat losses and heat loss parameter

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

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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
TER Opening Type			14.4000	1.1450	16.4885			(27)					
Heatloss Floor 1			40.0000	0.1300	5.2000			(28a)					
External Wall 1	70.0000	14.4000	55.6000	0.1800	10.0080			(29a)					
External Roof 1	40.0000		40.0000	0.1100	4.4000			(30)					
Total net area of external elements Aum(A, m2)			150.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		36.0965			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							191.5500	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E5 Ground floor (normal)				36.0000	0.1600	5.7600							
E6 Intermediate floor within a dwelling				36.0000	0.0000	0.0000							
E18 Party wall between dwellings				10.0000	0.0600	0.6000							
E2 Other lintels (including other steel lintels)				8.3500	0.0500	0.4175							
E3 Sill				5.5600	0.0500	0.2780							
E4 Jamb				20.4000	0.0500	1.0200							
E10 Eaves (insulation at ceiling level)				11.0000	0.0600	0.6600							
E12 Gable (insulation at ceiling level)				11.0000	0.0600	0.6600							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3955	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	45.4920	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Average = Sum(39)m / 12 =	84.6935	84.4527	84.2166	83.1080	82.9005	81.9349	81.9349	81.7561	82.3068	82.9005	83.3202	83.7589	(39)
												83.1070	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0587	1.0557	1.0527	1.0388	1.0363	1.0242	1.0242	1.0220	1.0288	1.0363	1.0415	1.0470	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

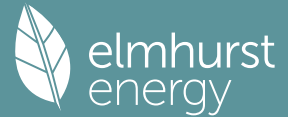
Assumed occupancy													2.4629	(42)
Hot water usage for mixer showers	65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)	
Hot water usage for baths	28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)	
Hot water usage for other uses	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)													122.8659	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	(44)	
Distribution loss (46)m = 0.15 x (45)m	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)	
Water storage loss:														
Store volume	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	(46)	
a) If manufacturer declared loss factor is known (kWh/day):													300.0000	(47)
Temperature factor from Table 2b													2.1127	(48)
Enter (49) or (54) in (55)													0.5400	(49)
Total storage loss													1.1409	(55)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)	
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
WWHRS	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	(62)	
PV diverter	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
12Total per year (kWh/year)	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)	
Electric shower(s)													2452.7993	(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)
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091	(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	
123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	116.8145	113.0463	116.8145	113.0463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)													
157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	156.3294	(72)
Total internal gains	553.0768	565.0252	542.4729	523.7195	498.2184	477.8954	460.3924	461.4634	474.8954	493.6644	522.7322	542.0769	(73)

6. Solar gains

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[Jan]			Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast			5.0000	36.7938	0.6300		0.7000		0.7700	56.2234 (77)
Southwest			0.6500	36.7938	0.6300		0.7000		0.7700	7.3090 (79)
Northwest			8.7500	11.2829	0.6300		0.7000		0.7700	30.1719 (81)

Solar gains	93.7043	169.6349	258.7218	365.1879	449.7670	464.4286	440.3037	374.4651	295.1594	194.6601	114.0612	79.0104 (83)
Total gains	646.7811	734.6601	801.1946	888.9074	947.9854	942.3240	900.6961	835.9286	770.0548	688.3246	636.7934	621.0872 (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	50.2597	50.4030	50.5443	51.2185	51.3467	51.9518	51.9518	52.0654	51.7170	51.3467	51.0881	50.8205
alpha	4.3506	4.3602	4.3696	4.4146	4.4231	4.4635	4.4635	4.4710	4.4478	4.4231	4.4059	4.3880
util living area	0.9817	0.9674	0.9391	0.8618	0.7230	0.5377	0.3962	0.4428	0.6758	0.8944	0.9664	0.9844 (86)
MIT	19.6921	19.9103	20.2124	20.5963	20.8556	20.9700	20.9938	20.9900	20.9197	20.5842	20.0857	19.6611 (87)
Th 2	20.0347	20.0372	20.0396	20.0511	20.0532	20.0632	20.0632	20.0651	20.0594	20.0532	20.0489	20.0444 (88)
util rest of house	0.9774	0.9599	0.9251	0.8319	0.6705	0.4659	0.3138	0.3561	0.6029	0.8643	0.9574	0.9807 (89)
MIT 2	18.5264	18.8023	19.1792	19.6460	19.9301	20.0445	20.0608	20.0608	20.0026	19.6447	19.0345	18.4942 (90)
Living area fraction	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567 (92)
MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9699	0.9502	0.9140	0.8251	0.6755	0.4808	0.3323	0.3754	0.6152	0.8570	0.9479	0.9739 (94)
Useful gains	627.2879	698.0451	732.3201	733.4492	640.3525	453.0603	299.2583	313.8209	473.7508	589.8953	603.6133	604.8668 (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	1227.0982	1195.1370	1087.3792	910.8487	699.5428	463.1581	300.7602	316.3869	502.8070	767.3359	1014.0928	1219.2553 (97)
Space heating kWh	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (98a)
Space heating requirement - total per year (kWh/year)												2100.8998
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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2100.8998
Space heating per m2										(98c) / (4) =		26.2612 (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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (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)	483.4874	361.9131	286.2015	138.3831	47.7114	0.0000	0.0000	0.0000	0.0000	143.0290	320.2006	495.2383 (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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Efficiency of water heater (217)m	85.4272	85.0672	84.4047	83.0730	81.3136	79.8000	79.8000	79.8000	79.8000	83.1131	84.7761	79.8000 (216)
Fuel for water heating, kWh/month	281.3705	250.0800	268.4656	241.7719	240.7294	222.4834	220.7394	228.7638	230.4292	245.0100	253.3374	278.3357 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.4888	18.8436	16.9666	12.4304	9.6016	7.8446	8.7589	11.3852	14.7882	19.4029	21.9156	24.1416 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-37.2723	-52.4700	-75.3150	-84.5623	-91.0859	-84.9809	-83.9216	-79.2664	-71.0465	-59.9299	-40.9455	-32.2325 (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	-21.2955	-44.7718	-88.9406	-133.5189	-176.4879	-177.3124	-175.2339	-148.4048	-108.8169	-64.0172	-28.4287	-16.8427 (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												2276.1644 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2961.5162	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	189.5679	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3536.1484	(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	2276.1644	0.2100	477.9945 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2961.5162	0.2100	621.9184 (264)
Space and water heating			1099.9129 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	189.5679	0.1443	27.3605 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	0.1346	-106.7552
PV Unit electricity exported	-1184.0715	0.1259	-149.0855
Total			-255.8407 (269)
Total CO2, kg/year			883.3620 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (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	2276.1644	1.1300	2572.0658 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2961.5162	1.1300	3346.5133 (278)
Space and water heating			5918.5791 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	189.5679	1.5338	290.7656 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	1.4975	-1187.5791
PV Unit electricity exported	-1184.0715	0.4622	-547.2470
Total			-1734.8261 (283)
Total Primary energy kWh/year			4604.6194 (286)
Target Primary Energy Rate (TPER)			57.5600 (287)

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Property Reference	House Type 3			Issued on Date	24/10/2025
Assessment Reference	Plot 15	Prop Type Ref			
Property					
SAP Rating	83 B	DER	4.17	TER	11.04
Environmental	97 A	% DER < TER			62.23
CO ₂ Emissions (t/year)	0.31	DFEE	27.97	TFEE	33.74
Compliance Check	See BREL	% DFEE < TFEE			17.11
% DPER < TPER	23.44	DPER	44.07	TPER	57.56
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

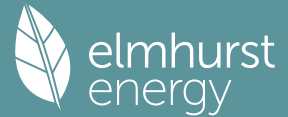
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			14.4000	1.3258	19.0909		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	14.4000	55.6000	0.2000	11.1200	190.0000	10564.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.4109		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15324.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.5500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											3.9389	(36)
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	43.3498	(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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000
Average = Sum(39)m / 12 =	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544
HLP (average)												0.9544
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4629	(42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	(44)
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													300.0000
a) If manufacturer declared loss factor is known (kWh/day):													1.8000
Temperature factor from Table 2b													0.5400
Enter (49) or (54) in (55)													0.9720
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													

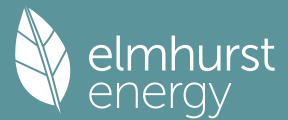
5. Internal gains (see Table 5 and 5a)

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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	113.0463	116.8145	113.0463	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Total internal gains	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	(72)
	536.2790	548.3833	526.2403	510.6191	485.6954	467.2609	447.8508	451.6970	464.0497	480.2201	508.6753	526.3332	(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	5.0000	36.7938	0.7600	0.0000	0.7700	107.6588	(77)						
Southwest	0.6500	36.7938	0.7600	0.0000	0.7700	13.9956	(79)						
Northwest	8.7500	11.2829	0.7600	0.0000	0.7700	57.7743	(81)						
Solar gains	179.4287	324.8237	495.4108	699.2763	861.2318	889.3065	843.1112	717.0408	565.1830	372.7430	218.4089	151.2922	(83)
Total gains	715.7077	873.2070	1021.6511	1209.8954	1346.9272	1356.5674	1290.9619	1168.7378	1029.2327	852.9631	727.0843	677.6254	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	
alpha	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	
util living area	0.9701	0.9328	0.8565	0.6992	0.5147	0.3583	0.2599	0.2998	0.5010	0.7943	0.9402	0.9761 (86)	
Living	20.1857	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.1335	
Non living	19.1800	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.1147	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5834	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.2547 (87)	
Th 2	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215 (88)	
util rest of house	0.9637	0.9198	0.8323	0.6610	0.4696	0.3099	0.2082	0.2429	0.4411	0.7534	0.9263	0.9709 (89)	
MIT 2	19.7462	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.2961 (90)	
Living area fraction									fLA = Living area / (4) =				0.2250 (91)
MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9621	0.9119	0.8265	0.6620	0.4748	0.3163	0.2151	0.2505	0.4485	0.7522	0.9187	0.9664 (94)
Useful gains	688.5838	796.2608	844.4326	800.9402	639.5337	429.0691	277.6718	292.7519	461.6504	641.5672	667.9656	654.8680 (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	1193.6958	1126.8177	1025.2811	858.4374	650.5712	430.3782	277.8273	293.0742	467.9151	725.1110	963.4156	1169.0543 (97)
Space heating kWh	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98a)
Space heating requirement - total per year (kWh/year)												1439.5340
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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1439.5340
Space heating per m2										(98c) / (4) =		17.9942 (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 %)												234.1140 (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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98)
Space heating efficiency (main heating system 1)	234.1140	234.1140	234.1140	234.1140	234.1140	0.0000	0.0000	0.0000	0.0000	234.1140	234.1140	234.1140 (210)
Space heating fuel (main heating system)	160.5215	94.8829	57.4725	17.6829	3.5076	0.0000	0.0000	0.0000	0.0000	26.5497	90.8634	163.4053 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457 (216)
Fuel for water heating, kWh/month	137.6897	121.7886	129.4787	116.6360	113.3646	100.3941	96.3009	103.9449	104.0303	117.1384	124.5543	137.3608 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Pumps and Fa	29.7522	23.8683	21.4908	15.7451	12.1620	9.9364	11.0945	14.4211	18.7316	24.5769	27.7595	30.5791 (232)
Lighting	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 PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												614.8858 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2457
Water heating fuel used												1402.6812 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)

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Electricity for lighting (calculated in Appendix L)	240.1175	(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	2290.4631	(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	614.8858	0.1579	97.0974	(261)
Total CO2 associated with community systems			0.0000	(262)
Water heating (other fuel)	1402.6812	0.1409	197.5815	(263)
Space and water heating			294.6789	(264)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468	(265)
Energy for lighting	240.1175	0.1443	34.6564	(266)
Total CO2, kg/year			333.8820	(267)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1700	(268)

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	614.8858	1.5845	974.2894	(275)
Total CO2 associated with community systems			0.0000	(276)
Water heating (other fuel)	1402.6812	1.5208	2133.2615	(277)
Space and water heating			3107.5510	(278)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874	(279)
Energy for lighting	240.1175	1.5338	368.3003	(280)
Total Primary energy kWh/year			3525.4386	(281)
Dwelling Primary energy Rate (DPER)			44.0700	(282)

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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)	
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	200.0000	(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) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4000	(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) =	0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995	(22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798	(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			14.4000	1.1450	16.4885			(27)					
Heatloss Floor 1			40.0000	0.1300	5.2000			(28a)					
External Wall 1	70.0000	14.4000	55.6000	0.1800	10.0080			(29a)					
External Roof 1	40.0000		40.0000	0.1100	4.4000			(30)					
Total net area of external elements Aum(A, m2)			150.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		36.0965			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							191.5500	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E5 Ground floor (normal)				36.0000	0.1600	5.7600							
E6 Intermediate floor within a dwelling				36.0000	0.0000	0.0000							
E18 Party wall between dwellings				10.0000	0.0600	0.6000							
E2 Other lintels (including other steel lintels)				8.3500	0.0500	0.4175							
E3 Sill				5.5600	0.0500	0.2780							
E4 Jamb				20.4000	0.0500	1.0200							
E10 Eaves (insulation at ceiling level)				11.0000	0.0600	0.6600							
E12 Gable (insulation at ceiling level)				11.0000	0.0600	0.6600							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3955	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	45.4920	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Average = Sum(39)m / 12 =	84.6935	84.4527	84.2166	83.1080	82.9005	81.9349	81.9349	81.7561	82.3068	82.9005	83.3202	83.7589	(39)
												83.1070	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0587	1.0557	1.0527	1.0388	1.0363	1.0242	1.0242	1.0220	1.0288	1.0363	1.0415	1.0470	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

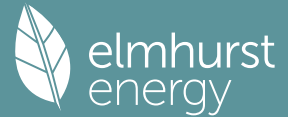
Assumed occupancy													2.4629	(42)
Hot water usage for mixer showers	65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	(42a)	
Hot water usage for baths	28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	(42b)	
Hot water usage for other uses	39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	(42c)	
Average daily hot water use (litres/day)													122.8659	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	(44)	
Distribution loss (46)m = 0.15 x (45)m	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)	
Water storage loss:										Total = Sum(45)m =			2040.7768	
Store volume	31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	(46)	
a) If manufacturer declared loss factor is known (kWh/day):													300.0000	(47)
Temperature factor from Table 2b													2.1127	(48)
Enter (49) or (54) in (55)													0.5400	(49)
Total storage loss													1.1409	(55)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)	
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
WWHRS	270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	(62)	
PV diverter	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
12Total per year (kWh/year)	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)	
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =					2452.7993	(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)
Heat gains from water heating, kWh/month								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =					0.0000	(64a)
	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091	(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	
123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	116.8145	113.0463	116.8145	113.0463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)													
157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	156.3294	(72)
Total internal gains	553.0768	565.0252	542.4729	523.7195	498.2184	477.8954	460.3924	461.4634	474.8954	493.6644	522.7322	542.0769	(73)

6. Solar gains

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[Jan]			Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast			5.0000	36.7938	0.6300		0.7000		0.7700	56.2234 (77)
Southwest			0.6500	36.7938	0.6300		0.7000		0.7700	7.3090 (79)
Northwest			8.7500	11.2829	0.6300		0.7000		0.7700	30.1719 (81)

Solar gains	93.7043	169.6349	258.7218	365.1879	449.7670	464.4286	440.3037	374.4651	295.1594	194.6601	114.0612	79.0104 (83)
Total gains	646.7811	734.6601	801.1946	888.9074	947.9854	942.3240	900.6961	835.9286	770.0548	688.3246	636.7934	621.0872 (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	50.2597	50.4030	50.5443	51.2185	51.3467	51.9518	51.9518	52.0654	51.7170	51.3467	51.0881	50.8205
alpha	4.3506	4.3602	4.3696	4.4146	4.4231	4.4635	4.4635	4.4710	4.4478	4.4231	4.4059	4.3880
util living area	0.9817	0.9674	0.9391	0.8618	0.7230	0.5377	0.3962	0.4428	0.6758	0.8944	0.9664	0.9844 (86)
MIT	19.6921	19.9103	20.2124	20.5963	20.8556	20.9700	20.9938	20.9900	20.9197	20.5842	20.0857	19.6611 (87)
Th 2	20.0347	20.0372	20.0396	20.0511	20.0532	20.0632	20.0632	20.0651	20.0594	20.0532	20.0489	20.0444 (88)
util rest of house												
	0.9774	0.9599	0.9251	0.8319	0.6705	0.4659	0.3138	0.3561	0.6029	0.8643	0.9574	0.9807 (89)
MIT 2	18.5264	18.8023	19.1792	19.6460	19.9301	20.0445	20.0608	20.0608	20.0026	19.6447	19.0345	18.4942 (90)
Living area fraction												0.2250 (91)
MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9699	0.9502	0.9140	0.8251	0.6755	0.4808	0.3323	0.3754	0.6152	0.8570	0.9479	0.9739 (94)
Useful gains	627.2879	698.0451	732.3201	733.4492	640.3525	453.0603	299.2583	313.8209	473.7508	589.8953	603.6133	604.8668 (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	1227.0982	1195.1370	1087.3792	910.8487	699.5428	463.1581	300.7602	316.3869	502.8070	767.3359	1014.0928	1219.2553 (97)
Space heating kWh	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (98a)
Space heating requirement - total per year (kWh/year)												2100.8998
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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2100.8998
Space heating per m2										(98c) / (4) =		26.2612 (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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050 (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)	483.4874	361.9131	286.2015	138.3831	47.7114	0.0000	0.0000	0.0000	0.0000	143.0290	320.2006	495.2383 (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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733 (64)
Efficiency of water heater (217)m	85.4272	85.0672	84.4047	83.0730	81.3136	79.8000	79.8000	79.8000	79.8000	83.1131	84.7761	79.8000 (216)
Fuel for water heating, kWh/month	281.3705	250.0800	268.4656	241.7719	240.7294	222.4834	220.7394	228.7638	230.4292	245.0100	253.3374	85.4986 (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	23.4888	18.8436	16.9666	12.4304	9.6016	7.8446	8.7589	11.3852	14.7882	19.4029	21.9156	24.1416 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-37.2723	-52.4700	-75.3150	-84.5623	-91.0859	-84.9809	-83.9216	-79.2664	-71.0465	-59.9299	-40.9455	-32.2325 (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	-21.2955	-44.7718	-88.9406	-133.5189	-176.4879	-177.3124	-175.2339	-148.4048	-108.8169	-64.0172	-28.4287	-16.8427 (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												2276.1644 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2961.5162	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	189.5679	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3536.1484	(238)

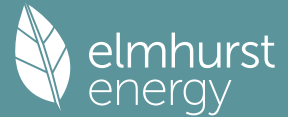
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2276.1644	0.2100	477.9945 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2961.5162	0.2100	621.9184 (264)
Space and water heating			1099.9129 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	189.5679	0.1443	27.3605 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	0.1346	-106.7552
PV Unit electricity exported	-1184.0715	0.1259	-149.0855
Total			-255.8407 (269)
Total CO2, kg/year			883.3620 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (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	2276.1644	1.1300	2572.0658 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2961.5162	1.1300	3346.5133 (278)
Space and water heating			5918.5791 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	189.5679	1.5338	290.7656 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	1.4975	-1187.5791
PV Unit electricity exported	-1184.0715	0.4622	-547.2470
Total			-1734.8261 (283)
Total Primary energy kWh/year			4604.6194 (286)
Target Primary Energy Rate (TPER)			57.5600 (287)

Full SAP Calculation Printout



Property Reference	House Type 3				Issued on Date	24/10/2025
Assessment Reference	Plot 16		Prop Type Ref			
Property						
SAP Rating	83 B	DER	4.17	TER	11.04	
Environmental	97 A	% DER < TER				62.23
CO ₂ Emissions (t/year)	0.31	DFEE	27.97	TFEE	33.74	
Compliance Check	See BREL	% DFEE < TFEE				17.11
% DPER < TPER	23.44	DPER	44.07	TPER	57.56	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	40.0000 (1b)	x 2.3000 (2b)	= 92.0000 (1b) - (3b)
First floor	40.0000 (1c)	x 2.7000 (2c)	= 108.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 200.0000 (5)

2. Ventilation rate

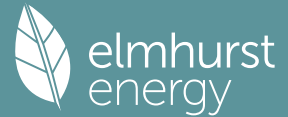
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			14.4000	1.3258	19.0909		(27)
Heatloss Floor 1			40.0000	0.1200	4.8000	110.0000	4400.0000 (28a)
External Wall 1	70.0000	14.4000	55.6000	0.2000	11.1200	190.0000	10564.0000 (29a)
External Roof 1	40.0000		40.0000	0.1100	4.4000	9.0000	360.0000 (30)
Total net area of external elements Aum(A, m ²)			150.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.4109		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	15324.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							191.5500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											3.9389	(36)
Point Thermal bridges										(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =	43.3498	(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	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000	33.0000
Average = Sum(39)m / 12 =	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498	76.3498
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544	0.9544
HLP (average)												0.9544
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4629	(42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	131.3763	128.5318	125.0477	120.4923	116.2554	110.9241	107.8892	112.9314	116.2101	121.5047	126.9567	131.2967	(44)
Energy content (annual)	193.4086	170.0736	178.6906	157.3931	149.8068	128.2800	119.2208	132.9223	134.7978	156.5711	171.5862	192.8189	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:													
Store volume													300.0000
a) If manufacturer declared loss factor is known (kWh/day):													1.8000
Temperature factor from Table 2b													0.5400
Enter (49) or (54) in (55)													0.9720
Total storage loss													
If cylinder contains dedicated solar storage													
Primary loss													
Combi loss													
Total heat required for water heating calculated for each month													
WWHRS													
PV diverter													
Solar input													
FGHRS													
Output from w/h													
12Total per year (kWh/year)													
Electric shower(s)													
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													
Heat gains from water heating, kWh/month													

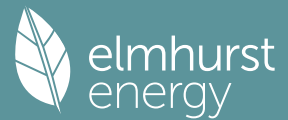
5. Internal gains (see Table 5 and 5a)

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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	113.0463	116.8145	113.0463	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	(68)
Pumps, fans	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(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)	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Total internal gains	143.8493	141.5643	137.2717	130.0983	124.3633	116.6538	110.6941	116.8175	119.6637	127.3863	136.6528	143.5857	(72)
	536.2790	548.3833	526.2403	510.6191	485.6954	467.2609	447.8508	451.6970	464.0497	480.2201	508.6753	526.3332	(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	5.0000	36.7938	0.7600	0.0000	0.7700	107.6588	(77)						
Southwest	0.6500	36.7938	0.7600	0.0000	0.7700	13.9956	(79)						
Northwest	8.7500	11.2829	0.7600	0.0000	0.7700	57.7743	(81)						
Solar gains	179.4287	324.8237	495.4108	699.2763	861.2318	889.3065	843.1112	717.0408	565.1830	372.7430	218.4089	151.2922	(83)
Total gains	715.7077	873.2070	1021.6511	1209.8954	1346.9272	1356.5674	1290.9619	1168.7378	1029.2327	852.9631	727.0843	677.6254	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	55.7521	
alpha	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	4.7168	
util living area	0.9701	0.9328	0.8565	0.6992	0.5147	0.3583	0.2599	0.2998	0.5010	0.7943	0.9402	0.9761 (86)	
Living	20.1857	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.1335	
Non living	19.1800	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.1147	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5834	20.3997	20.6352	20.8340	20.9127	20.9311	20.9338	20.9333	20.9200	20.7842	20.4475	20.2547 (87)	
Th 2	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215	20.1215 (88)	
util rest of house	0.9637	0.9198	0.8323	0.6610	0.4696	0.3099	0.2082	0.2429	0.4411	0.7534	0.9263	0.9709 (89)	
MIT 2	19.7462	19.4435	19.7236	19.9430	20.0201	20.0354	20.0371	20.0369	20.0278	19.8978	19.5068	19.2961 (90)	
Living area fraction									fLA = Living area / (4) =				0.2250 (91)
MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.9346	19.6586	19.9287	20.1435	20.2209	20.2369	20.2389	20.2386	20.2286	20.0972	19.7184	19.5118 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9621	0.9119	0.8265	0.6620	0.4748	0.3163	0.2151	0.2505	0.4485	0.7522	0.9187	0.9664 (94)
Useful gains	688.5838	796.2608	844.4326	800.9402	639.5337	429.0691	277.6718	292.7519	461.6504	641.5672	667.9656	654.8680 (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	1193.6958	1126.8177	1025.2811	858.4374	650.5712	430.3782	277.8273	293.0742	467.9151	725.1110	963.4156	1169.0543 (97)
Space heating kWh	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98a)
Space heating requirement - total per year (kWh/year)												1439.5340
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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1439.5340
Space heating per m2										(98c) / (4) =		17.9942 (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 %)												234.1140 (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	375.8034	222.1342	134.5512	41.3980	8.2118	0.0000	0.0000	0.0000	0.0000	62.1566	212.7240	382.5546 (98)
Space heating efficiency (main heating system 1)	234.1140	234.1140	234.1140	234.1140	234.1140	0.0000	0.0000	0.0000	0.0000	234.1140	234.1140	234.1140 (210)
Space heating fuel (main heating system)	160.5215	94.8829	57.4725	17.6829	3.5076	0.0000	0.0000	0.0000	0.0000	26.5497	90.8634	163.4053 (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	246.8030	218.3008	232.0850	209.0651	203.2012	179.9520	172.6152	186.3167	186.4698	209.9655	223.2582	246.2133 (64)
Efficiency of water heater	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457	179.2457 (216)
Fuel for water heating, kWh/month	137.6897	121.7886	129.4787	116.6360	113.3646	100.3941	96.3009	103.9449	104.0303	117.1384	124.5543	137.3608 (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	2.7839	2.5145	2.7839	2.6941	2.7839	2.6941	2.7839	2.7839	2.6941	2.7839	2.6941	2.7839 (231)
Pumps and Fa	29.7522	23.8683	21.4908	15.7451	12.1620	9.9364	11.0945	14.4211	18.7316	24.5769	27.7595	30.5791 (232)
Lighting	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 PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												614.8858 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.2457
Water heating fuel used												1402.6812 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												32.7785 (230a)
Total electricity for the above, kWh/year												32.7785 (231)

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Electricity for lighting (calculated in Appendix L)	240.1175	(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	2290.4631	(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	614.8858	0.1579	97.0974	(261)
Total CO2 associated with community systems			0.0000	(262)
Water heating (other fuel)	1402.6812	0.1409	197.5815	(263)
Space and water heating			294.6789	(264)
Pumps, fans and electric keep-hot	32.7785	0.1387	4.5468	(265)
Energy for lighting	240.1175	0.1443	34.6564	(266)
Total CO2, kg/year			333.8820	(267)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1700	(268)

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	614.8858	1.5845	974.2894	(275)
Total CO2 associated with community systems			0.0000	(276)
Water heating (other fuel)	1402.6812	1.5208	2133.2615	(277)
Space and water heating			3107.5510	(278)
Pumps, fans and electric keep-hot	32.7785	1.5128	49.5874	(279)
Energy for lighting	240.1175	1.5338	368.3003	(280)
Total Primary energy kWh/year			3525.4386	(281)
Dwelling Primary energy Rate (DPER)			44.0700	(282)

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	40.0000 (1b)	x	2.3000 (2b)	=	92.0000 (1b) - (3b)	
First floor	40.0000 (1c)	x	2.7000 (2c)	=	108.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	200.0000	(5)

2. Ventilation rate

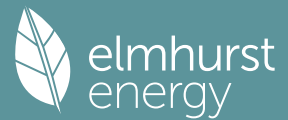
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1500 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4000	(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) =	0.3400 (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	0.4335	0.4250	0.4165	0.3740	0.3655	0.3230	0.3230	0.3145	0.3400	0.3655	0.3825	0.3995	(22b)
Effective ac	0.5940	0.5903	0.5867	0.5699	0.5668	0.5522	0.5522	0.5495	0.5578	0.5668	0.5732	0.5798	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Full SAP Calculation Printout



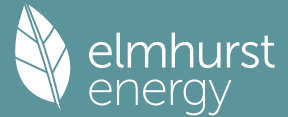
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K						
TER Opening Type			14.4000	1.1450	16.4885			(27)					
Heatloss Floor 1			40.0000	0.1300	5.2000			(28a)					
External Wall 1	70.0000	14.4000	55.6000	0.1800	10.0080			(29a)					
External Roof 1	40.0000		40.0000	0.1100	4.4000			(30)					
Total net area of external elements Aum(A, m2)			150.0000					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		36.0965			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							191.5500	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E5 Ground floor (normal)				36.0000	0.1600	5.7600							
E6 Intermediate floor within a dwelling				36.0000	0.0000	0.0000							
E18 Party wall between dwellings				10.0000	0.0600	0.6000							
E2 Other lintels (including other steel lintels)				8.3500	0.0500	0.4175							
E3 Sill				5.5600	0.0500	0.2780							
E4 Jamb				20.4000	0.0500	1.0200							
E10 Eaves (insulation at ceiling level)				11.0000	0.0600	0.6600							
E12 Gable (insulation at ceiling level)				11.0000	0.0600	0.6600							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.3955	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	45.4920	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	39.2014	38.9606	38.7246	37.6159	37.4085	36.4429	36.4429	36.2640	36.8148	37.4085	37.8281	38.2668	(38)
Average = Sum(39)m / 12 =	84.6935	84.4527	84.2166	83.1080	82.9005	81.9349	81.9349	81.7561	82.3068	82.9005	83.3202	83.7589	(39)
												83.1070	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0587	1.0557	1.0527	1.0388	1.0363	1.0242	1.0242	1.0220	1.0288	1.0363	1.0415	1.0470	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.4629 (42)
Hot water usage for mixer showers													
65.5138	64.5292	63.0946	60.3496	58.3238	56.0648	54.7807	56.2045	57.7653	60.1909	62.9948	65.2628	65.2628	(42a)
Hot water usage for baths													
28.2963	27.8761	27.2843	26.1931	25.3761	24.4701	23.9808	24.5684	25.2083	26.1777	27.2913	28.2006	28.2006	(42b)
Hot water usage for other uses													
39.8522	38.4030	36.9538	35.5047	34.0555	32.6063	32.6063	34.0555	35.5047	36.9538	38.4030	39.8522	39.8522	(42c)
Average daily hot water use (litres/day)													122.8659 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
133.6623	130.8083	127.3327	122.0474	117.7554	113.1412	111.3678	114.8284	118.4782	123.3223	128.6891	133.3156	133.3156	(44)
Energy conte	211.6883	186.2693	195.7056	167.0767	158.5214	139.1203	134.6897	142.1816	146.0955	167.3473	183.3412	208.7400	(45)
Energy content (annual)										Total = Sum(45)m =	2040.7768		
Distribution loss (46)m = 0.15 x (45)m													
31.7533	27.9404	29.3558	25.0615	23.7782	20.8680	20.2035	21.3272	21.9143	25.1021	27.5012	31.3110	31.3110	(46)
Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1127 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1409 (55)
Total storage loss													
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	(56)
If cylinder contains dedicated solar storage													
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	(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													
270.3171	239.2243	254.3344	223.8143	217.1502	195.8579	193.3185	200.8104	202.8330	225.9761	240.0788	267.3688	267.3688	(62)
WWHRS	-29.9502	-26.4882	-27.7369	-22.9672	-21.4046	-18.3161	-17.1684	-18.2569	-18.9505	-22.3406	-25.3092	-29.3955	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
12Total per year (kWh/year)													2452.7993 (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	117.2894	104.2986	111.9752	100.9431	99.6114	91.6476	91.6874	94.1784	93.9668	102.5460	106.3510	116.3091	(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	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	123.1431	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
113.0463	125.1584	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	116.8145	113.0463	116.8145	113.0463	113.0463	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
219.4405	221.7177	215.9794	203.7634	188.3429	173.8497	164.1674	161.8903	167.6286	179.8446	195.2651	209.7582	209.7582	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	35.3143	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	-98.5144	(71)
Water heating gains (Table 5)													
157.6471	155.2062	150.5042	140.1987	133.8863	127.2883	123.2357	126.5839	130.5094	137.8307	147.7097	156.3294	156.3294	(72)
Total internal gains	553.0768	565.0252	542.4729	523.7195	498.2184	477.8954	460.3924	461.4634	474.8954	493.6644	522.7322	542.0769	(73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Southeast	5.0000				36.7938	0.6300		0.7000		0.7700		56.2234 (77)	
Southwest	0.6500				36.7938	0.6300		0.7000		0.7700		7.3090 (79)	
Northwest	8.7500				11.2829	0.6300		0.7000		0.7700		30.1719 (81)	
Solar gains	93.7043	169.6349	258.7218	365.1879	449.7670	464.4286	440.3037	374.4651	295.1594	194.6601	114.0612	79.0104	(83)
Total gains	646.7811	734.6601	801.1946	888.9074	947.9854	942.3240	900.6961	835.9286	770.0548	688.3246	636.7934	621.0872	(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	50.2597	50.4030	50.5443	51.2185	51.3467	51.9518	51.9518	52.0654	51.7170	51.3467	51.0881	50.8205	
alpha	4.3506	4.3602	4.3696	4.4146	4.4231	4.4635	4.4635	4.4710	4.4478	4.4231	4.4059	4.3880	
util living area	0.9817	0.9674	0.9391	0.8618	0.7230	0.5377	0.3962	0.4428	0.6758	0.8944	0.9664	0.9844	(86)
MIT	19.6921	19.9103	20.2124	20.5963	20.8556	20.9700	20.9938	20.9900	20.9197	20.5842	20.0857	19.6611	(87)
Th 2	20.0347	20.0372	20.0396	20.0511	20.0532	20.0632	20.0632	20.0651	20.0594	20.0532	20.0489	20.0444	(88)
util rest of house	0.9774	0.9599	0.9251	0.8319	0.6705	0.4659	0.3138	0.3561	0.6029	0.8643	0.9574	0.9807	(89)
MIT 2	18.5264	18.8023	19.1792	19.6460	19.9301	20.0445	20.0608	20.0608	20.0026	19.6447	19.0345	18.4942	(90)
Living area fraction										fLA = Living area / (4) =		0.2250	(91)
MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7887	19.0516	19.4117	19.8598	20.1383	20.2528	20.2707	20.2699	20.2089	19.8561	19.2710	18.7567	(93)
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9699	0.9502	0.9140	0.8251	0.6755	0.4808	0.3323	0.3754	0.6152	0.8570	0.9479	0.9739	(94)
Useful gains	627.2879	698.0451	732.3201	733.4492	640.3525	453.0603	299.2583	313.8209	473.7508	589.8953	603.6133	604.8668	(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	1227.0982	1195.1370	1087.3792	910.8487	699.5428	463.1581	300.7602	316.3869	502.8070	767.3359	1014.0928	1219.2553	(97)
Space heating kWh	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050	(98a)
Space heating requirement - total per year (kWh/year)												2100.8998	
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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2100.8998	
Space heating per m2										(98c) / (4) =		26.2612	(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	446.2588	334.0458	264.1640	127.7276	44.0376	0.0000	0.0000	0.0000	0.0000	132.0158	295.5452	457.1050	(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)	483.4874	361.9131	286.2015	138.3831	47.7114	0.0000	0.0000	0.0000	0.0000	143.0290	320.2006	495.2383	(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	240.3670	212.7362	226.5975	200.8471	195.7456	177.5418	176.1501	182.5535	183.8825	203.6355	214.7696	237.9733	(64)
Efficiency of water heater	85.4272	85.0672	84.4047	83.0730	81.3136	79.8000	79.8000	79.8000	79.8000	83.1131	84.7761	79.8000	(216)
Fuel for water heating, kWh/month	281.3705	250.0800	268.4656	241.7719	240.7294	222.4834	220.7394	228.7638	230.4292	245.0100	253.3374	278.3357	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	23.4888	18.8436	16.9666	12.4304	9.6016	7.8446	8.7589	11.3852	14.7882	19.4029	21.9156	24.1416	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-37.2723	-52.4700	-75.3150	-84.5623	-91.0859	-84.9809	-83.9216	-79.2664	-71.0465	-59.9299	-40.9455	-32.2325	(233a)
(233a)m	-37.2723	-52.4700	-75.3150	-84.5623	-91.0859	-84.9809	-83.9216	-79.2664	-71.0465	-59.9299	-40.9455	-32.2325	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.2955	-44.7718	-88.9406	-133.5189	-176.4879	-177.3124	-175.2339	-148.4048	-108.8169	-64.0172	-28.4287	-16.8427	(233b)
(233b)m	-21.2955	-44.7718	-88.9406	-133.5189	-176.4879	-177.3124	-175.2339	-148.4048	-108.8169	-64.0172	-28.4287	-16.8427	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2276.1644	(211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2961.5162	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	189.5679	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1977.1002	(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	3536.1484	(238)

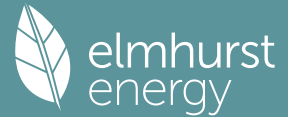
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2276.1644	0.2100	477.9945 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2961.5162	0.2100	621.9184 (264)
Space and water heating			1099.9129 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	189.5679	0.1443	27.3605 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	0.1346	-106.7552
PV Unit electricity exported	-1184.0715	0.1259	-149.0855
Total			-255.8407 (269)
Total CO2, kg/year			883.3620 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (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	2276.1644	1.1300	2572.0658 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2961.5162	1.1300	3346.5133 (278)
Space and water heating			5918.5791 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	189.5679	1.5338	290.7656 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-793.0287	1.4975	-1187.5791
PV Unit electricity exported	-1184.0715	0.4622	-547.2470
Total			-1734.8261 (283)
Total Primary energy kWh/year			4604.6194 (286)
Target Primary Energy Rate (TPER)			57.5600 (287)

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Property Reference	House Type 4			Issued on Date	24/10/2025
Assessment Reference	Plot 17	Prop Type Ref			
Property					
SAP Rating	85 B	DER	3.08	TER	7.46
Environmental	97 A	% DER < TER			58.71
CO ₂ Emissions (t/year)	0.45	DFEE	29.79	TFEE	33.58
Compliance Check	See BREL	% DFEE < TFEE			11.30
% DPER < TPER	17.09	DPER	32.27	TPER	38.92
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	85.0000 (1b)	x 2.3000 (2b)	= 195.5000 (1b) - (3b)
First floor	75.0000 (1c)	x 2.7000 (2c)	= 202.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	160.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 398.0000 (5)

2. Ventilation rate

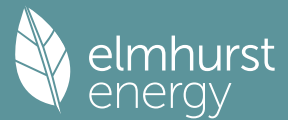
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			33.8000	1.3258	44.8106		(27)
Heatloss Floor 1			85.0000	0.1200	10.2000	110.0000	9350.0000 (28a)
External Wall 1	95.0000	33.8000	61.2000	0.2000	12.2400	190.0000	11628.0000 (29a)
External Roof 1	85.0000		85.0000	0.1100	9.3500	9.0000	765.0000 (30)
Total net area of external elements Aum(A, m ²)			265.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	76.6006		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21743.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							135.8938 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 80.5395 (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	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700	65.6700 (38)
Average = Sum(39)m / 12 =	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095	146.2095 (39)
	146.2095											146.2095
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138	0.9138 (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													2.9489 (42)
Hot water usage for mixer showers													
71.8022	70.7029	69.0829	66.5907	64.3578	61.2339	58.7631	61.6516	63.1044	66.1984	69.4206	71.7375	71.7375	(42a)
Hot water usage for baths													
31.0919	30.6226	29.9549	28.9550	28.0538	26.8132	25.8721	27.0230	27.6270	28.8561	30.1341	31.0673	31.0673	(42b)
Hot water usage for other uses													
44.8297	43.1996	41.5694	39.9392	38.3091	36.6789	36.6789	38.3091	39.9392	41.5694	43.1996	44.8297	44.8297	(42c)
Average daily hot water use (litres/day)													135.7800 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
147.7239	144.5251	140.6072	135.4849	130.7206	124.7260	121.3141	126.9836	130.6706	136.6240	142.7543	147.6345	147.6345	(44)
Energy content (annual)													
217.4751	191.2359	200.9248	176.9771	168.4467	144.2415	134.0556	149.4620	151.5713	176.0538	192.9372	216.8121	216.8121	(45)
Distribution loss (46)m = 0.15 x (45)m													
32.6213	28.6854	30.1387	26.5466	25.2670	21.6362	20.1083	22.4193	22.7357	26.4081	28.9406	32.5218	32.5218	(46)
Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9720 (55)
Total storage loss													
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(56)
If cylinder contains dedicated solar storage													
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065	270.2065	(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													
270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065	270.2065	(64)
12Total per year (kWh/year)													
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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													
115.0260	102.1677	109.5230	100.1825	98.7241	89.2979	87.2890	92.4116	91.7351	101.2534	105.4892	114.8055	114.8055	(65)

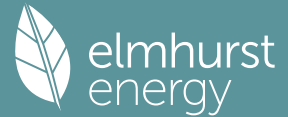
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
167.4452	185.3858	167.4452	173.0267	167.4452	173.0267	167.4452	167.4452	173.0267	167.4452	173.0267	167.4452	167.4452	167.4452 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
331.2042	334.6410	325.9803	307.5425	284.2681	262.3934	247.7798	244.3430	253.0038	271.4415	294.7159	316.5906	316.5906	316.5906 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445 (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	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)													
-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562 (71)
Water heating gains (Table 5)													
154.6048	152.0353	147.2083	139.1423	132.6936	124.0249	117.3239	124.2092	127.4098	136.0933	146.5128	154.3085	154.3085	154.3085 (72)
Total internal gains													
720.4878	739.2957	707.8674	686.9451	651.6405	626.6786	599.7826	603.2310	620.6739	642.2136	681.4890	705.5779	705.5779	705.5779 (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													15.1000		11.2829		0.7600		0.0000		0.7700		99.7019	(75)	
Southeast													2.9000		36.7938		0.7600		0.0000		0.7700		62.4421	(77)	
Southwest													7.5000		36.7938		0.7600		0.0000		0.7700		161.4881	(79)	
Northwest													8.3000		11.2829		0.7600		0.0000		0.7700		54.8031	(81)	
Solar gains													378.4352	695.9354	1088.5252	1577.2218	1975.1716	2052.6231	1940.7719	1629.8588	1255.5493	805.9112	462.6240	317.8141	(83)
Total gains													1098.9230	1435.2310	1796.3926	2264.1669	2626.8121	2679.3017	2540.5544	2233.0898	1876.2232	1448.1248	1144.1131	1023.3920	(84)

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087	41.3087
alpha	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539	3.7539
util living area	0.9719	0.9327	0.8496	0.6834	0.4956	0.3448	0.2521	0.2988	0.5122	0.8085	0.9459	0.9779 (86)
Living	19.7600	20.0620	20.4173	20.7308	20.8690	20.9079	20.9155	20.9134	20.8774	20.6230	20.1170	19.6910
Non living	18.6925	19.0696	19.5020	19.8623	20.0074	20.0434	20.0492	20.0480	20.0193	19.7535	19.1437	18.6053
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.3657	20.0620	20.4173	20.7308	20.8690	20.9079	20.9155	20.9134	20.8774	20.6230	20.1170	19.8741 (87)
Th 2	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558	20.1558 (88)
util rest of house	0.9671	0.9223	0.8292	0.6501	0.4555	0.3008	0.2042	0.2449	0.4566	0.7753	0.9357	0.9740 (89)
MIT 2	19.5724	19.0696	19.5020	19.8623	20.0074	20.0434	20.0492	20.0480	20.0193	19.7535	19.1437	18.8847 (90)
Living area fraction										fLA = Living area / (4) =		0.1562 (91)
MIT	19.6964	19.2247	19.6450	19.9980	20.1420	20.1785	20.1846	20.1833	20.1534	19.8894	19.2958	19.0393 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6964	19.2247	19.6450	19.9980	20.1420	20.1785	20.1846	20.1833	20.1534	19.8894	19.2958	19.0393 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9641	0.9087	0.8155	0.6435	0.4548	0.3020	0.2059	0.2467	0.4565	0.7636	0.9229	0.9676 (94)
Useful gains	1059.5109	1304.1766	1464.8744	1457.0104	1194.7968	809.0738	522.9847	550.9371	856.4038	1105.8211	1055.9023	990.2612 (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	2251.0960	2094.4036	1921.9254	1622.6356	1234.2993	815.6254	524.0963	553.1486	885.0637	1358.1944	1783.1359	2169.6452 (97)
Space heating kWh	886.5394	531.0325	340.0460	119.2502	29.3898	0.0000	0.0000	0.0000	0.0000	187.7658	523.6082	877.4617 (98a)
Space heating requirement - total per year (kWh/year)												3495.0935
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	886.5394	531.0325	340.0460	119.2502	29.3898	0.0000	0.0000	0.0000	0.0000	187.7658	523.6082	877.4617 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3495.0935
Space heating per m2										(98c) / (4) =		21.8443 (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 %)

261.9093 (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	886.5394	531.0325	340.0460	119.2502	29.3898	0.0000	0.0000	0.0000	0.0000	187.7658	523.6082	877.4617 (98)
Space heating efficiency (main heating system 1)	261.9093	261.9093	261.9093	261.9093	261.9093	0.0000	0.0000	0.0000	0.0000	261.9093	261.9093	261.9093 (210)
Space heating fuel (main heating system)	338.4910	202.7544	129.8335	45.5311	11.2214	0.0000	0.0000	0.0000	0.0000	71.6911	199.9197	335.0250 (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	270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065 (64)
Efficiency of water heater	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534	175.2534 (216)
Fuel for water heating, kWh/month	154.5588	136.6382	145.1151	130.4677	126.5831	111.7887	106.9594	115.7504	115.9711	130.9237	139.5746	154.1804 (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	5.5400	5.0039	5.5400	5.3613	5.5400	5.3613	5.5400	5.5400	5.3613	5.5400	5.3613	5.5400 (231)
Lighting	45.7892	36.7338	33.0747	24.2319	18.7174	15.2923	17.0747	22.1943	28.8282	37.8242	42.7223	47.0618 (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												1334.4672 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.2534
Water heating fuel used												1568.5112 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

65.2293 (230a)

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Total electricity for the above, kWh/year	65.2293 (231)
Electricity for lighting (calculated in Appendix L)	369.5448 (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	3337.7525 (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	1334.4672	0.1574	210.0184 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1568.5112	0.1409	221.0361 (264)
Space and water heating			431.0545 (265)
Pumps, fans and electric keep-hot	65.2293	0.1387	9.0481 (267)
Energy for lighting	369.5448	0.1443	53.3367 (268)
Total CO2, kg/year			493.4393 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.0800 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1334.4672	1.5825	2111.8564 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1568.5112	1.5211	2385.8225 (278)
Space and water heating			4497.6789 (279)
Pumps, fans and electric keep-hot	65.2293	1.5128	98.6788 (281)
Energy for lighting	369.5448	1.5338	566.8202 (282)
Total Primary energy kWh/year			5163.1780 (286)
Dwelling Primary energy Rate (DPER)			32.2700 (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	85.0000 (1b)	x 2.3000 (2b)	= 195.5000 (1b) - (3b)
First floor	75.0000 (1c)	x 2.7000 (2c)	= 202.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	160.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	398.0000 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1005 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3505 (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) = 0.2979 (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	0.3799	0.3724	0.3650	0.3277	0.3203	0.2830	0.2830	0.2756	0.2979	0.3203	0.3352	0.3501 (22b)
Effective ac	0.5721	0.5693	0.5666	0.5537	0.5513	0.5401	0.5401	0.5380	0.5444	0.5513	0.5562	0.5613 (25)

3. Heat losses and heat loss parameter

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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			33.8000	1.1450	38.7023		(27)
Heatloss Floor 1			85.0000	0.1300	11.0500		(28a)
External Wall 1	95.0000	33.8000	61.2000	0.1800	11.0160		(29a)
External Roof 1	85.0000		85.0000	0.1100	9.3500		(30)
Total net area of external elements Aum(A, m2)			265.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		70.1183		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 135.8938 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 79.5138 (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	75.1456	74.7777	74.4170	72.7230	72.4060	70.9306	70.9306	70.6574	71.4989	72.4060	73.0472	73.7175
Heat transfer coeff	154.6594	154.2915	153.9308	152.2368	151.9198	150.4444	150.4444	150.1711	151.0127	151.9198	152.5610	153.2313
Average = Sum(39)m / 12 =												152.2352

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9666	0.9643	0.9621	0.9515	0.9495	0.9403	0.9403	0.9386	0.9438	0.9495	0.9535	0.9577
HLP (average)												0.9515
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9489 (42)

Hot water usage for mixer showers 73.6633 72.5563 70.9432 67.8567 65.5790 63.0389 61.5951 63.1960 64.9509 67.6782 70.8310 73.3811 (42a)

Hot water usage for baths 31.8009 31.3286 30.6635 29.4372 28.5190 27.5008 26.9508 27.6113 28.3303 29.4198 30.6714 31.6933 (42b)

Hot water usage for other uses 44.8297 43.1996 41.5694 39.9392 38.3091 36.6789 36.6789 38.3091 39.9392 41.5694 43.1996 44.8297 (42c)

Average daily hot water use (litres/day) 138.1538 (43)

Daily hot water use 150.2939 147.0844 143.1760 137.2331 132.4070 127.2186 125.2248 129.1163 133.2205 138.6675 144.7019 149.9042 (44)

Energy conte 238.0288 209.4463 220.0562 187.8653 178.2453 156.4301 151.4486 159.8730 164.2742 188.1704 206.1544 234.7137 (45)

Energy content (annual) 2294.7063

Distribution loss (46)m = 0.15 x (45)m 35.7043 31.4169 33.0084 28.1798 26.7368 23.4645 22.7173 23.9809 24.6411 28.2256 30.9232 35.2071 (46)

Water storage loss: 300.0000 (47)

Store volume 2.1127 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 1.1409 (55)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)

If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 296.6576 262.4013 278.6851 244.6029 236.8741 213.1676 210.0774 218.5018 221.0118 246.7992 262.8920 293.3425 (62)

WWHRS -33.6758 -29.7831 -31.1872 -25.8242 -24.0673 -20.5945 -19.3041 -20.5280 -21.3079 -25.1196 -28.4575 -33.0522 (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 262.9818 232.6182 247.4979 218.7786 212.8068 192.5731 190.7733 197.9739 199.7039 221.6796 234.4345 260.2903 (64)

Total per year (kWh/year) 2672.1119 (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 126.0476 112.0049 120.0718 107.8553 106.1696 97.4030 97.2597 100.0608 100.0112 109.4697 113.9364 124.9454 (65)

12Total per year (kWh/year) 2672.1119 (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 126.0476 112.0049 120.0718 107.8553 106.1696 97.4030 97.2597 100.0608 100.0112 109.4697 113.9364 124.9454 (65)

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

Metabolic gains (Table 5), Watts 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 147.4453 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 167.4452 185.3858 167.4452 173.0267 167.4452 173.0267 167.4452 167.4452 173.0267 167.4452 173.0267 167.4452 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 331.2042 334.6410 325.9803 307.5425 284.2681 262.3934 247.7798 244.3430 253.0038 271.4415 294.7159 316.5906 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 37.7445 (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)

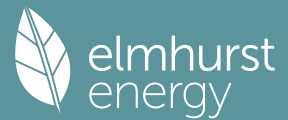
Losses e.g. evaporation (negative values) (Table 5) -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 -117.9562 (71)

Water heating gains (Table 5) 169.4189 166.6740 161.3868 149.7990 142.7011 135.2820 130.7254 134.4904 138.9045 147.1367 158.2450 167.9373 (72)

Total internal gains 738.3018 756.9344 725.0458 700.6017 664.6479 637.9357 613.1840 613.5121 632.1685 656.2570 696.2212 722.2067 (73)

6. Solar gains

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[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		
Northeast	15.1000				11.2829	0.6300	0.7000	0.7700	0.7700	52.0680 (75)		
Southeast	2.9000				36.7938	0.6300	0.7000	0.7700	0.7700	32.6096 (77)		
Southwest	7.5000				36.7938	0.6300	0.7000	0.7700	0.7700	84.3351 (79)		
Northwest	8.3000				11.2829	0.6300	0.7000	0.7700	0.7700	28.6202 (81)		
Solar gains	197.6328	363.4431	568.4680	823.6833	1031.5074	1071.9554	1013.5426	851.1723	655.6941	420.8765	241.5993	165.9743 (83)
Total gains	935.9346	1120.3775	1293.5138	1524.2851	1696.1553	1709.8912	1626.7266	1464.6844	1287.8627	1077.1336	937.8205	888.1809 (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	39.0518	39.1449	39.2366	39.6732	39.7560	40.1459	40.1459	40.2189	39.9948	39.7560	39.5889	39.4157
alpha	3.6035	3.6097	3.6158	3.6449	3.6504	3.6764	3.6764	3.6813	3.6663	3.6504	3.6393	3.6277
util living area	0.9834	0.9682	0.9364	0.8521	0.7083	0.5311	0.3979	0.4555	0.6959	0.9055	0.9707	0.9861 (86)
MIT	19.1614	19.4513	19.8695	20.3965	20.7648	20.9391	20.9837	20.9736	20.8377	20.3278	19.6562	19.1165 (87)
Th 2	20.1112	20.1132	20.1151	20.1240	20.1256	20.1334	20.1334	20.1348	20.1304	20.1256	20.1223	20.1187 (88)
util rest of house	0.9804	0.9626	0.9251	0.8271	0.6639	0.4685	0.3232	0.3759	0.6346	0.8835	0.9645	0.9836 (89)
MIT 2	17.9430	18.3112	18.8372	19.4853	19.9060	20.0885	20.1250	20.1202	19.9969	19.4188	18.5804	17.8908 (90)
Living area fraction	18.1334	18.4893	18.9985	19.6277	20.0402	20.2214	20.2591	20.2536	20.1283	19.5608	18.7485	18.0823 (92)
MIT	18.1334	18.4893	18.9985	19.6277	20.0402	20.2214	20.2591	20.2536	20.1283	19.5608	18.7485	18.0823 (93)
Temperature adjustment												0.0000
adjusted MIT	18.1334	18.4893	18.9985	19.6277	20.0402	20.2214	20.2591	20.2536	20.1283	19.5608	18.7485	18.0823 (93)
8. Space heating requirement												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9708	0.9487	0.9072	0.8109	0.6592	0.4751	0.3342	0.3872	0.6344	0.8661	0.9514	0.9751 (94)
Useful gains	908.5624	1062.8567	1173.4179	1236.0666	1118.1601	812.3470	543.6727	567.0747	817.0698	932.9504	892.2106	866.0271 (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	2139.4651	2096.7189	1923.9000	1633.1489	1267.0382	845.7097	550.4982	578.6934	910.3530	1361.3239	1777.1114	2127.2037 (97)
Space heating kWh	915.7916	694.7554	558.3587	285.8992	110.7653	0.0000	0.0000	0.0000	0.0000	318.7099	637.1286	938.3154 (98a)
Space heating requirement - total per year (kWh/year)												4459.7241
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	915.7916	694.7554	558.3587	285.8992	110.7653	0.0000	0.0000	0.0000	0.0000	318.7099	637.1286	938.3154 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4459.7241
Space heating per m2										(98c) / (4) =		27.8733 (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	915.7916	694.7554	558.3587	285.8992	110.7653	0.0000	0.0000	0.0000	0.0000	318.7099	637.1286	938.3154 (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)	992.1903	752.7144	604.9390	309.7500	120.0057	0.0000	0.0000	0.0000	0.0000	345.2979	690.2801	1016.5931 (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	262.9818	232.6182	247.4979	218.7786	212.8068	192.5731	190.7733	197.9739	199.7039	221.6796	234.4345	260.2903 (64)
Efficiency of water heater (217)m	86.6205	86.3570	85.8271	84.6608	82.6681	79.8000	79.8000	79.8000	79.8000	84.8733	86.1855	79.8000 (216)
Fuel for water heating, kWh/month	303.6023	269.3681	288.3679	258.4178	257.4230	241.3197	239.0643	248.0875	250.2555	261.1889	272.0116	300.2988 (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	34.7918	27.9113	25.1310	18.4121	14.2220	11.6195	12.9738	16.8638	21.9044	28.7398	32.4615	35.7588 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-72.0909	-98.0639	-136.0215	-147.3326	-154.1879	-142.1168	-140.1610	-134.4320	-123.8846	-109.2099	-77.8887	-62.7365 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-52.3658	-108.5749	-213.0217	-316.0899	-414.4064	-415.2564	-410.5445	-349.3693	-258.3251	-154.1776	-69.5316	-41.5483 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

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Annual totals kWh/year		
Space heating fuel - main system 1	4831.7704	(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	3189.4055	(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)	280.7898	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-4201.3380	(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	4186.6277	(238)

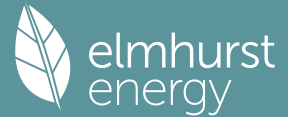
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4831.7704	0.2100	1014.6718 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3189.4055	0.2100	669.7751 (264)
Space and water heating			1684.4469 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	280.7898	0.1443	40.5266 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1398.1265	0.1354	-189.2957
PV Unit electricity exported	-2803.2115	0.1262	-353.8986
Total			-543.1943 (269)
Total CO2, kg/year			1193.7085 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.4600 (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	4831.7704	1.1300	5459.9006 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3189.4055	1.1300	3604.0282 (278)
Space and water heating			9063.9288 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	280.7898	1.5338	430.6847 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1398.1265	1.5004	-2097.7938
PV Unit electricity exported	-2803.2115	0.4634	-1299.0936
Total			-3396.8875 (283)
Total Primary energy kWh/year			6227.8269 (286)
Target Primary Energy Rate (TPER)			38.9200 (287)

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Property Reference	House Type 5			Issued on Date	24/10/2025
Assessment Reference	Plot 18	Prop Type Ref			
Property					
SAP Rating	85 B	DER	2.93	TER	7.05
Environmental	97 A	% DER < TER			58.44
CO ₂ Emissions (t/year)	0.43	DFEE	27.12	TFEE	30.15
Compliance Check	See BREL	% DFEE < TFEE			10.05
% DPER < TPER	15.83	DPER	30.77	TPER	36.56
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	75.0000 (1b)	x 2.3000 (2b)	= 172.5000 (1b) - (3b)
First floor	85.0000 (1c)	x 2.7000 (2c)	= 229.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	160.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 402.0000 (5)

2. Ventilation rate

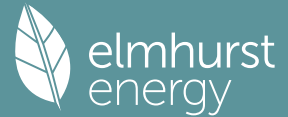
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			33.4000	1.3258	44.2803		(27)
Heatloss Floor 1			85.0000	0.1200	10.2000	110.0000	9350.0000 (28a)
External Wall 1	48.7000	33.4000	15.3000	0.2000	3.0600	190.0000	2906.9998 (29a)
External Roof 1	85.0000		85.0000	0.1100	9.3500	9.0000	765.0000 (30)
Total net area of external elements Aum(A, m ²)			218.7000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	66.8903		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	13021.9998 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							81.3875 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 70.8292 (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	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300	66.3300 (38)
Average = Sum(39)m / 12 =	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592	137.1592 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572	0.8572 (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													2.9489 (42)
Hot water usage for mixer showers													
71.8022	70.7029	69.0829	66.5907	64.3578	61.2339	58.7631	61.6516	63.1044	66.1984	69.4206	71.7375	71.7375	(42a)
Hot water usage for baths													
31.0919	30.6226	29.9549	28.9550	28.0538	26.8132	25.8721	27.0230	27.6270	28.8561	30.1341	31.0673	31.0673	(42b)
Hot water usage for other uses													
44.8297	43.1996	41.5694	39.9392	38.3091	36.6789	36.6789	38.3091	39.9392	41.5694	43.1996	44.8297	44.8297	(42c)
Average daily hot water use (litres/day)													135.7800 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
147.7239	144.5251	140.6072	135.4849	130.7206	124.7260	121.3141	126.9836	130.6706	136.6240	142.7543	147.6345	147.6345	(44)
Energy content (annual)													
217.4751	191.2359	200.9248	176.9771	168.4467	144.2415	134.0556	149.4620	151.5713	176.0538	192.9372	216.8121	216.8121	(45)
Distribution loss (46)m = 0.15 x (45)m													
32.6213	28.6854	30.1387	26.5466	25.2670	21.6362	20.1083	22.4193	22.7357	26.4081	28.9406	32.5218	32.5218	(46)
Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9720 (55)
Total storage loss													
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(56)
If cylinder contains dedicated solar storage													
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065	270.2065	(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													
270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065	270.2065	(64)
12Total per year (kWh/year)													2748.8692 (64)
Electric shower(s)													2749 (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													
115.0260	102.1677	109.5230	100.1825	98.7241	89.2979	87.2890	92.4116	91.7351	101.2534	105.4892	114.8055	114.8055	(65)

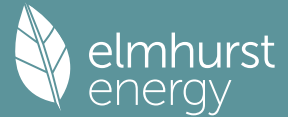
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	167.5851	185.5406	167.5851	173.1713	167.5851	173.1713	167.5851	167.5851	173.1713	167.5851	173.1713	167.5851 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	331.2042	334.6410	325.9803	307.5425	284.2681	262.3934	247.7798	244.3430	253.0038	271.4415	294.7159	316.5906 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445 (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)	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562 (71)
Water heating gains (Table 5)	154.6048	152.0353	147.2083	139.1423	132.6936	124.0249	117.3239	124.2092	127.4098	136.0933	146.5128	154.3085 (72)
Total internal gains	720.6277	739.4505	708.0073	687.0897	651.7804	626.8231	599.9225	603.3709	620.8184	642.3535	681.6336	705.7178 (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					13.4000	11.2829	0.7600	0.0000	0.7700		88.4772 (75)	
Southeast					9.0000	36.7938	0.7600	0.0000	0.7700		193.7858 (77)	
Southwest					7.5000	36.7938	0.7600	0.0000	0.7700		161.4881 (79)	
Northwest					3.5000	11.2829	0.7600	0.0000	0.7700		23.1097 (81)	
Solar gains	466.8608	832.3013	1237.2414	1698.0200	2052.5447	2103.9547	2000.8654	1726.2452	1395.2146	946.4151	565.9415	395.1679 (83)
Total gains	1187.4885	1571.7519	1945.2487	2385.1097	2704.3251	2730.7779	2600.7879	2329.6161	2016.0330	1588.7686	1247.5751	1100.8857 (84)

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724	26.3724
alpha	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582	2.7582
util living area	0.9141	0.8436	0.7420	0.5912	0.4383	0.3118	0.2289	0.2654	0.4366	0.6932	0.8653	0.9274 (86)
Living	19.4244	19.8166	20.2260	20.5857	20.7793	20.8568	20.8788	20.8735	20.8084	20.4938	19.8840	19.3294
Non living	18.3361	18.8209	19.3180	19.7397	19.9552	20.0351	20.0550	20.0512	19.9912	19.6473	18.9129	18.2173
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1940	19.8166	20.2260	20.5857	20.7793	20.8568	20.8788	20.8735	20.8084	20.4938	19.8840	19.5631 (87)
Th 2	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040	20.2040 (88)
util rest of house	0.9052	0.8294	0.7212	0.5636	0.4061	0.2753	0.1885	0.2212	0.3930	0.6620	0.8503	0.9197 (89)
MIT 2	19.4593	18.8209	19.3180	19.7397	19.9552	20.0351	20.0550	20.0512	19.9912	19.6473	18.9129	18.5753 (90)
Living area fraction									fLA = Living area / (4) =			0.1562 (91)
MIT	19.5741	18.9765	19.4599	19.8719	20.0840	20.1635	20.1837	20.1797	20.1189	19.7796	19.0647	18.7296 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5741	18.9765	19.4599	19.8719	20.0840	20.1635	20.1837	20.1797	20.1189	19.7796	19.0647	18.7296 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8973	0.8042	0.7000	0.5515	0.4011	0.2734	0.1874	0.2198	0.3881	0.6439	0.8250	0.9024 (94)
Useful gains	1065.5891	1263.9918	1361.7228	1315.3890	1084.8267	746.6153	487.5055	512.0072	782.5044	1023.0129	1029.1924	993.4553 (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	2094.9857	1930.7199	1777.5720	1504.9007	1149.9382	763.0828	491.5397	518.4179	825.5472	1259.0645	1641.0632	1992.8758 (97)
Space heating kWh	765.8711	448.0413	309.3918	136.4485	48.4430	0.0000	0.0000	0.0000	0.0000	175.6224	440.5470	743.5688 (98a)
Space heating requirement - total per year (kWh/year)												3067.9339
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	765.8711	448.0413	309.3918	136.4485	48.4430	0.0000	0.0000	0.0000	0.0000	175.6224	440.5470	743.5688 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3067.9339
Space heating per m2										(98c) / (4) =		19.1746 (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 %)

259.9503 (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	765.8711	448.0413	309.3918	136.4485	48.4430	0.0000	0.0000	0.0000	0.0000	175.6224	440.5470	743.5688 (98)
Space heating efficiency (main heating system 1)	259.9503	259.9503	259.9503	259.9503	259.9503	0.0000	0.0000	0.0000	0.0000	259.9503	259.9503	259.9503 (210)
Space heating fuel (main heating system)	294.6221	172.3565	119.0196	52.4902	18.6355	0.0000	0.0000	0.0000	0.0000	67.5600	169.4735	286.0427 (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	270.8695	239.4631	254.3192	228.6491	221.8411	195.9135	187.4500	202.8564	203.2433	229.4482	244.6092	270.2065 (64)
Efficiency of water heater	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730	174.8730 (216)
Fuel for water heating, kWh/month	154.8949	136.9354	145.4307	130.7515	126.8584	112.0318	107.1921	116.0021	116.2234	131.2085	139.8782	154.5158 (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	5.5957	5.0542	5.5957	5.4152	5.5957	5.4152	5.5957	5.5957	5.4152	5.5957	5.4152	5.5957 (231)
Lighting	45.8274	36.7645	33.1023	24.2522	18.7331	15.3051	17.0889	22.2129	28.8523	37.8558	42.7580	47.1011 (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												1180.2002 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												174.8730
Water heating fuel used												1571.9228 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

65.8848 (230a)

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Total electricity for the above, kWh/year	65.8848 (231)
Electricity for lighting (calculated in Appendix L)	369.8536 (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	3187.8614 (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	1180.2002	0.1569	185.1801 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1571.9228	0.1409	221.5169 (264)
Space and water heating			406.6969 (265)
Pumps, fans and electric keep-hot	65.8848	0.1387	9.1390 (267)
Energy for lighting	369.8536	0.1443	53.3813 (268)
Total CO2, kg/year			469.2173 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.9300 (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	1180.2002	1.5808	1865.6548 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1571.9228	1.5211	2391.0118 (278)
Space and water heating			4256.6666 (279)
Pumps, fans and electric keep-hot	65.8848	1.5128	99.6706 (281)
Energy for lighting	369.8536	1.5338	567.2938 (282)
Total Primary energy kWh/year			4923.6310 (286)
Dwelling Primary energy Rate (DPER)			30.7700 (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	75.0000 (1b)	x 2.3000 (2b)	= 172.5000 (1b) - (3b)
First floor	85.0000 (1c)	x 2.7000 (2c)	= 229.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	160.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	402.0000 (5)

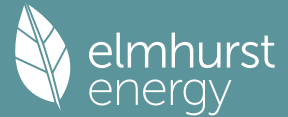
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.0995 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3495 (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) = 0.2971 (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	0.3788	0.3713	0.3639	0.3268	0.3194	0.2822	0.2822	0.2748	0.2971	0.3194	0.3342	0.3491 (22b)
Effective ac	0.5717	0.5689	0.5662	0.5534	0.5510	0.5398	0.5398	0.5378	0.5441	0.5510	0.5558	0.5609 (25)

3. Heat losses and heat loss parameter

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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			33.4000	1.1450	38.2443		(27)
Heatloss Floor 1			85.0000	0.1300	11.0500		(28a)
External Wall 1	48.7000	33.4000	15.3000	0.1800	2.7540		(29a)
External Roof 1	85.0000		85.0000	0.1100	9.3500		(30)
Total net area of external elements Aum(A, m2)			218.7000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		61.3983		(33)

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

81.3875 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

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

9.3955 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 70.7938 (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	75.8463	75.4768	75.1146	73.4133	73.0950	71.6132	71.6132	71.3388	72.1839	73.0950	73.7389	74.4121
Heat transfer coeff	146.6401	146.2706	145.9083	144.2070	143.8887	142.4070	142.4070	142.1326	142.9777	143.8887	144.5327	145.2059
Average = Sum(39)m / 12 =												144.2055

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9165	0.9142	0.9119	0.9013	0.8993	0.8900	0.8900	0.8883	0.8936	0.8993	0.9033	0.9075
HLP (average)												0.9013
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

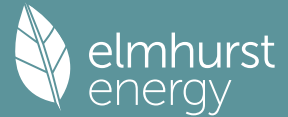
Assumed occupancy												2.9489 (42)
Hot water usage for mixer showers												
73.6633	72.5563	70.9432	67.8567	65.5790	63.0389	61.5951	63.1960	64.9509	67.6782	70.8310	73.3811	(42a)
Hot water usage for baths												
31.8009	31.3286	30.6635	29.4372	28.5190	27.5008	26.9508	27.6113	28.3303	29.4198	30.6714	31.6933	(42b)
Hot water usage for other uses												
44.8297	43.1996	41.5694	39.9392	38.3091	36.6789	36.6789	38.3091	39.9392	41.5694	43.1996	44.8297	(42c)
Average daily hot water use (litres/day)												138.1538 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	150.2939	147.0844	143.1760	137.2331	132.4070	127.2186	125.2248	129.1163	133.2205	138.6675	144.7019	149.9042
Energy conte	238.0288	209.4463	220.0562	187.8653	178.2453	156.4301	151.4486	159.8730	164.2742	188.1704	206.1544	234.7137
Energy content (annual)										Total = Sum(45)m =		2294.7063 (45)
Distribution loss (46)m = 0.15 x (45)m												
35.7043	31.4169	33.0084	28.1798	26.7368	23.4645	22.7173	23.9809	24.6411	28.2256	30.9232	35.2071	(46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1127 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1409 (55)
Total storage loss												
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage												
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(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												
296.6576	262.4013	278.6851	244.6029	236.8741	213.1676	210.0774	218.5018	221.0118	246.7992	262.8920	293.3425	(62)
WWHRS	-33.6758	-29.7831	-31.1872	-25.8242	-24.0673	-20.5945	-19.3041	-20.5280	-21.3079	-25.1196	-28.4575	-33.0522 (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												
262.9818	232.6182	247.4979	218.7786	212.8068	192.5731	190.7733	197.9739	199.7039	221.6796	234.4345	260.2903	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2672.1119 (64)
Electric shower(s)												2672 (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												
126.0476	112.0049	120.0718	107.8553	106.1696	97.4030	97.2597	100.0608	100.0112	109.4697	113.9364	124.9454	(65)

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

Metabolic gains (Table 5), Watts												
(66)m	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453	147.4453 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
167.5851	185.5406	167.5851	173.1713	167.5851	173.1713	167.5851	167.5851	173.1713	167.5851	173.1713	167.5851	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
331.2042	334.6410	325.9803	307.5425	284.2681	262.3934	247.7798	244.3430	253.0038	271.4415	294.7159	316.5906	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	37.7445	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	-117.9562	(71)
Water heating gains (Table 5)												
169.4189	166.6740	161.3868	149.7990	142.7011	135.2820	130.7254	134.4904	138.9045	147.1367	158.2450	167.9373	(72)
Total internal gains												
738.4417	757.0893	725.1857	700.7463	664.7879	638.0803	613.3239	613.6520	632.3131	656.3969	696.3658	722.3466	(73)

6. Solar gains

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[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	
Northeast	13.4000				11.2829		0.6300		0.7000			0.7700	46.2061 (75)		
Southeast	9.0000				36.7938		0.6300		0.7000			0.7700	101.2021 (77)		
Southwest	7.5000				36.7938		0.6300		0.7000			0.7700	84.3351 (79)		
Northwest	3.5000				11.2829		0.6300		0.7000			0.7700	12.0687 (81)		
Solar gains	243.8119	434.6584	646.1331	886.7686	1071.9144	1098.7627	1044.9256	901.5089	728.6325	494.2528	295.5555	206.3712	(83)		
Total gains	982.2536	1191.7477	1371.3188	1587.5149	1736.7023	1736.8430	1658.2495	1515.1609	1360.9456	1150.6498	991.9213	928.7178	(84)		
7. Mean internal temperature (heating season)															
Temperature during heating periods in the living area from Table 9, Th1 (C)															
Utilisation factor for gains for living area, nil,m (see Table 9a)															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)		
tau	24.6673	24.7297	24.7911	25.0835	25.1390	25.4006	25.4006	25.4496	25.2992	25.1390	25.0270	24.9110			
alpha	2.6445	2.6486	2.6527	2.6722	2.6759	2.6934	2.6934	2.6966	2.6866	2.6759	2.6685	2.6607			
util living area	0.9445	0.9113	0.8599	0.7611	0.6277	0.4764	0.3603	0.4049	0.6039	0.8153	0.9168	0.9512	(86)		
MIT	18.5981	18.9943	19.5183	20.1471	20.6055	20.8658	20.9534	20.9355	20.7375	20.1118	19.2537	18.5333	(87)		
Th 2	20.1535	20.1555	20.1574	20.1664	20.1681	20.1760	20.1760	20.1774	20.1729	20.1681	20.1647	20.1611	(88)		
util rest of house	0.9382	0.9015	0.8446	0.7361	0.5902	0.4253	0.2981	0.3401	0.5527	0.7896	0.9060	0.9455	(89)		
MIT 2	17.3102	17.8087	18.4632	19.2360	19.7733	20.0623	20.1455	20.1331	19.9353	19.2123	18.1480	17.2330	(90)		
Living area fraction	fLA = Living area / (4) =												0.1562	(91)	
MIT	17.5114	17.9940	18.6280	19.3783	19.9033	20.1879	20.2717	20.2585	20.0606	19.3528	18.3208	17.4362	(92)		
Temperature adjustment													0.0000		
adjusted MIT	17.5114	17.9940	18.6280	19.3783	19.9033	20.1879	20.2717	20.2585	20.0606	19.3528	18.3208	17.4362	(93)		
8. Space heating requirement															
Utilisation	0.9107	0.8693	0.8112	0.7095	0.5775	0.4260	0.3055	0.3467	0.5452	0.7600	0.8748	0.9198	(94)		
Useful gains	894.5222	1036.0370	1112.3546	1126.3221	1002.9107	739.9500	506.6634	525.2952	742.0292	874.4409	867.7162	854.2131	(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	1937.3237	1915.2645	1769.5825	1511.0481	1180.3637	795.7536	522.8818	548.4202	852.2387	1259.4348	1621.7719	1921.9683	(97)		
Space heating kWh	775.8443	590.8409	488.9775	277.0028	132.0251	0.0000	0.0000	0.0000	0.0000	286.4354	542.9201	794.4099	(98a)		
Space heating requirement - total per year (kWh/year)													3888.4560		
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	775.8443	590.8409	488.9775	277.0028	132.0251	0.0000	0.0000	0.0000	0.0000	286.4354	542.9201	794.4099	(98c)		
Space heating requirement after solar contribution - total per year (kWh/year)													3888.4560		
Space heating per m2	(98c) / (4) =												24.3028	(99)	
9a. Energy requirements - Individual heating systems, including micro-CHP															
Fraction of space heat from secondary/supplementary system (Table 11)															
Fraction of space heat from main system(s)															
Efficiency of main space heating system 1 (in %)															
Efficiency of main space heating system 2 (in %)															
Efficiency of secondary/supplementary heating system, %															
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	775.8443	590.8409	488.9775	277.0028	132.0251	0.0000	0.0000	0.0000	0.0000	286.4354	542.9201	794.4099	(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)	840.5680	640.1310	529.7698	300.1113	143.0391	0.0000	0.0000	0.0000	0.0000	310.3309	588.2125	860.6824	(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	262.9818	232.6182	247.4979	218.7786	212.8068	192.5731	190.7733	197.9739	199.7039	221.6796	234.4345	260.2903	(64)		
Efficiency of water heater (217)m	86.3350	86.0582	85.5573	84.5901	83.0216	79.8000	79.8000	79.8000	79.8000	84.6356	85.8790	86.3953	(217)		
Fuel for water heating, kWh/month	304.6061	270.3033	289.2774	258.6339	256.3271	241.3197	239.0643	248.0875	250.2555	261.9225	272.9822	301.2783	(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	34.8209	27.9346	25.1520	18.4274	14.2339	11.6292	12.9846	16.8779	21.9227	28.7638	32.4887	35.7887	(232)		
Electricity generated by PVs (Appendix M) (negative quantity)															
(233a)m	-65.7995	-90.6184	-127.2379	-139.5678	-147.5080	-136.4795	-134.6168	-128.4147	-117.2161	-101.7664	-71.4979	-57.1274	(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	-44.0153	-91.7100	-180.7413	-269.3344	-354.1929	-355.3204	-351.2998	-298.4689	-220.0277	-130.6343	-58.5788	-34.8886	(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)		

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Annual totals kWh/year	
Space heating fuel - main system 1	4212.8450 (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	3194.0579 (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)	281.0244 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3707.0629 (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	4066.8645 (238)

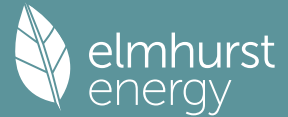
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4212.8450	0.2100	884.6975 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3194.0579	0.2100	670.7522 (264)
Space and water heating			1555.4496 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	281.0244	0.1443	40.5605 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1317.8504	0.1351	-178.0719
PV Unit electricity exported	-2389.2125	0.1261	-301.3253
Total			-479.3972 (269)
Total CO2, kg/year			1128.5422 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.0500 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	4212.8450	1.1300	4760.5149 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3194.0579	1.1300	3609.2855 (278)
Space and water heating			8369.8004 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	281.0244	1.5338	431.0446 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1317.8504	1.4994	-1976.0135
PV Unit electricity exported	-2389.2125	0.4630	-1106.0932
Total			-3082.1067 (283)
Total Primary energy kWh/year			5848.8391 (286)
Target Primary Energy Rate (TPER)			36.5600 (287)

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Property Reference	House Type 6				Issued on Date	24/10/2025	
Assessment Reference	Plot 19			Prop Type Ref			
Property							
SAP Rating	84 B	DER	3.36	TER	8.72		
Environmental	97 A	% DER < TER				61.47	
CO ₂ Emissions (t/year)	0.38	DFEE	28.55	TFEE	33.31		
Compliance Check	See BREL	% DFEE < TFEE				14.29	
% DPER < TPER	21.90	DPER	35.36	TPER	45.27		
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 305.0000 (5)

2. Ventilation rate

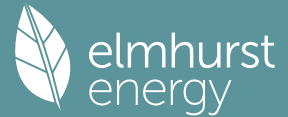
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			28.0200	1.3258	37.1477		(27)
Heatloss Floor 1			61.0000	0.1200	7.3200	110.0000	6710.0000 (28a)
External Wall 1	95.0000	28.0200	66.9800	0.2000	13.3960	190.0000	12726.2000 (29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100	9.0000	549.0000 (30)
Total net area of external elements Aum(A, m ²)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	64.5737		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	19985.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							163.8131 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														3.9389 (36)
Point Thermal bridges														0.0000 (36a)
Total fabric heat loss														(33) + (36) + (36a) = 68.5127 (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		
	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	(38)
Heat transfer coeff	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	118.8377	(39)
Average = Sum(39)m / 12 =														118.8377
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	0.9741	(40)
HLP (average)														
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		
													0.9741	
													31	

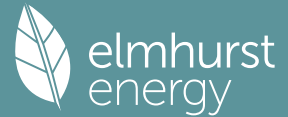
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.8707 (42)
Hot water usage for mixer showers	70.5244	69.4447	67.8535	65.4056	63.2124	60.1442	57.7174	60.5544	61.9814	65.0204	68.1852	70.4608 (42a)
Hot water usage for baths	30.5408	30.0797	29.4239	28.4417	27.5565	26.3379	25.4134	26.5439	27.1372	28.3446	29.5999	30.5165 (42b)
Hot water usage for other uses	44.0291	42.4280	40.8269	39.2259	37.6248	36.0238	36.0238	37.6248	39.2259	40.8269	42.4280	44.0291 (42c)
Average daily hot water use (litres/day)												133.3630 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	145.0942	141.9524	138.1043	133.0732	128.3938	122.5059	119.1546	124.7232	128.3445	134.1919	140.2131	145.0064 (44)
Energy content (annual)	213.6038	187.8318	197.3482	173.8268	165.4483	141.6739	131.6693	146.8015	148.8732	172.9199	189.5027	212.9526 (45)
Distribution loss (46)m = 0.15 x (45)m	32.0406	28.1748	29.6022	26.0740	24.8173	21.2511	19.7504	22.0202	22.3310	25.9380	28.4254	31.9429 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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												
	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (64)
Total per year (kWh/year) = Sum(64)m =												2711.1280 (64)
12Total per year (kWh/year)												2711 (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												
	113.7388	101.0358	108.3338	99.1350	97.7271	88.4442	86.4956	91.5270	90.8379	100.2114	104.3473	113.5222 (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	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	145.1593	160.7121	145.1593	149.9979	145.1593	149.9979	145.1593	145.1593	149.9979	145.1593	149.9979	145.1593 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.7945	290.7809	283.2553	267.2340	247.0101	228.0025	215.3043	212.3179	219.8435	235.8647	256.0886	275.0962 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536 (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)	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289 (71)
Water heating gains (Table 5)	152.8747	150.3509	145.6099	137.6875	131.3536	122.8391	116.2575	123.0202	126.1638	134.6927	144.9267	152.5837 (72)
Total internal gains	651.8893	667.9047	640.0853	620.9803	589.5839	566.9004	542.7819	546.5581	562.0660	581.7775	617.0741	638.9000 (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					8.9200	11.2829	0.7600	0.0000		0.7700		58.8968 (75)
Southeast					14.5000	36.7938	0.7600	0.0000		0.7700		312.2104 (77)
Southwest					1.1000	36.7938	0.7600	0.0000		0.7700		23.6849 (79)
Northwest					3.5000	11.2829	0.7600	0.0000		0.7700		23.1097 (81)
Solar gains	417.9018	739.0806	1083.5947	1463.8998	1750.3827	1786.4149	1702.0320	1480.8591	1214.1236	836.3496	505.5106	354.4270 (83)
Total gains	1069.7911	1406.9853	1723.6799	2084.8801	2339.9665	2353.3153	2244.8138	2027.4172	1776.1896	1418.1271	1122.5847	993.3270 (84)

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145	46.7145
alpha	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143	4.1143
util living area	0.9621	0.9057	0.8043	0.6351	0.4607	0.3211	0.2325	0.2687	0.4511	0.7456	0.9241	0.9707 (86)
Living	20.0196	20.3194	20.6058	20.8171	20.8991	20.9202	20.9240	20.9232	20.9072	20.7557	20.3426	19.9468
Non living	18.9671	19.3349	19.6731	19.9058	19.9874	20.0057	20.0083	20.0079	19.9964	19.8493	19.3699	18.8760
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4985	20.3194	20.6058	20.8171	20.8991	20.9202	20.9240	20.9232	20.9072	20.7557	20.3426	20.0941 (87)
Th 2	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050	20.1050 (88)
util rest of house	0.9550	0.8905	0.7779	0.5981	0.4194	0.2770	0.1854	0.2169	0.3961	0.7041	0.9088	0.9651 (89)
MIT 2	19.6513	19.3349	19.6731	19.9058	19.9874	20.0057	20.0083	20.0079	19.9964	19.8493	19.3699	19.0975 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.8249	19.5367	19.8643	20.0925	20.1742	20.1931	20.1959	20.1954	20.1830	20.0350	19.5692	0.2049 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	19.8249	19.5367	19.8643	20.0925	20.1742	20.1931	20.1959	20.1954	20.1830	20.0350	19.5692	19.3017 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9524	0.8794	0.7702	0.5976	0.4226	0.2813	0.1902	0.2221	0.4010	0.7006	0.8980	0.9588 (94)
Useful gains	1018.9144	1237.2564	1327.6108	1245.8645	988.9439	662.0394	426.9523	450.3172	712.1683	993.5229	1008.0603	952.4365 (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	1844.9471	1739.3861	1588.1771	1330.0941	1007.0589	664.6702	427.3283	451.0410	722.8893	1121.2342	1481.8139	1794.6498 (97)
Space heating kWh	614.5683	337.4312	193.8613	60.6454	13.4775	0.0000	0.0000	0.0000	0.0000	95.0172	341.1026	626.6066 (98a)
Space heating requirement - total per year (kWh/year)												2282.7101
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	614.5683	337.4312	193.8613	60.6454	13.4775	0.0000	0.0000	0.0000	0.0000	95.0172	341.1026	626.6066 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2282.7101
Space heating per m2										(98c) / (4) =		18.7107 (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 %)

254.6152 (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	614.5683	337.4312	193.8613	60.6454	13.4775	0.0000	0.0000	0.0000	0.0000	95.0172	341.1026	626.6066 (98)
Space heating efficiency (main heating system 1)	254.6152	254.6152	254.6152	254.6152	254.6152	0.0000	0.0000	0.0000	0.0000	254.6152	254.6152	254.6152 (210)
Space heating fuel (main heating system)	241.3714	132.5260	76.1389	23.8184	5.2933	0.0000	0.0000	0.0000	0.0000	37.3180	133.9679	246.0995 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (64)
Efficiency of water heater	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888	176.8888 (216)
Fuel for water heating, kWh/month	150.9413	133.4505	141.7516	127.4806	123.7177	109.3037	104.6215	113.1761	113.3736	127.9416	136.3426	150.5731 (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	4.2455	3.8346	4.2455	4.1085	4.2455	4.1085	4.2455	4.2455	4.1085	4.2455	4.1085	4.2455 (231)
Lighting	39.2305	31.4722	28.3372	20.7610	16.0364	13.1019	14.6290	19.0153	24.6990	32.4064	36.6029	40.3208 (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												896.5334 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												176.8888
Water heating fuel used												1532.6738 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

49.9873 (230a)

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Total electricity for the above, kWh/year	49.9873 (231)
Electricity for lighting (calculated in Appendix L)	316.6127 (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	2795.8071 (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	896.5334	0.1581	141.7203 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1532.6738	0.1409	215.9719 (264)
Space and water heating			357.6922 (265)
Pumps, fans and electric keep-hot	49.9873	0.1387	6.9338 (267)
Energy for lighting	316.6127	0.1443	45.6970 (268)
Total CO2, kg/year			410.3230 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3600 (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	896.5334	1.5851	1421.0818 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1532.6738	1.5210	2331.2588 (278)
Space and water heating			3752.3406 (279)
Pumps, fans and electric keep-hot	49.9873	1.5128	75.6207 (281)
Energy for lighting	316.6127	1.5338	485.6311 (282)
Total Primary energy kWh/year			4313.5924 (286)
Dwelling Primary energy Rate (DPER)			35.3600 (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	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	305.0000 (5)

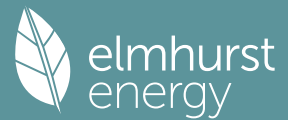
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1311 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3811 (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) = 0.3240 (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	0.4131	0.4050	0.3969	0.3564	0.3483	0.3078	0.3078	0.2997	0.3240	0.3483	0.3645	0.3807 (22b)
Effective ac	0.5853	0.5820	0.5788	0.5635	0.5606	0.5474	0.5474	0.5449	0.5525	0.5606	0.5664	0.5725 (25)

3. Heat losses and heat loss parameter

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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			28.0200	1.1450	32.0840		(27)
Heatloss Floor 1			61.0000	0.1300	7.9300		(28a)
External Wall 1	95.0000	28.0200	66.9800	0.1800	12.0564		(29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100		(30)
Total net area of external elements Aum(A, m2)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		58.7804		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 163.8131 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 68.1759 (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	58.9117	58.5783	58.2515	56.7164	56.4291	55.0921	55.0921	54.8445	55.6071	56.4291	57.0102	57.6176
Heat transfer coeff	127.0876	126.7542	126.4273	124.8922	124.6050	123.2680	123.2680	123.0204	123.7830	124.6050	125.1860	125.7935
Average = Sum(39)m / 12 =						123.2680	123.2680	123.0204	123.7830	124.6050	125.1860	125.7935

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0417	1.0390	1.0363	1.0237	1.0214	1.0104	1.0104	1.0084	1.0146	1.0214	1.0261	1.0311
HLP (average)												1.0237
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8707 (42)

Hot water usage for mixer showers 72.3524 71.2651 69.6806 66.6491 64.4119 61.9170 60.4989 62.0714 63.7951 66.4738 69.5705 72.0752 (42a)

Hot water usage for baths 31.2371 30.7732 30.1199 28.9154 28.0134 27.0133 26.4731 27.1218 27.8281 28.8983 30.1276 31.1315 (42b)

Hot water usage for other uses 44.0291 42.4280 40.8269 39.2259 37.6248 36.0238 36.0238 37.6248 39.2259 40.8269 42.4280 44.0291 (42c)

Average daily hot water use (litres/day) 135.6946 (43)

Daily hot water use 147.6186 144.4663 140.6275 134.7904 130.0502 124.9541 122.9958 126.8180 130.8491 136.1991 142.1261 147.2357 (44)

Energy conte 233.7917 205.7181 216.1392 184.5213 175.0725 153.6456 148.7527 157.0272 161.3500 184.8208 202.4847 230.5356 (45)

Energy content (annual) Total = Sum(45)m = 2253.8595

Distribution loss (46)m = 0.15 x (45)m 35.0688 30.8577 32.4209 27.6782 26.2609 23.0468 22.3129 23.5541 24.2025 27.7231 30.3727 34.5803 (46)

Water storage loss: 300.0000 (47)

Store volume 2.1127 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 1.1409 (55)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)

If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 292.4205 258.6731 274.7680 241.2588 233.7013 210.3832 207.3816 215.6560 218.0876 243.4497 259.2223 289.1644 (62)

WWHRS -33.0765 -29.2531 -30.6322 -25.3647 -23.6389 -20.2280 -18.9605 -20.1626 -20.9287 -24.6726 -27.9511 -32.4640 (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 259.3440 229.4200 244.1359 215.8942 210.0624 190.1552 188.4210 195.4934 197.1589 218.7770 231.2712 256.7005 (64)

Total per year (kWh/year) 2636.8336 (64)

12Total per year (kWh/year) 2637 (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 124.6388 110.7653 118.7693 106.7434 105.1147 96.4772 96.3633 99.1146 99.0389 108.3560 112.7162 123.5561 (65)

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

Metabolic gains (Table 5), Watts 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 (66)

(66)m 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 145.1593 160.7121 145.1593 149.9979 145.1593 149.9979 145.1593 145.1593 149.9979 145.1593 149.9979 145.1593 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 287.7945 290.7809 283.2553 267.2340 247.0101 228.0025 215.3043 212.3179 219.8435 235.8647 256.0886 275.0962 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 (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)

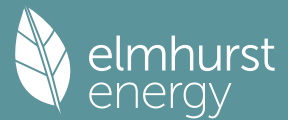
Losses e.g. evaporation (negative values) (Table 5) -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 (71)

Water heating gains (Table 5) 167.5253 164.8293 159.6362 148.2547 141.2832 133.9961 129.5206 133.2185 137.5541 145.6398 156.5503 166.0701 (72)

Total internal gains 669.5399 685.3831 657.1116 634.5475 602.5134 578.0574 556.0450 556.7565 573.4563 595.7246 631.6977 655.3864 (73)

6. Solar gains

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[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
Northeast	8.9200				11.2829	0.6300	0.7000	0.7700				30.7581 (75)
Southeast	14.5000				36.7938	0.6300	0.7000	0.7700				163.0478 (77)
Southwest	1.1000				36.7938	0.6300	0.7000	0.7700				12.3691 (79)
Northwest	3.5000				11.2829	0.6300	0.7000	0.7700				12.0687 (81)
Solar gains	218.2437	385.9751	565.8931	764.5024	914.1143	932.9317	888.8638	773.3592	634.0601	436.7726	263.9962	185.0948 (83)
Total gains	887.7836	1071.3582	1223.0046	1399.0499	1516.6277	1510.9891	1444.9088	1330.1157	1207.5164	1032.4971	895.6939	840.4813 (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	43.6820	43.7969	43.9102	44.4499	44.5523	45.0356	45.0356	45.1262	44.8482	44.5523	44.3456	44.1314
alpha	3.9121	3.9198	3.9273	3.9633	3.9702	4.0024	4.0024	4.0084	3.9899	3.9702	3.9564	3.9421
util living area	0.9805	0.9603	0.9214	0.8281	0.6801	0.5029	0.3707	0.4174	0.6441	0.8781	0.9636	0.9839 (86)
MIT	19.4458	19.7429	20.1219	20.5601	20.8410	20.9636	20.9915	20.9866	20.9045	20.5142	19.9068	19.3986 (87)
Th 2	20.0487	20.0510	20.0532	20.0636	20.0656	20.0747	20.0747	20.0764	20.0712	20.0656	20.0616	20.0575 (88)
util rest of house	0.9764	0.9524	0.9060	0.7971	0.6299	0.4366	0.2948	0.3370	0.5754	0.8482	0.9549	0.9806 (89)
MIT 2	18.2412	18.6161	19.0874	19.6171	19.9262	20.0504	20.0709	20.0700	20.0001	19.5792	18.8344	18.1875 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.4880	18.8470	19.2994	19.8103	20.1136	20.2376	20.2596	20.2578	20.1855	19.7708	19.0541	18.4357 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4880	18.8470	19.2994	19.8103	20.1136	20.2376	20.2596	20.2578	20.1855	19.7708	19.0541	18.4357 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9672	0.9395	0.8913	0.7879	0.6326	0.4486	0.3102	0.3531	0.5844	0.8372	0.9428	0.9724 (94)
Useful gains	858.7024	1006.5788	1090.1015	1102.2440	959.4673	677.8163	448.1621	469.6565	705.6367	864.3593	844.4772	817.3185 (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	1803.1231	1767.8405	1618.1890	1362.6153	1048.3804	694.9295	451.1105	474.5895	753.2782	1142.7268	1496.4891	1790.7533 (97)
Space heating kWh	702.6490	511.5679	392.8971	187.4673	66.1513	0.0000	0.0000	0.0000	0.0000	207.1054	469.4486	724.2355 (98a)
Space heating requirement - total per year (kWh/year)												3261.5221
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	702.6490	511.5679	392.8971	187.4673	66.1513	0.0000	0.0000	0.0000	0.0000	207.1054	469.4486	724.2355 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3261.5221
Space heating per m2	(98c) / (4) =											26.7338 (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	702.6490	511.5679	392.8971	187.4673	66.1513	0.0000	0.0000	0.0000	0.0000	207.1054	469.4486	724.2355 (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)	761.2665	554.2447	425.6740	203.1065	71.6699	0.0000	0.0000	0.0000	0.0000	224.3829	508.6117	784.6538 (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	259.3440	229.4200	244.1359	215.8942	210.0624	190.1552	188.4210	195.4934	197.1589	218.7770	231.2712	256.7005 (64)
Efficiency of water heater (217)m	86.1797	85.8038	85.1209	83.7447	81.7852	79.8000	79.8000	79.8000	79.8000	83.9370	85.6132	79.8000 (216)
Fuel for water heating, kWh/month	300.9340	267.3773	286.8108	257.8003	256.8466	238.2897	236.1166	244.9791	247.0663	260.6444	270.1350	86.2543 (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	30.1612	24.1965	21.7862	15.9615	12.3291	10.0730	11.2471	14.6193	18.9891	24.9147	28.1411	30.9995 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.5506	-75.6538	-106.9788	-118.2303	-125.7285	-116.6478	-115.1015	-109.4441	-99.3091	-85.4234	-59.4821	-47.3016 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.7654	-72.6399	-143.5110	-214.3436	-282.3215	-283.3495	-280.1107	-237.7545	-174.9825	-103.5959	-46.3136	-27.5381 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

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Annual totals kWh/year	
Space heating fuel - main system 1	3533.6101 (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	3164.6089 (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)	243.4184 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3015.0778 (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	4012.5596 (238)

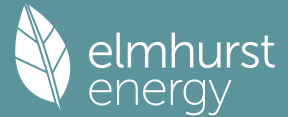
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3533.6101	0.2100	742.0581 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3164.6089	0.2100	664.5679 (264)
Space and water heating			1406.6260 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	243.4184	0.1443	35.1328 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	0.1350	-150.3242
PV Unit electricity exported	-1901.2262	0.1261	-239.6568
Total			-389.9810 (269)
Total CO2, kg/year			1063.7071 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.7200 (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	3533.6101	1.1300	3992.9794 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3164.6089	1.1300	3576.0081 (278)
Space and water heating			7568.9875 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	243.4184	1.5338	373.3633 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	1.4988	-1669.4477
PV Unit electricity exported	-1901.2262	0.4627	-879.7177
Total			-2549.1654 (283)
Total Primary energy kWh/year			5523.2862 (286)
Target Primary Energy Rate (TPER)			45.2700 (287)

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Property Reference	House Type 7				Issued on Date	24/10/2025	
Assessment Reference	Plot 20			Prop Type Ref			
Property							
SAP Rating	84 B	DER	3.39	TER	8.80		
Environmental	97 A	% DER < TER				61.48	
CO ₂ Emissions (t/year)	0.38	DFEE	29.42	TFEE	33.89		
Compliance Check	See BREL	% DFEE < TFEE				13.19	
% DPER < TPER	22.06	DPER	35.61	TPER	45.69		
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 305.0000 (5)

2. Ventilation rate

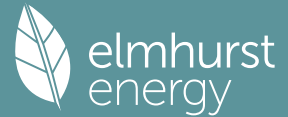
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			30.3200	1.3258	40.1970		(27)
Heatloss Floor 1			61.0000	0.1200	7.3200	110.0000	6710.0000 (28a)
External Wall 1	95.0000	30.3200	64.6800	0.2000	12.9360	190.0000	12289.2000 (29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100	9.0000	549.0000 (30)
Total net area of external elements Aum(A, m ²)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.1630		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	19548.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							160.2311 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600		0.0190		0.1056		
E4 Jamb						20.4000		0.0150		0.3060		
E10 Eaves (insulation at ceiling level)						11.0000		0.0520		0.5720		
E12 Gable (insulation at ceiling level)						11.0000		0.0450		0.4950		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												
Point Thermal bridges										(36a) =	3.9389	(36)
Total fabric heat loss										(33) + (36) + (36a) =	71.1019	(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	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250 (38)
Average = Sum(39)m / 12 =	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269 (39)
												121.4269
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9953
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8707 (42)
Hot water usage for mixer showers	70.5244	69.4447	67.8535	65.4056	63.2124	60.1442	57.7174	60.5544	61.9814	65.0204	68.1852	70.4608 (42a)	
Hot water usage for baths	30.5408	30.0797	29.4239	28.4417	27.5565	26.3379	25.4134	26.5439	27.1372	28.3446	29.5999	30.5165 (42b)	
Hot water usage for other uses	44.0291	42.4280	40.8269	39.2259	37.6248	36.0238	36.0238	37.6248	39.2259	40.8269	42.4280	44.0291 (42c)	
Average daily hot water use (litres/day)												133.3630 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	145.0942	141.9524	138.1043	133.0732	128.3938	122.5059	119.1546	124.7232	128.3445	134.1919	140.2131	145.0064 (44)	
Energy content (annual)	213.6038	187.8318	197.3482	173.8268	165.4483	141.6739	131.6693	146.8015	148.8732	172.9199	189.5027	212.9526 (45)	
Distribution loss (46)m = 0.15 x (45)m	32.0406	28.1748	29.6022	26.0740	24.8173	21.2511	19.7504	22.0202	22.3310	25.9380	28.4254	31.9429 (46)	
Water storage loss:													
Store volume												300.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.9720 (55)	
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)	
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (64)	
12Total per year (kWh/year)												2711.1280 (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	113.7388	101.0358	108.3338	99.1350	97.7271	88.4442	86.4956	91.5270	90.8379	100.2114	104.3473	113.5222 (65)	

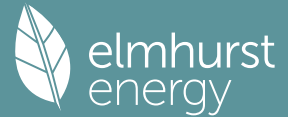
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
145.1593	160.7121	145.1593	149.9979	145.1593	149.9979	145.1593	145.1593	149.9979	145.1593	149.9979	145.1593	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
287.7945	290.7809	283.2553	267.2340	247.0101	228.0025	215.3043	212.3179	219.8435	235.8647	256.0886	275.0962	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	(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)												
-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	(71)
Water heating gains (Table 5)												
152.8747	150.3509	145.6099	137.6875	131.3536	122.8391	116.2575	123.0202	126.1638	134.6927	144.9267	152.5837	(72)
Total internal gains												
651.8893	667.9047	640.0853	620.9803	589.5839	566.9004	542.7819	546.5581	562.0660	581.7775	617.0741	638.9000	(73)

6. Solar gains

[Jan]												Gains	
				Area	Solar flux		g	FF		Access			W
				m2	Table 6a		Specific data	Specific data		factor			
					W/m2		or Table 6b	or Table 6c		Table 6d			
Northeast				8.9200	11.2829		0.7600	0.0000		0.7700			58.8968 (75)
Southeast				15.5000	36.7938		0.7600	0.0000		0.7700			333.7421 (77)
Southwest				0.5000	36.7938		0.7600	0.0000		0.7700			10.7659 (79)
Northwest				5.4000	11.2829		0.7600	0.0000		0.7700			35.6550 (81)
Solar gains	439.0598	779.2875	1149.6759	1564.3300	1879.8065	1922.3513	1829.9895	1586.0473	1291.9201	883.7711	531.6118	372.0428 (83)	
Total gains	1090.9491	1447.1922	1789.7612	2185.3103	2469.3903	2489.2518	2372.7713	2132.6054	1853.9862	1465.5486	1148.6859	1010.9428 (84)	

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187
alpha	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812
util living area	0.9590	0.8990	0.7927	0.6197	0.4461	0.3101	0.2247	0.2610	0.4412	0.7358	0.9191	0.9682 (86)
Living	19.9821	20.2960	20.5948	20.8123	20.8959	20.9175	20.9214	20.9205	20.9035	20.7458	20.3170	19.9060
Non living	18.9072	19.2917	19.6438	19.8827	19.9658	19.9846	19.9873	19.9869	19.9746	19.8214	19.3245	18.8121
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4793	20.2960	20.5948	20.8123	20.8959	20.9175	20.9214	20.9205	20.9035	20.7458	20.3170	20.0590 (87)
Th 2	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872 (88)
util rest of house	0.9514	0.8830	0.7655	0.5825	0.4052	0.2666	0.1783	0.2096	0.3863	0.6937	0.9031	0.9622 (89)
MIT 2	19.6168	19.2917	19.6438	19.8827	19.9658	19.9846	19.9873	19.9869	19.9746	19.8214	19.3245	19.0419 (90)
Living area fraction									FLA = Living area / (4) =			0.2049 (91)
MIT	19.7936	19.4975	19.8387	20.0732	20.1564	20.1758	20.1787	20.1782	20.1649	20.0108	19.5278	19.2503 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7936	19.4975	19.8387	20.0732	20.1564	20.1758	20.1787	20.1782	20.1649	20.0108	19.5278	19.2503 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9486	0.8712	0.7575	0.5819	0.4083	0.2709	0.1830	0.2148	0.3911	0.6899	0.8916	0.9554 (94)
Useful gains	1034.8785	1260.8497	1355.7532	1271.7048	1008.3717	674.2779	434.1399	457.9814	725.0836	1011.1540	1024.1289	965.8080 (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	1881.3340	1772.5337	1619.6740	1356.7285	1026.8372	677.0463	434.5523	458.7755	736.4425	1142.7299	1509.0747	1827.5126 (97)
Space heating kWh	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98a)
Space heating requirement - total per year (kWh/year)												2333.0886
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	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2333.0886
Space heating per m2										(98c) / (4) =		19.1237 (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 %)

255.4521 (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	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98)
Space heating efficiency (main heating system 1)	255.4521	255.4521	255.4521	255.4521	255.4521	0.0000	0.0000	0.0000	0.0000	255.4521	255.4521	255.4521 (210)
Space heating fuel (main heating system)	246.5287	134.6051	76.8665	23.9642	5.3780	0.0000	0.0000	0.0000	0.0000	38.3213	136.6836	250.9700 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (64)
Efficiency of water heater	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639 (216)
Fuel for water heating, kWh/month	151.2190	133.6961	142.0124	127.7152	123.9454	109.5048	104.8140	113.3844	113.5822	128.1770	136.5935	150.8502 (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	4.2455	3.8346	4.2455	4.1085	4.2455	4.1085	4.2455	4.2455	4.1085	4.2455	4.1085	4.2455 (231)
Lighting	39.2305	31.4722	28.3372	20.7610	16.0364	13.1019	14.6290	19.0153	24.6990	32.4064	36.6029	40.3208 (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												913.3174 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												176.5639
Water heating fuel used												1535.4940 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

49.9873 (230a)

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Total electricity for the above, kWh/year	49.9873 (231)
Electricity for lighting (calculated in Appendix L)	316.6127 (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	2815.4114 (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	913.3174	0.1581	144.3774 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1535.4940	0.1409	216.3693 (264)
Space and water heating			360.7467 (265)
Pumps, fans and electric keep-hot	49.9873	0.1387	6.9338 (267)
Energy for lighting	316.6127	0.1443	45.6970 (268)
Total CO2, kg/year			413.3775 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3900 (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	913.3174	1.5851	1447.6981 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1535.4940	1.5210	2335.5485 (278)
Space and water heating			3783.2466 (279)
Pumps, fans and electric keep-hot	49.9873	1.5128	75.6207 (281)
Energy for lighting	316.6127	1.5338	485.6311 (282)
Total Primary energy kWh/year			4344.4984 (286)
Dwelling Primary energy Rate (DPER)			35.6100 (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	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	305.0000 (5)

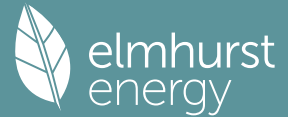
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1311 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3811 (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) = 0.3240 (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	0.4131	0.4050	0.3969	0.3564	0.3483	0.3078	0.3078	0.2997	0.3240	0.3483	0.3645	0.3807 (22b)
Effective ac	0.5853	0.5820	0.5788	0.5635	0.5606	0.5474	0.5474	0.5449	0.5525	0.5606	0.5664	0.5725 (25)

3. Heat losses and heat loss parameter

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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			30.3200	1.1450	34.7176		(27)
Heatloss Floor 1			61.0000	0.1300	7.9300		(28a)
External Wall 1	95.0000	30.3200	64.6800	0.1800	11.6424		(29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100		(30)
Total net area of external elements Aum(A, m2)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		61.0000		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.2311 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 70.3955 (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	58.9117	58.5783	58.2515	56.7164	56.4291	55.0921	55.0921	54.8445	55.6071	56.4291	57.0102	57.6176
Average = Sum(39)m / 12 =	129.3072	128.9738	128.6469	127.1118	126.8246	125.4876	125.4876	125.2400	126.0026	126.8246	127.4056	128.0131

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0599	1.0572	1.0545	1.0419	1.0395	1.0286	1.0286	1.0266	1.0328	1.0395	1.0443	1.0493
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8707 (42)
Hot water usage for mixer showers												
Hot water usage for baths	72.3524	71.2651	69.6806	66.6491	64.4119	61.9170	60.4989	62.0714	63.7951	66.4738	69.5705	72.0752 (42a)
Hot water usage for other uses	31.2371	30.7732	30.1199	28.9154	28.0134	27.0133	26.4731	27.1218	27.8281	28.8983	30.1276	31.1315 (42b)
Average daily hot water use (litres/day)	44.0291	42.4280	40.8269	39.2259	37.6248	36.0238	36.0238	37.6248	39.2259	40.8269	42.4280	44.0291 (42c)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	147.6186	144.4663	140.6275	134.7904	130.0502	124.9541	122.9958	126.8180	130.8491	136.1991	142.1261	147.2357 (44)
Energy content (annual)	233.7917	205.7181	216.1392	184.5213	175.0725	153.6456	148.7527	157.0272	161.3500	184.8208	202.4847	230.5356 (45)
Distribution loss (46)m = 0.15 x (45)m	35.0688	30.8577	32.4209	27.6782	26.2609	23.0468	22.3129	23.5541	24.2025	27.7231	30.3727	34.5803 (46)

Water storage loss: 300.0000 (47)
Store volume 2.1127 (48)
a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (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	292.4205	258.6731	274.7680	241.2588	233.7013	210.3832	207.3816	215.6560	218.0876	243.4497	259.2223	289.1644 (62)
WWHRS	-33.0765	-29.2531	-30.6322	-25.3647	-23.6389	-20.2280	-18.9605	-20.1626	-20.9287	-24.6726	-27.9511	-32.4640 (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 259.3440 229.4200 244.1359 215.8942 210.0624 190.1552 188.4210 195.4934 197.1589 218.7770 231.2712 256.7005 (64)
Total per year (kWh/year) = Sum(64)m = 2636.8336 (64)
2637 (64)

12Total per year (kWh/year)
Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

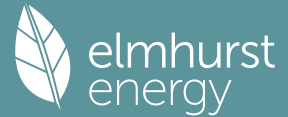
Heat gains from water heating, kWh/month 124.6388 110.7653 118.7693 106.7434 105.1147 96.4772 96.3633 99.1146 99.0389 108.3560 112.7162 123.5561 (65)

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	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	145.1593	160.7121	145.1593	149.9979	145.1593	149.9979	145.1593	145.1593	149.9979	145.1593	149.9979	145.1593 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.7945	290.7809	283.2553	267.2340	247.0101	228.0025	215.3043	212.3179	219.8435	235.8647	256.0886	275.0962 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536 (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)	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289 (71)
Water heating gains (Table 5)	167.5253	164.8293	159.6362	148.2547	141.2832	133.9961	129.5206	133.2185	137.5541	145.6398	156.5503	166.0701 (72)
Total internal gains	669.5399	685.3831	657.1116	634.5475	602.5134	578.0574	556.0450	556.7565	573.4563	595.7246	631.6977	655.3864 (73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				8.9200	11.2829	0.6300		0.7000		0.7700		30.7581 (75)
Southeast				15.5000	36.7938	0.6300		0.7000		0.7700		174.2924 (77)
Southwest				0.5000	36.7938	0.6300		0.7000		0.7700		5.6223 (79)
Northwest				5.4000	11.2829	0.6300		0.7000		0.7700		18.6204 (81)
Solar gains	229.2932	406.9726	600.4031	816.9507	981.7042	1003.9227	955.6879	828.2923	674.6883	461.5378	277.6273	194.2945 (83)
Total gains	898.8331	1092.3557	1257.5147	1451.4982	1584.2176	1581.9801	1511.7329	1385.0488	1248.1446	1057.2624	909.3249	849.6809 (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	41.9935	42.1020	42.2090	42.7187	42.8155	43.2717	43.2717	43.3572	43.0948	42.8155	42.6202	42.4180
alpha	3.7996	3.8068	3.8139	3.8479	3.8544	3.8848	3.8848	3.8905	3.8730	3.8544	3.8413	3.8279
util living area	0.9788	0.9569	0.9148	0.8161	0.6644	0.4890	0.3606	0.4078	0.6337	0.8715	0.9609	0.9825 (86)
MIT	19.3931	19.7042	20.1009	20.5540	20.8397	20.9627	20.9911	20.9858	20.9007	20.4981	19.8688	19.3431 (87)
Th 2	20.0337	20.0360	20.0382	20.0486	20.0505	20.0596	20.0596	20.0613	20.0561	20.0505	20.0466	20.0425 (88)
util rest of house	0.9744	0.9485	0.8986	0.7841	0.6138	0.4234	0.2856	0.3280	0.5648	0.8406	0.9517	0.9789 (89)
MIT 2	18.1668	18.5589	19.0512	19.5969	19.9102	20.0347	20.0556	20.0545	19.9822	19.5486	18.7781	18.1095 (90)
Living area fraction	fLA = Living area / (4) = 0.2049 (91)											
MIT	18.4181	18.7936	19.2663	19.7930	20.1007	20.2249	20.2473	20.2453	20.1704	19.7432	19.0016	18.3623 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4181	18.7936	19.2663	19.7930	20.1007	20.2249	20.2473	20.2453	20.1704	19.7432	19.0016	18.3623 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9644	0.9346	0.8830	0.7746	0.6166	0.4352	0.3007	0.3440	0.5736	0.8290	0.9387	0.9700 (94)
Useful gains	866.8612	1020.9382	1110.3868	1124.3361	976.8957	688.5131	454.6062	476.4021	715.9366	876.4381	853.5796	824.2077 (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	1825.5704	1791.9128	1642.3466	1384.6318	1065.4127	705.8522	457.6923	481.5863	764.8867	1159.5811	1516.3317	1812.9579 (97)
Space heating kWh	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (98a)
Space heating requirement - total per year (kWh/year)												3303.8922
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	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3303.8922
Space heating per m2	(98c) / (4) =											27.0811 (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	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (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)	772.7840	561.3163	428.7953	203.0476	71.3506	0.0000	0.0000	0.0000	0.0000	228.2323	516.9897	796.9990 (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	259.3440	229.4200	244.1359	215.8942	210.0624	190.1552	188.4210	195.4934	197.1589	218.7770	231.2712	256.7005 (64)
Efficiency of water heater	86.2075	85.8291	85.1367	83.7441	81.7783	79.8000	79.8000	79.8000	79.8000	83.9750	85.6467	79.8000 (216)
Fuel for water heating, kWh/month	300.8369	267.2986	286.7573	257.8023	256.8682	238.2897	236.1166	244.9791	247.0663	260.5263	270.0292	86.2827 (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	30.1612	24.1965	21.7862	15.9615	12.3291	10.0730	11.2471	14.6193	18.9891	24.9147	28.1411	30.9995 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.5506	-75.6538	-106.9788	-118.2303	-125.7285	-116.6478	-115.1015	-109.4441	-99.3091	-85.4234	-59.4821	-47.3016 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.7654	-72.6399	-143.5110	-214.3436	-282.3215	-283.3495	-280.1107	-237.7545	-174.9825	-103.5959	-46.3136	-27.5381 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

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Annual totals kWh/year		
Space heating fuel - main system 1	3579.5148	(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	3164.0814	(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)	243.4184	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-3015.0778	(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	4057.9367	(238)

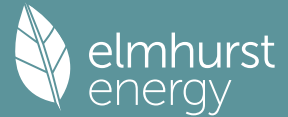
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3579.5148	0.2100	751.6981 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3164.0814	0.2100	664.4571 (264)
Space and water heating			1416.1552 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	243.4184	0.1443	35.1328 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	0.1350	-150.3242
PV Unit electricity exported	-1901.2262	0.1261	-239.6568
Total			-389.9810 (269)
Total CO2, kg/year			1073.2363 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.8000 (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	3579.5148	1.1300	4044.8517 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3164.0814	1.1300	3575.4119 (278)
Space and water heating			7620.2637 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	243.4184	1.5338	373.3633 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	1.4988	-1669.4477
PV Unit electricity exported	-1901.2262	0.4627	-879.7177
Total			-2549.1654 (283)
Total Primary energy kWh/year			5574.5624 (286)
Target Primary Energy Rate (TPER)			45.6900 (287)

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Property Reference	House Type 8			Issued on Date	24/10/2025
Assessment Reference	Plot 21	Prop Type Ref			
Property					
SAP Rating	84 B	DER	3.70	TER	9.69
Environmental	97 A	% DER < TER			61.82
CO ₂ Emissions (t/year)	0.35	DFEE	26.39	TFEE	32.67
Compliance Check	See BREL	% DFEE < TFEE			19.22
% DPER < TPER	22.72	DPER	38.98	TPER	50.44
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			13.7000	1.3258	18.1629		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	95.0000	13.7000	81.3000	0.2000	16.2600	190.0000	15447.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			197.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.1529		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21516.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							210.9412 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

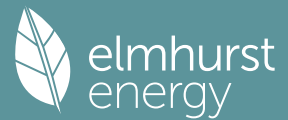
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7573 (42)
Hot water usage for mixer showers												68.6086 (42a)
Hot water usage for baths												29.7175 (42b)
Hot water usage for other uses												42.8674 (42c)
Average daily hot water use (litres/day)												129.8562 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934 (44)
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											2027.6939
	31.1980	27.4339	28.8239	25.3884	24.1647	20.6923	19.2311	21.4412	21.7438	25.2559	27.6780	31.1029 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											2656.3699 (64)
Electric shower(s)												2656 (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)
Heat gains from water heating, kWh/month	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Water heating gains (Table 5)	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811 (72)
Total internal gains	615.9561	631.3751	604.7891	587.3515	558.2234	537.5162	514.9331	518.8249	533.3959	551.4241	584.3498	604.2219 (73)

[Jan]											Area	Solar flux		g	FF	Access	Gains
											m2	Table 6a	Specific data	Specific data	factor	W	
												W/m2	or Table 6b	or Table 6c	Table 6d		
Northeast											5.2000	11.2829	0.7600	0.0000	0.7700	34.3344 (75)	
Southwest											8.5000	36.7938	0.7600	0.0000	0.7700	183.0199 (79)	
Solar gains	217.3543	381.6393	552.4680	735.3094	869.9526	884.0471	843.8323	740.2658	615.2964	429.9604	262.4173	184.6661 (84)					
Total gains	833.3104	1013.0144	1157.2572	1322.6609	1428.1760	1421.5633	1358.7653	1259.0907	1148.6923	981.3845	846.7670	788.8880 (83)					

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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	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462
alpha	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231
util living area	0.9821	0.9543	0.8957	0.7624	0.5837	0.4127	0.2981	0.3360	0.5428	0.8318	0.9596	0.9863 (86)
Living	20.2586	20.4516	20.6576	20.8405	20.9194	20.9387	20.9413	20.9409	20.9299	20.8069	20.4977	20.2116
Non living	19.3024	19.5420	19.7898	19.9942	20.0721	20.0880	20.0896	20.0894	20.0821	19.9646	19.6025	19.2432
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6207	20.4516	20.6576	20.8405	20.9194	20.9387	20.9413	20.9409	20.9299	20.8069	20.4977	20.3219 (87)
Th 2	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644 (88)
util rest of house	0.9778	0.9443	0.8752	0.7256	0.5361	0.3598	0.2417	0.2754	0.4811	0.7935	0.9489	0.9829 (89)
MIT 2	19.8208	19.5420	19.7898	19.9942	20.0721	20.0880	20.0896	20.0894	20.0821	19.9646	19.6025	19.4092 (90)
Living area fraction									FLA = Living area / (4) =			0.2451 (91)
MIT	20.0168	19.7650	20.0025	20.2016	20.2798	20.2965	20.2983	20.2981	20.2899	20.1711	19.8219	19.6329 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0168	19.7650	20.0025	20.2016	20.2798	20.2965	20.2983	20.2981	20.2899	20.1711	19.8219	19.6329 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9769	0.9387	0.8708	0.7273	0.5428	0.3682	0.2507	0.2851	0.4906	0.7938	0.9437	0.9802 (94)
Useful gains	814.0774	950.8861	1007.7064	961.9813	775.2278	523.3740	340.7004	358.9522	563.4973	779.0071	799.0812	773.2717 (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	1448.5710	1370.0577	1244.4817	1041.6364	790.7713	525.0263	340.8627	359.2762	570.5026	882.1360	1172.5391	1422.4015 (97)
Space heating kWh	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98a)
Space heating requirement - total per year (kWh/year)												1827.3936
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	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1827.3936
Space heating per m2										(98c) / (4) =		17.9156 (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 %)												243.6414 (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	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98)
Space heating efficiency (main heating system 1)	243.6414	243.6414	243.6414	243.6414	243.6414	0.0000	0.0000	0.0000	0.0000	243.6414	243.6414	243.6414 (210)
Space heating fuel (main heating system)	193.7533	115.6139	72.3033	23.5394	4.7465	0.0000	0.0000	0.0000	0.0000	31.4922	110.3629	198.2228 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898 (216)
Fuel for water heating, kWh/month	145.8684	128.9805	137.0354	123.2928	119.7012	105.8212	101.3459	109.5686	109.7331	123.7611	131.8109	145.5146 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	37.9243	30.4243	27.3937	20.0698	15.5025	12.6657	14.1419	18.3822	23.8766	31.3274	35.3843	38.9784 (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												750.0342 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.1898
Water heating fuel used												1482.4336 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												41.7926 (230a)
Total electricity for the above, kWh/year												41.7926 (231)
Electricity for lighting (calculated in Appendix L)												306.0712 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2580.3316 (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	750.0342	0.1579	118.3931 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1482.4336	0.1409	208.8722 (264)
Space and water heating			327.2653 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	306.0712	0.1443	44.1755 (268)
Total CO2, kg/year			377.2380 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7000 (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	750.0342	1.5843	1188.2696 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1482.4336	1.5210	2254.7654 (278)
Space and water heating			3443.0349 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	306.0712	1.5338	469.4622 (282)
Total Primary energy kWh/year			3975.7210 (286)
Dwelling Primary energy Rate (DPER)			38.9800 (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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	255.0000 (5)

2. Ventilation rate

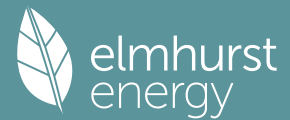
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (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							

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TER Opening Type			13.7000	1.1450	15.6870	(27)
Heatloss Floor 1			51.0000	0.1300	6.6300	(28a)
External Wall 1	95.0000	13.7000	81.3000	0.1800	14.6340	(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	(30)
Total net area of external elements Aum(A, m2)			197.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	42.5610		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 210.9412 (35)

List of Thermal Bridges													
K1 Element													
E5 Ground floor (normal)													
E6 Intermediate floor within a dwelling													
E8 Party wall between dwellings													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E10 Eaves (insulation at ceiling level)													
E12 Gable (insulation at ceiling level)													

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 51.9565 (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	
	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226	(38)

Heat transfer coeff 102.2120 101.8943 101.5830 100.1205 99.8469 98.5731 98.5731 98.3372 99.0637 99.8469 100.4004 100.9791 (39)

Average = Sum(39)m / 12 = 100.1192

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0021	0.9990	0.9959	0.9816	0.9789	0.9664	0.9664	0.9641	0.9712	0.9789	0.9843	0.9900	(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												2.7573 (42)
Hot water usage for mixer showers												
70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for baths												
30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Hot water usage for other uses												
42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)
Average daily hot water use (litres/day)												132.1266 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737	(45)
Energy content (annual)										Total = Sum(45)m =			2194.5956
Distribution loss (46)m = 0.15 x (45)m													
	34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)

Water storage loss:

Store volume 300.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(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													
	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
WWHRS	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106	(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													
	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)

Heat gains from water heating, kWh/month 122.5947 108.9667 116.8797 105.1302 103.5841 95.1340 95.0628 97.7417 97.6282 106.7401 110.9459 121.5405 (65)

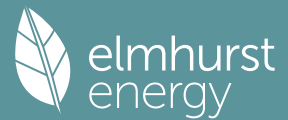
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)
Water heating gains (Table 5)	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609	(72)
Total internal gains	633.3695	648.6208	621.5946	600.7888	571.0398	548.5279	527.9955	528.9032	544.6347	565.2313	598.8157	620.5018	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	5.2000		11.2829		0.6300		0.7000		0.7700		17.9307	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	113.5104	199.3061	288.5192	384.0057	454.3213	461.6820	440.6803	386.5941	321.3305	224.5412	137.0440	96.4394	(83)
Total gains	746.8799	847.9269	910.1138	984.7945	1025.3612	1010.2099	968.6758	915.4972	865.9651	789.7725	735.8597	716.9412	(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	58.4732	58.6555	58.8353	59.6947	59.8583	60.6318	60.6318	60.7773	60.3315	59.8583	59.5283	59.1872	
alpha	4.8982	4.9104	4.9224	4.9796	4.9906	5.0421	5.0421	5.0518	5.0221	4.9906	4.9686	4.9458	
util living area	0.9901	0.9807	0.9621	0.9061	0.7892	0.6013	0.4434	0.4869	0.7226	0.9242	0.9799	0.9918	(86)
MIT	19.8032	19.9986	20.2601	20.6035	20.8517	20.9708	20.9948	20.9918	20.9280	20.6165	20.1624	19.7778	(87)
Th 2	20.0816	20.0842	20.0867	20.0987	20.1010	20.1114	20.1114	20.1134	20.1074	20.1010	20.0964	20.0917	(88)
util rest of house	0.9875	0.9757	0.9521	0.8818	0.7400	0.5266	0.3560	0.3966	0.6507	0.8993	0.9738	0.9896	(89)
MIT 2	18.6918	18.9408	19.2702	19.6957	19.9732	20.0934	20.1094	20.1100	20.0569	19.7207	19.1591	18.6669	(90)
Living area fraction	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(91)
MIT	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9832	0.9695	0.9443	0.8763	0.7452	0.5437	0.3774	0.4186	0.6647	0.8940	0.9677	0.9858	(94)
Useful gains	734.3157	822.0381	859.4037	862.9271	764.0568	549.2676	365.6042	383.2186	575.6240	706.0958	712.1070	706.7828	(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	1498.8579	1457.0931	1321.8829	1103.1431	847.5536	562.6993	367.3255	386.0817	611.2638	932.5922	1235.4252	1488.3514	(97)
Space heating kWh	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(98a)
Space heating requirement - total per year (kWh/year)												2701.5273	
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	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2701.5273	
Space heating per m2										(98c) / (4) =		26.4856	(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	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(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)	616.2724	462.3586	372.7893	187.3841	67.3040	0.0000	0.0000	0.0000	0.0000	182.5713	408.2222	629.9967	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)	
Efficiency of water heater (217)m	85.8119	85.4742	84.8739	83.6101	81.7184	79.8000	79.8000	79.8000	79.8000	83.5238	85.1909	85.8758	(216)	
Fuel for water heating, kWh/month	296.0732	262.9796	281.8980	253.2099	252.1839	233.8936	231.8398	240.4692	242.4390	256.8918	266.0865	292.8553	(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	(221)	
Lighting	29.4448	23.6217	21.2687	15.5824	12.0363	9.8337	10.9799	14.2721	18.5380	24.3229	27.4727	30.2632	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-46.6174	-65.1548	-92.8310	-103.3959	-110.6315	-102.9084	-101.5991	-96.3236	-86.9010	-74.0200	-51.0354	-40.3673	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0566	-58.8285	-116.5949	-174.6576	-230.5250	-231.5156	-228.8242	-193.9572	-142.4248	-84.0125	-37.4168	-22.2036	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2926.8985	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	3110.8198	(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)	237.6364	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	3840.5519	(238)

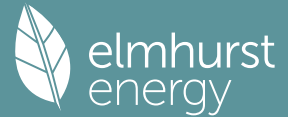
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2926.8985	0.2100	614.6487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3110.8198	0.2100	653.2722 (264)
Space and water heating			1267.9209 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	237.6364	0.1443	34.2983 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	0.1348	-130.9851
PV Unit electricity exported	-1549.0174	0.1260	-195.1295
Total			-326.1146 (269)
Total CO2, kg/year			988.0338 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6900 (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	2926.8985	1.1300	3307.3953 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3110.8198	1.1300	3515.2264 (278)
Space and water heating			6822.6217 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	237.6364	1.5338	364.4946 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	1.4982	-1455.8954
PV Unit electricity exported	-1549.0174	0.4624	-716.2640
Total			-2172.1593 (283)
Total Primary energy kWh/year			5145.0578 (286)
Target Primary Energy Rate (TPER)			50.4400 (287)

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Property Reference	House Type 8				Issued on Date	24/10/2025	
Assessment Reference	Plot 22			Prop Type Ref			
Property							
SAP Rating	84 B	DER	3.70	TER	9.69		
Environmental	97 A	% DER < TER				61.82	
CO ₂ Emissions (t/year)	0.35	DFEE	26.39	TFEE	32.67		
Compliance Check	See BREL	% DFEE < TFEE				19.22	
% DPER < TPER	22.72	DPER	38.98	TPER	50.44		
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

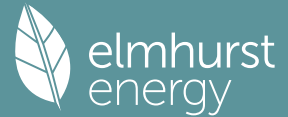
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			13.7000	1.3258	18.1629		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	95.0000	13.7000	81.3000	0.2000	16.2600	190.0000	15447.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			197.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.1529		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21516.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							210.9412 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														3.9389 (36)
Point Thermal bridges														0.0000
Total fabric heat loss														(33) + (36) + (36a) = 50.0918 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	(38)
Average = Sum(39)m / 12 =	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	92.1668	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	0.9036	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	0.9036	
													31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7573	(42)
Hot water usage for mixer showers	68.6705	67.6191	66.0698	63.6862	61.5507	58.5631	56.2001	58.9626	60.3520	63.3111	66.3927	68.6086	(42a)	
Hot water usage for baths	29.7411	29.2921	28.6534	27.6969	26.8349	25.6483	24.7480	25.8489	26.4266	27.6024	28.8249	29.7175	(42b)	
Hot water usage for other uses	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)	
Average daily hot water use (litres/day)													129.8562	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934	(44)	
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529	(45)	
Distribution loss (46)m = 0.15 x (45)m	31.1980	27.4339	28.8239	25.3884	24.1647	20.6923	19.2311	21.4412	21.7438	25.2559	27.6780	31.1029	(46)	
Water storage loss:														
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)	
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(64)	
12Total per year (kWh/year)													2656.3699	(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	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603	(65)	

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

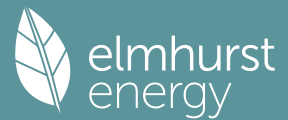
Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)	
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)	
Total internal gains	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811	(72)	
	615.9561	631.3751	604.7891	587.3515	558.2234	537.5162	514.9331	518.8249	533.3959	551.4241	584.3498	604.2219	(73)	

6. Solar gains

[Jan]														
Northeast														
Southwest														
Solar gains	217.3543	381.6393	552.4680	735.3094	869.9526	884.0471	843.8323	740.2658	615.2964	429.9604	262.4173	184.6661	(83)	
Total gains	833.3104	1013.0144	1157.2572	1322.6609	1428.1760	1421.5633	1358.7653	1259.0907	1148.6923	981.3845	846.7670	788.8880	(84)	

7. Mean internal temperature (heating season)

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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	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462	64.8462
alpha	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231	5.3231
util living area	0.9821	0.9543	0.8957	0.7624	0.5837	0.4127	0.2981	0.3360	0.5428	0.8318	0.9596	0.9863 (86)
Living	20.2586	20.4516	20.6576	20.8405	20.9194	20.9387	20.9413	20.9409	20.9299	20.8069	20.4977	20.2116
Non living	19.3024	19.5420	19.7898	19.9942	20.0721	20.0880	20.0896	20.0894	20.0821	19.9646	19.6025	19.2432
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6207	20.4516	20.6576	20.8405	20.9194	20.9387	20.9413	20.9409	20.9299	20.8069	20.4977	20.3219 (87)
Th 2	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644	20.1644 (88)
util rest of house	0.9778	0.9443	0.8752	0.7256	0.5361	0.3598	0.2417	0.2754	0.4811	0.7935	0.9489	0.9829 (89)
MIT 2	19.8208	19.5420	19.7898	19.9942	20.0721	20.0880	20.0896	20.0894	20.0821	19.9646	19.6025	19.4092 (90)
Living area fraction									FLA = Living area / (4) =			0.2451 (91)
MIT	20.0168	19.7650	20.0025	20.2016	20.2798	20.2965	20.2983	20.2981	20.2899	20.1711	19.8219	19.6329 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0168	19.7650	20.0025	20.2016	20.2798	20.2965	20.2983	20.2981	20.2899	20.1711	19.8219	19.6329 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9769	0.9387	0.8708	0.7273	0.5428	0.3682	0.2507	0.2851	0.4906	0.7938	0.9437	0.9802 (94)
Useful gains	814.0774	950.8861	1007.7064	961.9813	775.2278	523.3740	340.7004	358.9522	563.4973	779.0071	799.0812	773.2717 (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	1448.5710	1370.0577	1244.4817	1041.6364	790.7713	525.0263	340.8627	359.2762	570.5026	882.1360	1172.5391	1422.4015 (97)
Space heating kWh	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98a)
Space heating requirement - total per year (kWh/year)												1827.3936
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	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1827.3936
Space heating per m2										(98c) / (4) =		17.9156 (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 %)												243.6414 (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	472.0632	281.6833	176.1608	57.3517	11.5644	0.0000	0.0000	0.0000	0.0000	76.7279	268.8897	482.9526 (98)
Space heating efficiency (main heating system 1)	243.6414	243.6414	243.6414	243.6414	243.6414	0.0000	0.0000	0.0000	0.0000	243.6414	243.6414	243.6414 (210)
Space heating fuel (main heating system)	193.7533	115.6139	72.3033	23.5394	4.7465	0.0000	0.0000	0.0000	0.0000	31.4922	110.3629	198.2228 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898	179.1898 (216)
Fuel for water heating, kWh/month	145.8684	128.9805	137.0354	123.2928	119.7012	105.8212	101.3459	109.5686	109.7331	123.7611	131.8109	145.5146 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	37.9243	30.4243	27.3937	20.0698	15.5025	12.6657	14.1419	18.3822	23.8766	31.3274	35.3843	38.9784 (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												750.0342 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												179.1898
Water heating fuel used												1482.4336 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												41.7926 (230a)
Total electricity for the above, kWh/year												41.7926 (231)
Electricity for lighting (calculated in Appendix L)												306.0712 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2580.3316 (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	750.0342	0.1579	118.3931 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1482.4336	0.1409	208.8722 (264)
Space and water heating			327.2653 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	306.0712	0.1443	44.1755 (268)
Total CO2, kg/year			377.2380 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7000 (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	750.0342	1.5843	1188.2696 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1482.4336	1.5210	2254.7654 (278)
Space and water heating			3443.0349 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	306.0712	1.5338	469.4622 (282)
Total Primary energy kWh/year			3975.7210 (286)
Dwelling Primary energy Rate (DPER)			38.9800 (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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	255.0000 (5)

2. Ventilation rate

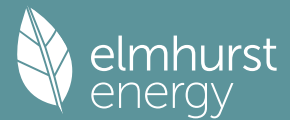
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (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							

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TER Opening Type			13.7000	1.1450	15.6870	(27)
Heatloss Floor 1			51.0000	0.1300	6.6300	(28a)
External Wall 1	95.0000	13.7000	81.3000	0.1800	14.6340	(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	(30)
Total net area of external elements Aum(A, m2)			197.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	42.5610		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 210.9412 (35)

List of Thermal Bridges													
K1 Element													
E5 Ground floor (normal)													
E6 Intermediate floor within a dwelling													
E18 Party wall between dwellings													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E10 Eaves (insulation at ceiling level)													
E12 Gable (insulation at ceiling level)													
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													
Point Thermal bridges													
Total fabric heat loss													

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 51.9565 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226	(38)
Average = Sum(39)m / 12 =	102.2120	101.8943	101.5830	100.1205	99.8469	98.5731	98.5731	98.3372	99.0637	99.8469	100.4004	100.9791	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0021	0.9990	0.9959	0.9816	0.9789	0.9664	0.9664	0.9641	0.9712	0.9789	0.9843	0.9900	(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													2.7573 (42)
Hot water usage for mixer showers													
Hot water usage for baths	70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for other uses	30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Average daily hot water use (litres/day)	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy content (annual)	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737	(45)
Distribution loss (46)m = 0.15 x (45)m	34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)

Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1127 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
PV diverter	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)

12Total per year (kWh/year)													
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	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405	(65)

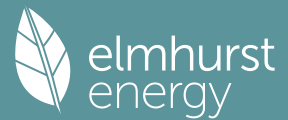
5. Internal gains (see Table 5 and 5a)

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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)
Total internal gains	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609	(72)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	5.2000		11.2829		0.6300		0.7000		0.7700		17.9307	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	113.5104	199.3061	288.5192	384.0057	454.3213	461.6820	440.6803	386.5941	321.3305	224.5412	137.0440	96.4394	(83)
Total gains	746.8799	847.9269	910.1138	984.7945	1025.3612	1010.2099	968.6758	915.4972	865.9651	789.7725	735.8597	716.9412	(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	58.4732	58.6555	58.8353	59.6947	59.8583	60.6318	60.6318	60.7773	60.3315	59.8583	59.5283	59.1872	
alpha	4.8982	4.9104	4.9224	4.9796	4.9906	5.0421	5.0421	5.0518	5.0221	4.9906	4.9686	4.9458	
util living area	0.9901	0.9807	0.9621	0.9061	0.7892	0.6013	0.4434	0.4869	0.7226	0.9242	0.9799	0.9918	(86)
MIT	19.8032	19.9986	20.2601	20.6035	20.8517	20.9708	20.9948	20.9918	20.9280	20.6165	20.1624	19.7778	(87)
Th 2	20.0816	20.0842	20.0867	20.0987	20.1010	20.1114	20.1114	20.1134	20.1074	20.1010	20.0964	20.0917	(88)
util rest of house	0.9875	0.9757	0.9521	0.8818	0.7400	0.5266	0.3560	0.3966	0.6507	0.8993	0.9738	0.9896	(89)
MIT 2	18.6918	18.9408	19.2702	19.6957	19.9732	20.0934	20.1094	20.1100	20.0569	19.7207	19.1591	18.6669	(90)
Living area fraction	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(91)
MIT	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9642	19.2000	19.5128	19.9182	20.1885	20.3084	20.3264	20.3261	20.2704	19.9402	19.4050	18.9392	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9832	0.9695	0.9443	0.8763	0.7452	0.5437	0.3774	0.4186	0.6647	0.8940	0.9677	0.9858	(94)
Useful gains	734.3157	822.0381	859.4037	862.9271	764.0568	549.2676	365.6042	383.2186	575.6240	706.0958	712.1070	706.7828	(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	1498.8579	1457.0931	1321.8829	1103.1431	847.5536	562.6993	367.3255	386.0817	611.2638	932.5922	1235.4252	1488.3514	(97)
Space heating kWh	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(98a)
Space heating requirement - total per year (kWh/year)												2701.5273	
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	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2701.5273	
Space heating per m2										(98c) / (4) =		26.4856	(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	568.8194	426.7570	344.0845	172.9555	62.1216	0.0000	0.0000	0.0000	0.0000	168.5133	376.7891	581.4870	(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)	616.2724	462.3586	372.7893	187.3841	67.3040	0.0000	0.0000	0.0000	0.0000	182.5713	408.2222	629.9967	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
Efficiency of water heater (217)m	85.8119	85.4742	84.8739	83.6101	81.7184	79.8000	79.8000	79.8000	79.8000	83.5238	85.1909	85.8758	(216)
Fuel for water heating, kWh/month	296.0732	262.9796	281.8980	253.2099	252.1839	233.8936	231.8398	240.4692	242.4390	256.8918	266.0865	292.8553	(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	(223)
Lighting	29.4448	23.6217	21.2687	15.5824	12.0363	9.8337	10.9799	14.2721	18.5380	24.3229	27.4727	30.2632	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-46.6174	-65.1548	-92.8310	-103.3959	-110.6315	-102.9084	-101.5991	-96.3236	-86.9010	-74.0200	-51.0354	-40.3673	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0566	-58.8285	-116.5949	-174.6576	-230.5250	-231.5156	-228.8242	-193.9572	-142.4248	-84.0125	-37.4168	-22.2036	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												2926.8985	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	3110.8198	(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)	237.6364	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	3840.5519	(238)

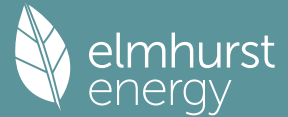
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2926.8985	0.2100	614.6487 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3110.8198	0.2100	653.2722 (264)
Space and water heating			1267.9209 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	237.6364	0.1443	34.2983 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	0.1348	-130.9851
PV Unit electricity exported	-1549.0174	0.1260	-195.1295
Total			-326.1146 (269)
Total CO2, kg/year			988.0338 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6900 (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	2926.8985	1.1300	3307.3953 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3110.8198	1.1300	3515.2264 (278)
Space and water heating			6822.6217 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	237.6364	1.5338	364.4946 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	1.4982	-1455.8954
PV Unit electricity exported	-1549.0174	0.4624	-716.2640
Total			-2172.1593 (283)
Total Primary energy kWh/year			5145.0578 (286)
Target Primary Energy Rate (TPER)			50.4400 (287)

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Property Reference	House Type 8				Issued on Date	24/10/2025
Assessment Reference	Plot 23		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.03	TER	11.15	
Environmental	96 A	% DER < TER				63.86
CO ₂ Emissions (t/year)	0.37	DFEE	32.20	TFEE	39.43	
Compliance Check	See BREL	% DFEE < TFEE				18.34
% DPER < TPER	27.47	DPER	42.30	TPER	58.32	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

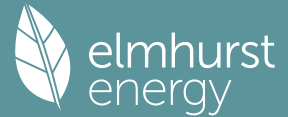
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			13.7000	1.3258	18.1629		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	160.0000	13.7000	146.3000	0.2000	29.2600	190.0000	27797.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.1529		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	33866.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							332.0196 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill						5.5600	0.0190	0.1056				
E4 Jamb						20.4000	0.0150	0.3060				
E10 Eaves (insulation at ceiling level)						11.0000	0.0520	0.5720				
E12 Gable (insulation at ceiling level)						11.0000	0.0450	0.4950				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges											(36a) =	0.0000
Total fabric heat loss											(33) + (36) + (36a) =	63.0918 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750 (38)
Average = Sum(39)m / 12 =	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668 (39)
	105.1668											105.1668
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310 (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												2.7573 (42)
Hot water usage for mixer showers												68.6086 (42a)
Hot water usage for baths												29.7175 (42b)
Hot water usage for other uses												42.8674 (42c)
Average daily hot water use (litres/day)												129.8562 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934 (44)
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529 (45)
Distribution loss (46)m = 0.15 x (45)m												2027.6939
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
Combi loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (57)
Total heat required for water heating calculated for each month	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)
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 (61)
PV diverter	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (62)
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 (63a)
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 (63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
12Total per year (kWh/year)	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Electric shower(s)												2656.3699 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	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												
	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603 (65)

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

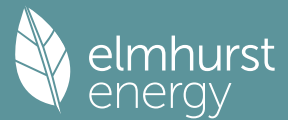
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Total internal gains	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811 (72)
	615.9561	631.3751	604.7891	587.3515	558.2234	537.5162	514.9331	518.8249	533.3959	551.4241	584.3498	604.2219 (73)

6. Solar gains

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
Northeast	5.2000											34.3344 (75)
Southwest	8.5000											183.0199 (79)
Solar gains	217.3543	381.6393	552.4680	735.3094	869.9526	884.0471	843.8323	740.2658	615.2964	429.9604	262.4173	184.6661 (83)
Total gains	833.3104	1013.0144	1157.2572	1322.6609	1428.1760	1421.5633	1358.7653	1259.0907	1148.6923	981.3845	846.7670	788.8880 (84)

7. Mean internal temperature (heating season)

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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	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505
alpha	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634
util living area	0.9971	0.9886	0.9603	0.8569	0.6686	0.4721	0.3404	0.3839	0.6220	0.9165	0.9905	0.9980 (86)
Living	20.3660	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.3316
Non living	19.3242	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.2802
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6757	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.4251 (87)
Th 2	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9958	0.9841	0.9456	0.8164	0.6072	0.4033	0.2676	0.3054	0.5418	0.8802	0.9859	0.9971 (89)
MIT 2	19.7652	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.4203 (90)
Living area fraction									FLA = Living area / (4) =			0.2451 (91)
MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (93)

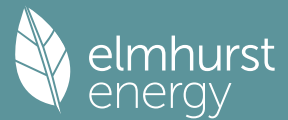
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9957	0.9822	0.9439	0.8209	0.6183	0.4162	0.2813	0.3202	0.5568	0.8831	0.9843	0.9967 (94)
Useful gains	829.7494	995.0208	1092.3850	1085.8339	883.0314	591.6935	382.1674	403.1359	639.5537	866.6906	833.5044	786.2462 (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	1649.8920	1562.5637	1416.1033	1183.6408	896.3860	592.4736	382.2075	403.2347	644.6718	1001.5371	1336.8213	1626.5708 (97)
Space heating kWh	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98a)
Space heating requirement - total per year (kWh/year)												2400.6936
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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2400.6936
Space heating per m2										(98c) / (4) =		23.5362 (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 %)												249.6295 (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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98)
Space heating efficiency (main heating system 1)	249.6295	249.6295	249.6295	249.6295	249.6295	0.0000	0.0000	0.0000	0.0000	249.6295	249.6295	249.6295 (210)
Space heating fuel (main heating system)	244.4367	152.7820	96.4816	28.2102	3.9802	0.0000	0.0000	0.0000	0.0000	40.1899	145.1704	250.4518 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955 (216)
Fuel for water heating, kWh/month	146.1084	129.1927	137.2608	123.4957	119.8982	105.9953	101.5126	109.7488	109.9136	123.9647	132.0277	145.7539 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	37.9243	30.4243	27.3937	20.0698	15.5025	12.6657	14.1419	18.3822	23.8766	31.3274	35.3843	38.9784 (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												961.7028 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.8955
Water heating fuel used												1484.8723 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												41.7926 (230a)
Total electricity for the above, kWh/year												41.7926 (231)
Electricity for lighting (calculated in Appendix L)												306.0712 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2794.4389 (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	961.7028	0.1579	151.8196 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1484.8723	0.1409	209.2158 (264)
Space and water heating			361.0354 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	306.0712	0.1443	44.1755 (268)
Total CO2, kg/year			411.0081 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0300 (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	961.7028	1.5844	1523.6784 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1484.8723	1.5210	2258.4746 (278)
Space and water heating			3782.1530 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	306.0712	1.5338	469.4622 (282)
Total Primary energy kWh/year			4314.8391 (286)
Dwelling Primary energy Rate (DPER)			42.3000 (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			
Ground floor	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

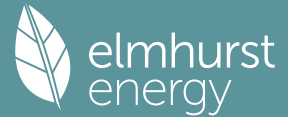
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (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							

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TER Opening Type			13.7000	1.1450	15.6870	(27)
Heatloss Floor 1			51.0000	0.1300	6.6300	(28a)
External Wall 1	160.0000	13.7000	146.3000	0.1800	26.3340	(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	(30)
Total net area of external elements Aum(A, m2)			262.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	54.2610		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 332.0196 (35)

List of Thermal Bridges													
K1 Element													
E5 Ground floor (normal)													
E6 Intermediate floor within a dwelling													
E18 Party wall between dwellings													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E10 Eaves (insulation at ceiling level)													
E12 Gable (insulation at ceiling level)													

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 63.6565 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226	(38)
Average = Sum(39)m / 12 =	113.9120	113.5943	113.2830	111.8205	111.5469	110.2731	110.2731	110.0372	110.7637	111.5469	112.1004	112.6791	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1168	1.1137	1.1106	1.0963	1.0936	1.0811	1.0811	1.0788	1.0859	1.0936	1.0990	1.1047	(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													2.7573 (42)
Hot water usage for mixer showers													
Hot water usage for baths	70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for other uses	30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Average daily hot water use (litres/day)	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)
Daily hot water use	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737	(45)
Energy content (annual)										Total = Sum(45)m =		2194.5956	
Distribution loss (46)m = 0.15 x (45)m	34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)
Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1127 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1409 (55)
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
PV diverter	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2585.6488	(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	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405	(65)

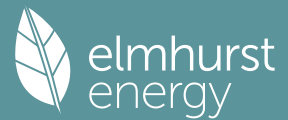
5. Internal gains (see Table 5 and 5a)

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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)
Total internal gains	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609	(72)
	633.3695	648.6208	621.5946	600.7888	571.0398	548.5279	527.9955	528.9032	544.6347	565.2313	598.8157	620.5018	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	5.2000		11.2829		0.6300		0.7000		0.7700		17.9307	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	113.5104	199.3061	288.5192	384.0057	454.3213	461.6820	440.6803	386.5941	321.3305	224.5412	137.0440	96.4394	(83)
Total gains	746.8799	847.9269	910.1138	984.7945	1025.3612	1010.2099	968.6758	915.4972	865.9651	789.7725	735.8597	716.9412	(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	82.5832	82.8142	83.0418	84.1279	84.3343	85.3084	85.3084	85.4913	84.9305	84.3343	83.9178	83.4868
alpha	6.5055	6.5209	6.5361	6.6085	6.6223	6.6872	6.6872	6.6994	6.6620	6.6223	6.5945	6.5658
util living area	0.9986	0.9964	0.9905	0.9634	0.8738	0.6782	0.4984	0.5482	0.8094	0.9736	0.9962	0.9989 (86)
MIT	20.0302	20.1745	20.3780	20.6600	20.8810	20.9826	20.9980	20.9964	20.9466	20.6709	20.3063	20.0114 (87)
Th 2	19.9871	19.9897	19.9922	20.0039	20.0061	20.0163	20.0163	20.0182	20.0123	20.0061	20.0016	19.9970 (88)
util rest of house	0.9980	0.9948	0.9861	0.9460	0.8209	0.5839	0.3885	0.4340	0.7238	0.9574	0.9943	0.9985 (89)
MIT 2	18.8664	19.0525	19.3126	19.6693	19.9145	20.0083	20.0158	20.0173	19.9820	19.6897	19.2307	18.8500 (90)
Living area fraction	fLA = Living area / (4) =											0.2451 (91)
MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346 (93)

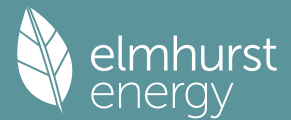
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9973	0.9934	0.9836	0.9440	0.8296	0.6069	0.4156	0.4622	0.7434	0.9558	0.9928	0.9979	(94)	
Useful gains	744.8327	842.3190	895.1812	929.6912	850.6384	613.0907	402.5492	423.1158	643.7272	754.8845	730.5823	715.4204	(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	1691.7831	1638.8868	1481.0295	1231.3805	942.7266	622.7223	403.2204	424.4399	677.6954	1040.7487	1389.4086	1682.8216	(97)	
Space heating kWh	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98a)	
Space heating requirement - total per year (kWh/year)												3368.2100		
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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3368.2100		
Space heating per m2												(98c) / (4) =	33.0217	(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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(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)	763.3056	579.9496	472.2331	235.3373	74.2293	0.0000	0.0000	0.0000	0.0000	230.4258	513.9273	779.7903	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
Efficiency of water heater	86.2227	85.9338	85.3872	84.1174	81.8703	79.8000	79.8000	79.8000	79.8000	84.0400	85.6756	79.8000	(216)
Fuel for water heating, kWh/month	294.6627	261.5732	280.2036	251.6829	251.7157	233.8936	231.8398	240.4692	242.4390	255.3138	264.5815	291.4825	(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	7.0685	7.3041	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	29.4448	23.6217	21.2687	15.5824	12.0363	9.8337	10.9799	14.2721	18.5380	24.3229	27.4727	30.2632	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-46.6174	-65.1548	-92.8310	-103.3959	-110.6315	-102.9084	-101.5991	-96.3236	-86.9010	-74.0200	-51.0354	-40.3673	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0566	-58.8285	-116.5949	-174.6576	-230.5250	-231.5156	-228.8242	-193.9572	-142.4248	-84.0125	-37.4168	-22.2036	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3649.1983	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	3099.8574	(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)	237.6364	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4551.8892	(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	3649.1983	0.2100	766.3316 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3099.8574	0.2100	650.9700 (264)
Space and water heating			1417.3017 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	237.6364	0.1443	34.2983 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	0.1348	-130.9851
PV Unit electricity exported	-1549.0174	0.1260	-195.1295
Total			-326.1146 (269)
Total CO2, kg/year			1137.4146 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1500 (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	3649.1983	1.1300	4123.5941 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3099.8574	1.1300	3502.8388 (278)
Space and water heating			7626.4329 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	237.6364	1.5338	364.4946 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	1.4982	-1455.8954
PV Unit electricity exported	-1549.0174	0.4624	-716.2640
Total			-2172.1593 (283)
Total Primary energy kWh/year			5948.8689 (286)
Target Primary Energy Rate (TPER)			58.3200 (287)

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Property Reference	House Type 9				Issued on Date	24/10/2025	
Assessment Reference	Plot 24			Prop Type Ref			
Property							
SAP Rating	82 B		DER	4.00	TER	11.24	
Environmental	96 A		% DER < TER				64.41
CO ₂ Emissions (t/year)	0.37		DFEE	36.23	TFEE	40.94	
Compliance Check	See BREL		% DFEE < TFEE				11.50
% DPER < TPER	28.42		DPER	42.01	TPER	58.69	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

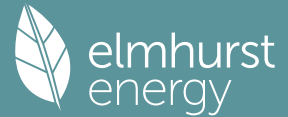
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Opening Type 1			31.2000	1.3258	41.3636		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	150.0000	31.2000	118.8000	0.2000	23.7600	190.0000	22572.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	76.8536		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	28641.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							280.7941 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7573 (42)
Hot water usage for mixer showers												
	68.6705	67.6191	66.0698	63.6862	61.5507	58.5631	56.2001	58.9626	60.3520	63.3111	66.3927	68.6086 (42a)
Hot water usage for baths												
	29.7411	29.2921	28.6534	27.6969	26.8349	25.6483	24.7480	25.8489	26.4266	27.6024	28.8249	29.7175 (42b)
Hot water usage for other uses												
	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674 (42c)
Average daily hot water use (litres/day)												129.8562 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934 (44)
Energy content (annual)												
	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 2027.6939
	31.1980	27.4339	28.8239	25.3884	24.1647	20.6923	19.2311	21.4412	21.7438	25.2559	27.6780	31.1029 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage												
	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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												
	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (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												
	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2656.3699 (64)
Electric shower(s)												2656 (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												
	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	130.8986	144.9234	130.8986	135.2619	130.8986	135.2619	130.8986	130.8986	135.2619	130.8986	135.2619	130.8986 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Water heating gains (Table 5)	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811 (72)
Total internal gains	605.1434	619.4039	593.9765	576.1784	547.4107	526.3431	504.1204	508.0123	522.2228	540.6114	573.1767	593.4093 (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				
Northeast				15.2000	11.2829	0.7600	0.0000	0.7700	100.3622 (75)				
Southeast				2.5000	36.7938	0.7600	0.0000	0.7700	53.8294 (77)				
Southwest				11.0000	36.7938	0.7600	0.0000	0.7700	236.8493 (79)				
Northwest				2.5000	11.2829	0.7600	0.0000	0.7700	16.5069 (81)				
Solar gains	407.5478	733.0238	1106.0660	1543.2988	1886.3740	1942.1220	1843.5362	1576.9783	1255.8087	837.9488	495.2177	344.2016	(83)
Total gains	1012.6912	1352.4277	1700.0425	2119.4773	2433.7847	2468.4651	2347.6566	2084.9906	1728.0315	1378.5603	1068.3944	937.6109	(84)

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513	64.7513
alpha	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168	5.3168
util living area	0.9880	0.9539	0.8607	0.6659	0.4650	0.3181	0.2302	0.2709	0.4719	0.8081	0.9674	0.9917 (86)
Living	20.1933	20.4519	20.7151	20.8880	20.9339	20.9408	20.9416	20.9414	20.9355	20.8251	20.4617	20.1343
Non living	18.9991	19.3180	19.6222	19.7978	19.8365	19.8411	19.8415	19.8414	19.8384	19.7460	19.3354	18.9246
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5873	20.4519	20.7151	20.8880	20.9339	20.9408	20.9416	20.9414	20.9355	20.8251	20.4617	20.2554 (87)
Th 2	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163	19.9163 (88)
util rest of house	0.9839	0.9404	0.8284	0.6160	0.4125	0.2645	0.1736	0.2072	0.4000	0.7545	0.9553	0.9888 (89)
MIT 2	19.5506	19.3180	19.6222	19.7978	19.8365	19.8411	19.8415	19.8414	19.8384	19.7460	19.3354	19.1033 (90)
Living area fraction									fLA = Living area / (4) =			0.2451 (91)
MIT	19.8047	19.5959	19.8901	20.0650	20.1055	20.1107	20.1111	20.1110	20.1073	20.0105	19.6114	19.3857 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8047	19.5959	19.8901	20.0650	20.1055	20.1107	20.1111	20.1110	20.1073	20.0105	19.6114	19.3857 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9834	0.9356	0.8276	0.6231	0.4218	0.2741	0.1837	0.2186	0.4129	0.7596	0.9510	0.9870 (94)
Useful gains	995.8972	1265.3855	1406.9122	1320.6455	1026.4949	676.5763	431.3593	455.8568	734.0610	1047.1056	1016.0493	925.4333 (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	1905.0295	1805.6508	1645.2099	1371.8149	1032.7576	677.0829	431.4024	455.9669	738.1051	1156.2418	1537.2511	1865.8248 (97)
Space heating kWh	676.3944	363.0583	177.2935	36.8420	4.6594	0.0000	0.0000	0.0000	0.0000	81.1974	375.2652	699.6513 (98a)
Space heating requirement - total per year (kWh/year)												2414.3616
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	676.3944	363.0583	177.2935	36.8420	4.6594	0.0000	0.0000	0.0000	0.0000	81.1974	375.2652	699.6513 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2414.3616
Space heating per m2										(98c) / (4) =		23.6702 (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 %)

255.9048 (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	676.3944	363.0583	177.2935	36.8420	4.6594	0.0000	0.0000	0.0000	0.0000	81.1974	375.2652	699.6513 (98)
Space heating efficiency (main heating system 1)	255.9048	255.9048	255.9048	255.9048	255.9048	0.0000	0.0000	0.0000	0.0000	255.9048	255.9048	255.9048 (210)
Space heating fuel (main heating system)	264.3149	141.8724	69.2810	14.3968	1.8208	0.0000	0.0000	0.0000	0.0000	31.7295	146.6425	273.4030 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895	176.3895 (216)
Fuel for water heating, kWh/month	148.1842	131.0281	139.2109	125.2502	121.6016	107.5011	102.9548	111.3080	111.4751	125.7258	133.9034	147.8247 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	35.0307	28.1029	25.3036	18.5385	14.3197	11.6993	13.0629	16.9796	22.0548	28.9371	32.6844	36.0043 (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												943.4609 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												176.3895
Water heating fuel used												1505.9679 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

41.7926 (230a)

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Total electricity for the above, kWh/year	41.7926 (231)
Electricity for lighting (calculated in Appendix L)	282.7178 (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	2773.9392 (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	943.4609	0.1587	149.7049 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1505.9679	0.1409	212.1881 (264)
Space and water heating			361.8930 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	282.7178	0.1443	40.8049 (268)
Total CO2, kg/year			408.4951 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0000 (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	943.4609	1.5873	1497.5311 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1505.9679	1.5210	2290.5607 (278)
Space and water heating			3788.0918 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	282.7178	1.5338	433.6419 (282)
Total Primary energy kWh/year			4284.9577 (286)
Dwelling Primary energy Rate (DPER)			42.0100 (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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	255.0000 (5)

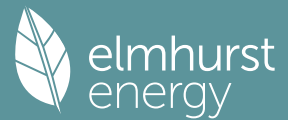
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (25)

3. Heat losses and heat loss parameter

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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			25.4900	1.1450	29.1870		(27)
Heatloss Floor 1			51.0000	0.1300	6.6300		(28a)
External Wall 1	150.0000	25.4900	124.5100	0.1800	22.4118		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum(A, m2)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.8388		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 280.7941 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 73.2343 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226
Average = Sum(39)m / 12 =	123.4898	123.1721	122.8608	121.3983	121.1247	119.8509	119.8509	119.6150	120.3415	121.1247	121.6782	122.2569

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2107	1.2076	1.2045	1.1902	1.1875	1.1750	1.1750	1.1727	1.1798	1.1875	1.1929	1.1986
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												2.7573 (42)
Hot water usage for baths	70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805 (42a)
Hot water usage for other uses	30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164 (42b)
Average daily hot water use (litres/day)	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674 (42c)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642 (44)
Energy content (annual)	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737 (45)
Distribution loss (46)m = 0.15 x (45)m												2194.5956

Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.1127 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1409 (55)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage												
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025 (62)
PV diverter	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)

Output from w/h	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919 (64)
12Total per year (kWh/year)												2585.6488 (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	2586 (64)

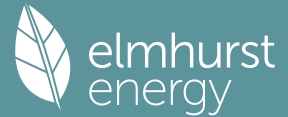
Heat gains from water heating, kWh/month	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	130.8986	144.9234	130.8986	135.2619	130.8986	135.2619	130.8986	130.8986	135.2619	130.8986	135.2619	130.8986 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Total internal gains	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609 (72)
	622.5568	636.6497	610.7820	589.6158	560.2272	537.3548	517.1829	518.0905	533.4616	554.4187	587.6427	609.6891 (73)

6. Solar gains

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[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		
Northeast	12.4200				11.2829	0.6300	0.7000	0.7700	42.8268 (75)			
Southeast	2.0400				36.7938	0.6300	0.7000	0.7700	22.9391 (77)			
Southwest	8.9900				36.7938	0.6300	0.7000	0.7700	101.0896 (79)			
Northwest	2.0400				11.2829	0.6300	0.7000	0.7700	7.0344 (81)			
Solar gains	173.8899	312.7607	471.9241	658.4730	804.8475	828.6316	786.5693	672.8414	535.8131	357.5284	211.2961	146.8619 (83)
Total gains	796.4467	949.4104	1082.7061	1248.0888	1365.0747	1365.9864	1303.7522	1190.9319	1069.2747	911.9471	798.9388	756.5510 (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)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	64.4250	64.5912	64.7549	65.5350	65.6830	66.3811	66.3811	66.5120	66.1105	65.6830	65.3842	65.0747
util living area	5.2950	5.3061	5.3170	5.3690	5.3789	5.4254	5.4254	5.4341	5.4074	5.3789	5.3589	5.3383
	0.9960	0.9894	0.9710	0.9029	0.7526	0.5505	0.4027	0.4582	0.7215	0.9443	0.9904	0.9969 (86)
MIT	19.7968	20.0099	20.3070	20.6746	20.9056	20.9856	20.9978	20.9957	20.9438	20.6207	20.1441	19.7653 (87)
Th 2	19.9115	19.9139	19.9164	19.9279	19.9300	19.9400	19.9400	19.9419	19.9362	19.9300	19.9257	19.9211 (88)
util rest of house	0.9945	0.9856	0.9605	0.8710	0.6883	0.4644	0.3067	0.3549	0.6319	0.9183	0.9863	0.9958 (89)
MIT 2	18.5296	18.8019	19.1754	19.6206	19.8601	19.9332	19.9395	19.9407	19.9036	19.5726	18.9829	18.4965 (90)
Living area fraction	fLA = Living area / (4) = 0.2451 (91)											
MIT	18.8402	19.0980	19.4528	19.8789	20.1163	20.1911	20.1989	20.1993	20.1586	19.8295	19.2675	18.8075 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8402	19.0980	19.4528	19.8789	20.1163	20.1911	20.1989	20.1993	20.1586	19.8295	19.2675	18.8075 (93)
8. Space heating requirement												
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9924	0.9817	0.9548	0.8693	0.7002	0.4853	0.3303	0.3803	0.6519	0.9153	0.9828	0.9941 (94)
Ext temp.	790.4238	932.0657	1033.7583	1084.9686	955.8789	662.8649	430.6129	452.9505	697.0952	834.6782	785.1786	752.0824 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1795.5686	1748.7995	1591.3859	1332.8246	1019.4237	670.1029	431.3280	454.4501	729.0978	1117.9186	1480.5246	1785.8620 (97)
Space heating requirement - total per year (kWh/year)	747.8278	548.8451	414.8749	178.4563	47.2773	0.0000	0.0000	0.0000	0.0000	210.7309	500.6491	769.1320 (98a)
Solar heating kWh												3417.7934
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	747.8278	548.8451	414.8749	178.4563	47.2773	0.0000	0.0000	0.0000	0.0000	210.7309	500.6491	769.1320 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3417.7934
Space heating per m2	(98c) / (4) =											33.5078 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
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
	747.8278	548.8451	414.8749	178.4563	47.2773	0.0000	0.0000	0.0000	0.0000	210.7309	500.6491	769.1320 (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)	810.2143	594.6318	449.4852	193.3438	51.2214	0.0000	0.0000	0.0000	0.0000	228.3108	542.4151	833.2958 (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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919 (64)
Water heating requirement	86.3309	85.9824	85.2820	83.6791	81.3383	79.8000	79.8000	79.8000	79.8000	84.0193	85.7847	79.8000 (216)
Efficiency of water heater (217)m	294.2931	261.4253	280.5492	253.0013	253.3622	233.8936	231.8398	240.4692	242.4390	255.3766	264.2449	291.0822 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Pumps and Fa	27.1981	21.8194	19.6459	14.3934	11.1179	9.0834	10.1421	13.1831	17.1236	22.4670	25.3765	27.9541 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											
	-46.5437	-65.0297	-92.6410	-103.1879	-110.4261	-102.7261	-101.3954	-96.0889	-86.6625	-73.8332	-50.9349	-40.3040 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(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)	-28.1304											
(233b)m	-28.1304	-58.9536	-116.7849	-174.8657	-230.7305	-231.6978	-229.0279	-194.1919	-142.6633	-84.1993	-37.5173	-22.2669 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000											
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000											
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000											
(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)

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Annual totals kWh/year		
Space heating fuel - main system 1	3702.9181	(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	3101.9765	(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)	219.5046	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4589.5964	(238)

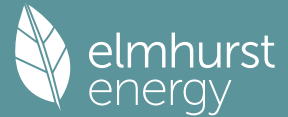
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3702.9181	0.2100	777.6128 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3101.9765	0.2100	651.4151 (264)
Space and water heating			1429.0279 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	219.5046	0.1443	31.6813 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-969.7733	0.1348	-130.7164
PV Unit electricity exported	-1551.0295	0.1260	-195.4006
Total			-326.1170 (269)
Total CO2, kg/year			1146.5214 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2400 (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	3702.9181	1.1300	4184.2974 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3101.9765	1.1300	3505.2335 (278)
Space and water heating			7689.5309 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	219.5046	1.5338	336.6834 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-969.7733	1.4982	-1452.8901
PV Unit electricity exported	-1551.0295	0.4624	-717.2601
Total			-2170.1502 (283)
Total Primary energy kWh/year			5986.1649 (286)
Target Primary Energy Rate (TPER)			58.6900 (287)

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Property Reference	House Type 10			Issued on Date	24/10/2025
Assessment Reference	Plot 25	Prop Type Ref			
Property					
SAP Rating	83 B	DER	3.79	TER	10.59
Environmental	96 A	% DER < TER			64.21
CO ₂ Emissions (t/year)	0.41	DFEE	34.78	TFEE	41.12
Compliance Check	See BREL	% DFEE < TFEE			15.41
% DPER < TPER	28.28	DPER	39.67	TPER	55.31
Assessor Details	Mr. Joe Mountain			Assessor ID	AV71-0001
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	60.0000 (1b)	x 2.3000 (2b)	= 138.0000 (1b) - (3b)
First floor	60.0000 (1c)	x 2.7000 (2c)	= 162.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	120.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 300.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

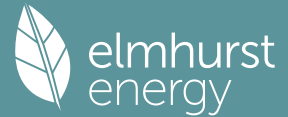
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Opening Type 1			26.0000	1.3258	34.4697		(27)
Heatloss Floor 1			60.0000	0.1200	7.2000	110.0000	6600.0000 (28a)
External Wall 1	185.0000	26.0000	159.0000	0.2000	31.8000	190.0000	30210.0000 (29a)
External Roof 1	60.0000		60.0000	0.1100	6.6000	9.0000	540.0000 (30)
Total net area of external elements Aum(A, m ²)			305.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	80.0697		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	37350.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							311.2500 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												
Hot water usage for mixer showers	70.4034	69.3255	67.7370	65.2934	63.1039	60.0409	57.6183	60.4505	61.8750	64.9088	68.0682	70.3399 (42a)
Hot water usage for baths	30.4885	30.0283	29.3736	28.3930	27.5094	26.2929	25.3700	26.4985	27.0908	28.2961	29.5493	30.4644 (42b)
Hot water usage for other uses	43.9532	42.3549	40.7566	39.1583	37.5600	35.9617	35.9617	37.5600	39.1583	40.7566	42.3549	43.9532 (42c)
Average daily hot water use (litres/day)												133.1340 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	144.8451	141.7087	137.8672	132.8447	128.1733	122.2955	118.9500	124.5090	128.1241	133.9615	139.9724	144.7574 (44)
Energy content (annual)	213.2370	187.5093	197.0094	173.5284	165.1643	141.4307	131.4432	146.5494	148.6175	172.6229	189.1773	212.5869 (45)
Distribution loss (46)m = 0.15 x (45)m	31.9856	28.1264	29.5514	26.0293	24.7746	21.2146	19.7165	21.9824	22.2926	25.8934	28.3766	31.8880 (46)
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (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	266.6314	235.7365	250.4038	225.2004	218.5587	193.1027	184.8376	199.9438	200.2895	226.0173	240.8493	265.9813 (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	266.6314	235.7365	250.4038	225.2004	218.5587	193.1027	184.8376	199.9438	200.2895	226.0173	240.8493	265.9813 (64)
12Total per year (kWh/year)												2707.5524 (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	113.6168	100.9286	108.2211	99.0358	97.6326	88.3633	86.4204	91.4432	90.7529	100.1126	104.2391	113.4007 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	143.9914	159.4191	143.9914	148.7911	143.9914	148.7911	143.9914	143.9914	148.7911	143.9914	148.7911	143.9914 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	285.2132	288.1728	280.7146	264.8371	244.7946	225.9575	213.3731	210.4135	217.8717	233.7492	253.7917	272.6288 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166 (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)	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326 (71)
Water heating gains (Table 5)	152.7108	150.1914	145.4585	137.5497	131.2267	122.7268	116.1564	122.9075	126.0457	134.5600	144.7765	152.4203 (72)
Total internal gains	647.8651	663.7329	636.1143	617.1277	585.9624	563.4252	539.4707	543.2622	558.6583	578.2503	613.3090	634.9902 (73)

[Jan]																				
					Area	Solar flux		g		FF		Access		Gains						
					m2	Table 6a		Specific data		Specific data		factor		W						
						W/m2		or Table 6b		or Table 6c		Table 6d								
Northeast					9.0000	11.2829		0.7600		0.0000		0.7700		59.4250 (75)						
Southeast					8.0000	36.7938		0.7600		0.0000		0.7700		172.2540 (77)						
Southwest					4.0000	36.7938		0.7600		0.0000		0.7700		86.1270 (79)						
Northwest					5.0000	11.2829		0.7600		0.0000		0.7700		33.0139 (81)						
Solar gains	350.8199	628.2805	941.1974	1302.8904	1584.1204	1627.5490	1546.2906	1328.0896	1065.1303	716.3735	425.7929			296.6105 (83)						
Total gains	998.6850	1292.0134	1577.3117	1920.0181	2170.0828	2190.9742	2085.7613	1871.3518	1623.7886	1294.6239	1039.1020			931.6008 (84)						

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103	77.7103
alpha	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807	6.1807
util living area	0.9961	0.9824	0.9322	0.7768	0.5643	0.3893	0.2816	0.3280	0.5598	0.8890	0.9876	0.9974 (86)
Living	20.2527	20.4529	20.6870	20.8798	20.9401	20.9489	20.9497	20.9495	20.9429	20.8156	20.4815	20.2082
Non living	19.1282	19.3801	19.6622	19.8678	19.9199	19.9257	19.9261	19.9261	19.9228	19.8118	19.4186	19.0714
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6177	20.4529	20.6870	20.8798	20.9401	20.9489	20.9497	20.9495	20.9429	20.8156	20.4815	20.3189 (87)
Th 2	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906	19.9906 (88)
util rest of house	0.9946	0.9760	0.9109	0.7293	0.5061	0.3283	0.2170	0.2561	0.4815	0.8465	0.9820	0.9964 (89)
MIT 2	19.6468	19.3801	19.6622	19.8678	19.9199	19.9257	19.9261	19.9261	19.9228	19.8118	19.4186	19.2371 (90)
Living area fraction									FLA = Living area / (4) =			0.2083 (91)
MIT	19.8491	19.6036	19.8757	20.0787	20.1325	20.1389	20.1393	20.1393	20.1353	20.0210	19.6400	19.4624 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8491	19.6036	19.8757	20.0787	20.1325	20.1389	20.1393	20.1393	20.1353	20.0210	19.6400	19.4624 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9943	0.9729	0.9081	0.7337	0.5144	0.3372	0.2265	0.2667	0.4929	0.8480	0.9794	0.9957 (94)
Useful gains	993.0268	1256.9902	1432.3842	1408.6746	1116.3410	738.8957	472.4936	499.1213	800.3878	1097.8508	1017.7355	927.5771 (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	2075.9339	1963.0605	1785.7735	1492.4465	1125.8066	739.4911	472.5314	499.2253	805.7627	1257.7790	1674.2045	2037.6679 (97)
Space heating kWh	805.6829	474.4793	262.9216	60.3158	7.0424	0.0000	0.0000	0.0000	0.0000	118.9866	472.6577	825.9076 (98a)
Space heating requirement - total per year (kWh/year)												3027.9937
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	805.6829	474.4793	262.9216	60.3158	7.0424	0.0000	0.0000	0.0000	0.0000	118.9866	472.6577	825.9076 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3027.9937
Space heating per m2										(98c) / (4) =		25.2333 (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 %)												258.9878 (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	805.6829	474.4793	262.9216	60.3158	7.0424	0.0000	0.0000	0.0000	0.0000	118.9866	472.6577	825.9076 (98)
Space heating efficiency (main heating system 1)	258.9878	258.9878	258.9878	258.9878	258.9878	0.0000	0.0000	0.0000	0.0000	258.9878	258.9878	258.9878 (210)
Space heating fuel (main heating system)	311.0891	183.2052	101.5189	23.2890	2.7192	0.0000	0.0000	0.0000	0.0000	45.9429	182.5019	318.8982 (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	266.6314	235.7365	250.4038	225.2004	218.5587	193.1027	184.8376	199.9438	200.2895	226.0173	240.8493	265.9813 (64)
Efficiency of water heater	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272	175.2272 (216)
Fuel for water heating, kWh/month	152.1633	134.5319	142.9023	128.5191	124.7287	110.2013	105.4846	114.1055	114.3028	128.9853	137.4498	151.7923 (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	4.1759	3.7718	4.1759	4.0412	4.1759	4.0412	4.1759	4.1759	4.0412	4.1759	4.0412	4.1759 (231)
Lighting	38.8826	31.1930	28.0859	20.5769	15.8942	12.9857	14.4992	18.8466	24.4799	32.1190	36.2783	39.9632 (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												1169.1645 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.2272
Water heating fuel used												1545.1668 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												49.1678 (230a)

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Total electricity for the above, kWh/year	49.1678 (231)
Electricity for lighting (calculated in Appendix L)	313.8045 (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	3077.3037 (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	1169.1645	0.1583	185.0284 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1545.1668	0.1409	217.7310 (264)
Space and water heating			402.7594 (265)
Pumps, fans and electric keep-hot	49.1678	0.1387	6.8202 (267)
Energy for lighting	313.8045	0.1443	45.2917 (268)
Total CO2, kg/year			454.8713 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.7900 (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	1169.1645	1.5858	1854.0168 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1545.1668	1.5210	2350.2562 (278)
Space and water heating			4204.2730 (279)
Pumps, fans and electric keep-hot	49.1678	1.5128	74.3810 (281)
Energy for lighting	313.8045	1.5338	481.3239 (282)
Total Primary energy kWh/year			4759.9779 (286)
Dwelling Primary energy Rate (DPER)			39.6700 (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	60.0000 (1b)	x 2.3000 (2b)	= 138.0000 (1b) - (3b)
First floor	60.0000 (1c)	x 2.7000 (2c)	= 162.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	120.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	300.0000 (5)

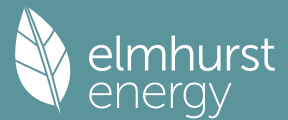
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1333 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3833 (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) = 0.3258 (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	0.4154	0.4073	0.3991	0.3584	0.3503	0.3095	0.3095	0.3014	0.3258	0.3503	0.3666	0.3829 (22b)
Effective ac	0.5863	0.5829	0.5797	0.5642	0.5613	0.5479	0.5479	0.5454	0.5531	0.5613	0.5672	0.5733 (25)

3. Heat losses and heat loss parameter

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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			26.0000	1.1450	29.7710		(27)
Heatloss Floor 1			60.0000	0.1300	7.8000		(28a)
External Wall 1	185.0000	26.0000	159.0000	0.1800	28.6200		(29a)
External Roof 1	60.0000		60.0000	0.1100	6.6000		(30)
Total net area of external elements Aum(A, m2)			305.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		72.7910		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 311.2500 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 82.1865 (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 58.0431 57.7114 57.3862 55.8589 55.5731 54.2429 54.2429 53.9966 54.7553 55.5731 56.1512 56.7556 (38)
140.2296 139.8979 139.5727 138.0454 137.7596 136.4294 136.4294 136.1830 136.9418 137.7596 138.3377 138.9421 (39)
Average = Sum(39)m / 12 = 138.0440

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1686	1.1658	1.1631	1.1504	1.1480	1.1369	1.1369	1.1349	1.1412	1.1480	1.1528	1.1579 (40)
HLP (average)												1.1504
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8633 (42)
Hot water usage for mixer showers												
72.2282	71.1427	69.5610	66.5347	64.3014	61.8108	60.3951	61.9648	63.6856	66.3597	69.4510	71.9515 (42a)	
Hot water usage for baths												
31.1837	30.7206	30.0684	28.8659	27.9655	26.9671	26.4278	27.0754	27.7806	28.8489	30.0761	31.0783 (42b)	
Hot water usage for other uses												
43.9532	42.3549	40.7566	39.1583	37.5600	35.9617	35.9617	37.5600	39.1583	40.7566	42.3549	43.9532 (42c)	
Average daily hot water use (litres/day)												135.4616 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	147.3651	144.2182	140.3860	134.5589	129.8269	124.7396	122.7846	126.6003	130.6244	135.9652	141.8821	146.9829 (44)
Energy conte	233.3903	205.3648	215.7681	184.2045	174.7719	153.3818	148.4973	156.7576	161.0730	184.5035	202.1370	230.1398 (45)
Energy content (annual)										Total = Sum(45)m =		2249.9897
Distribution loss (46)m = 0.15 x (45)m	35.0085	30.8047	32.3652	27.6307	26.2158	23.0073	22.2746	23.5136	24.1609	27.6755	30.3206	34.5210 (46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (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												
	292.0191	258.3199	274.3969	240.9420	233.4008	210.1194	207.1262	215.3864	217.8105	243.1323	258.8746	288.7686 (62)
WWHRS	-33.0197	-29.2029	-30.5796	-25.3211	-23.5984	-20.1933	-18.9280	-20.1280	-20.8928	-24.6303	-27.9031	-32.4082 (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 258.9994 229.1170 243.8173 215.6209 209.8024 189.9261 188.1982 195.2584 196.9178 218.5021 230.9715 256.3603 (64)
Total per year (kWh/year) = Sum(64)m = 2633.4914 (64)
2633 (64)

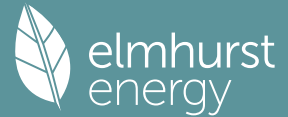
12Total per year (kWh/year)												
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	124.5053	110.6479	118.6460	106.6380	105.0147	96.3895	96.2784	99.0249	98.9468	108.2505	112.6006	123.4245 (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	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657	143.1657 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	143.9914	159.4191	143.9914	148.7911	143.9914	148.7911	143.9914	143.9914	148.7911	143.9914	148.7911	143.9914 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	285.2132	288.1728	280.7146	264.8371	244.7946	225.9575	213.3731	210.4135	217.8717	233.7492	253.7917	272.6288 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166	37.3166 (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)	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326	-114.5326 (71)
Water heating gains (Table 5)	167.3459	164.6545	159.4704	148.1084	141.1488	133.8743	129.4065	133.0980	137.4261	145.4979	156.3897	165.8932 (72)
Total internal gains	665.5002	681.1961	653.1262	630.6864	598.8846	574.5727	552.7208	553.4527	570.0386	592.1883	627.9223	651.4631 (73)

6. Solar gains

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[Jan]	Area m2				Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northeast	9.0000				11.2829	0.6300		0.7000		0.7700		31.0339 (75)	
Southeast	8.0000				36.7938	0.6300		0.7000		0.7700		89.9574 (77)	
Southwest	4.0000				36.7938	0.6300		0.7000		0.7700		44.9787 (79)	
Northwest	5.0000				11.2829	0.6300		0.7000		0.7700		17.2411 (81)	
Solar gains	183.2111	328.1112	491.5279	680.4174	827.2860	849.9660	807.5299	693.5773	556.2503	374.1167	222.3648	154.9010 (83)	
Total gains	848.7113	1009.3074	1144.6541	1311.1037	1426.1706	1424.5387	1360.2507	1247.0300	1126.2889	966.3049	850.2870	806.3641 (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	73.9858	74.1612	74.3340	75.1564	75.3123	76.0467	76.0467	76.1842	75.7621	75.3123	74.9976	74.6714	
alpha	5.9324	5.9441	5.9556	6.0104	6.0208	6.0698	6.0698	6.0789	6.0508	6.0208	5.9998	5.9781	
util living area	0.9985	0.9953	0.9851	0.9386	0.8078	0.6004	0.4396	0.4985	0.7732	0.9676	0.9958	0.9989 (86)	
MIT	19.8848	20.0685	20.3307	20.6709	20.9033	20.9866	20.9982	20.9964	20.9445	20.6274	20.1950	19.8573 (87)	
Th 2	19.9452	19.9474	19.9496	19.9599	19.9618	19.9708	19.9708	19.9725	19.9673	19.9618	19.9579	19.9539 (88)	
util rest of house	0.9978	0.9934	0.9788	0.9138	0.7459	0.5099	0.3378	0.3894	0.6842	0.9492	0.9937	0.9984 (89)	
MIT 2	18.6553	18.8913	19.2243	19.6443	19.8904	19.9647	19.9704	19.9715	19.9357	19.6041	19.0616	18.6266 (90)	
Living area fraction	fLA = Living area / (4) =												
MIT	18.9114	19.1365	19.4548	19.8582	20.1014	20.1776	20.1845	20.1850	20.1459	19.8173	19.2977	18.8830 (92)	
Temperature adjustment	0.0000												
adjusted MIT	18.9114	19.1365	19.4548	19.8582	20.1014	20.1776	20.1845	20.1850	20.1459	19.8173	19.2977	18.8830 (93)	
8. Space heating requirement													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9969	0.9912	0.9749	0.9109	0.7550	0.5286	0.3591	0.4122	0.7010	0.9459	0.9918	0.9976 (94)	
Useful gains	846.0401	1000.4700	1115.8676	1194.2822	1076.7258	752.9698	488.4051	514.0500	789.4734	914.0160	843.3231	804.4635 (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	2048.9560	1991.6599	1808.1399	1512.7252	1157.3780	760.9470	489.0353	515.4593	827.9349	1269.7650	1687.4073	2040.0848 (97)	
Space heating kWh	894.9695	666.0796	515.0506	229.2790	60.0052	0.0000	0.0000	0.0000	0.0000	264.6773	607.7406	919.3023 (98a)	
Space heating requirement - total per year (kWh/year)												4157.1040	
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	894.9695	666.0796	515.0506	229.2790	60.0052	0.0000	0.0000	0.0000	0.0000	264.6773	607.7406	919.3023 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												4157.1040	
Space heating per m2	(98c) / (4) =												34.6425 (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	894.9695	666.0796	515.0506	229.2790	60.0052	0.0000	0.0000	0.0000	0.0000	264.6773	607.7406	919.3023 (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)	969.6311	721.6464	558.0180	248.4063	65.0111	0.0000	0.0000	0.0000	0.0000	286.7576	658.4405	995.9938 (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	258.9994	229.1170	243.8173	215.6209	209.8024	189.9261	188.1982	195.2584	196.9178	218.5021	230.9715	256.3603 (64)	
Water heating requirement	86.6077	86.3087	85.6948	84.1978	81.6402	79.8000	79.8000	79.8000	79.8000	84.4908	86.1251	79.8000 (216)	
Efficiency of water heater	299.0489	265.4623	284.5183	256.0886	256.9841	238.0027	235.8373	244.6847	246.7641	258.6105	268.1815	86.6686 (217)	
Fuel for water heating, kWh/month	299.0489	265.4623	284.5183	256.0886	256.9841	238.0027	235.8373	244.6847	246.7641	258.6105	268.1815	295.7939 (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	29.9186	24.0018	21.6110	15.8331	12.2299	9.9920	11.1566	14.5017	18.8363	24.7143	27.9147	30.7501 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-53.7667	-74.6223	-105.5988	-116.7962	-124.2812	-115.3354	-113.8101	-108.1805	-98.1035	-84.3054	-58.6487	-46.6155 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-34.0851	-71.2404	-140.7846	-210.3256	-277.0795	-278.1045	-274.9232	-233.3263	-171.6916	-101.6152	-45.4127	-26.9973 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	

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Annual totals kWh/year	
Space heating fuel - main system 1	4503.9046 (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	3149.9770 (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)	241.4600 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2965.6503 (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	5015.6913 (238)

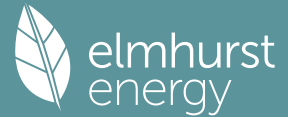
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	4503.9046	0.2100	945.8200 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3149.9770	0.2100	661.4952 (264)
Space and water heating			1607.3151 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	241.4600	0.1443	34.8501 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1100.0643	0.1349	-148.4450
PV Unit electricity exported	-1865.5861	0.1260	-235.1503
Total			-383.5952 (269)
Total CO2, kg/year			1270.4993 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5900 (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	4503.9046	1.1300	5089.4122 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3149.9770	1.1300	3559.4740 (278)
Space and water heating			8648.8862 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	241.4600	1.5338	370.3595 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1100.0643	1.4987	-1648.7136
PV Unit electricity exported	-1865.5861	0.4627	-863.1749
Total			-2511.8885 (283)
Total Primary energy kWh/year			6637.4579 (286)
Target Primary Energy Rate (TPER)			55.3100 (287)

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Property Reference	House Type 11				Issued on Date	24/10/2025
Assessment Reference	Plot 26		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.06	TER	11.19	
Environmental	96 A	% DER < TER				63.72
CO ₂ Emissions (t/year)	0.38	DFEE	33.21	TFEE	39.77	
Compliance Check	See BREL	% DFEE < TFEE				16.49
% DPER < TPER	27.11	DPER	42.62	TPER	58.47	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

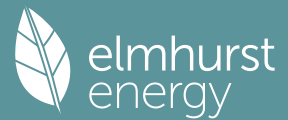
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			15.6000	1.3258	20.6918		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	150.0000	15.6000	134.4000	0.2000	26.8800	190.0000	25536.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.2918		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	31605.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.8529 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600	0.0190	0.1056	
E4 Jamb									20.4000	0.0150	0.3060	
E10 Eaves (insulation at ceiling level)									11.0000	0.0520	0.5720	
E12 Gable (insulation at ceiling level)									11.0000	0.0450	0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 63.2308 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750 (38)
Average = Sum(39)m / 12 =	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058 (39)
												105.3058
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324 (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													2.7573	(42)
Hot water usage for mixer showers														
Hot water usage for baths														
Hot water usage for other uses														
Average daily hot water use (litres/day)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934	(44)	
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529	(45)	
Distribution loss (46)m = 0.15 x (45)m														
Water storage loss:														
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss														
If cylinder contains dedicated solar storage														
Primary loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)	
Combi loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(57)	
Total heat required for water heating calculated for each month	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)	
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	(61)	
PV diverter	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(62)	
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	(63a)	
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	(63b)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
12Total per year (kWh/year)	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(64)	
Electric shower(s)														
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	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														
	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603	(65)	

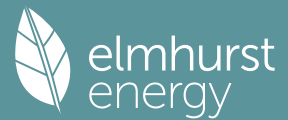
5. Internal gains (see Table 5 and 5a)

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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	137.8146	152.5805	137.8146	142.4084	137.8146	142.4084	137.8146	137.8146	142.4084	137.8146	142.4084	137.8146	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)	
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)	
Total internal gains	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811	(72)	
	612.0595	627.0610	600.8925	583.3250	554.3268	533.4897	511.0365	514.9283	529.3694	547.5275	580.3233	600.3253	(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				8.5000	11.2829		0.7600		0.0000		0.7700		56.1236 (75)
Southwest				6.6000	36.7938		0.7600		0.0000		0.7700		142.1096 (79)
Northwest				0.5000	11.2829		0.7600		0.0000		0.7700		3.3014 (81)
Solar gains	201.5346	363.0264	549.1379	768.2878	940.7586	969.2382	919.7660	785.7010	624.1797	415.3578	244.9865	170.1456	(83)
Total gains	813.5940	990.0874	1150.0304	1351.6128	1495.0854	1502.7279	1430.8025	1300.6293	1153.5491	962.8853	825.3098	770.4709	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683
alpha	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579
util living area	0.9966	0.9876	0.9564	0.8408	0.6403	0.4472	0.3237	0.3721	0.6183	0.9165	0.9897	0.9976 (86)
Living	20.3129	20.4683	20.6644	20.8596	20.9378	20.9513	20.9525	20.9523	20.9436	20.8091	20.5160	20.2773
Non living	19.2599	19.4562	19.6970	19.9144	19.9857	19.9951	19.9956	19.9955	19.9910	19.8685	19.5181	19.2145
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6485	20.4683	20.6644	20.8596	20.9378	20.9513	20.9525	20.9523	20.9436	20.8091	20.5160	20.3784 (87)
Th 2	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564 (88)
util rest of house	0.9952	0.9830	0.9415	0.7998	0.5810	0.3819	0.2544	0.2960	0.5391	0.8818	0.9850	0.9966 (89)
MIT 2	19.7389	19.4562	19.6970	19.9144	19.9857	19.9951	19.9956	19.9955	19.9910	19.8685	19.5181	19.3662 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.9618	19.7043	19.9341	20.1460	20.2191	20.2294	20.2301	20.2300	20.2245	20.0991	19.7626	19.6143 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.9618	19.7043	19.9341	20.1460	20.2191	20.2294	20.2301	20.2300	20.2245	20.0991	19.7626	19.6143 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9808	0.9392	0.8040	0.5914	0.3940	0.2671	0.3100	0.5536	0.8836	0.9832	0.9960 (94)
Useful gains	809.5695	971.0699	1080.0992	1086.7193	884.2426	592.0052	382.2235	403.1959	638.5854	850.8370	811.4121	767.4055 (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	1649.2789	1558.9729	1414.6860	1184.2736	897.1081	592.8111	382.2723	403.3247	644.9431	1000.3058	1333.4488	1623.2150 (97)
Space heating kWh	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98a)
Space heating requirement - total per year (kWh/year)	2472.3518											
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	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2472.3518											
Space heating per m2	(98c) / (4) = 24.2387 (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 %)	249.6855 (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	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98)
Space heating efficiency (main heating system 1)	249.6855	249.6855	249.6855	249.6855	249.6855	0.0000	0.0000	0.0000	0.0000	249.6855	249.6855	249.6855 (210)
Space heating fuel (main heating system)	250.2122	158.2273	99.6984	28.1310	3.8336	0.0000	0.0000	0.0000	0.0000	44.5379	150.5359	255.0097 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater (217)m	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722 (216)
Fuel for water heating, kWh/month	146.1274	129.2095	137.2787	123.5117	119.9138	106.0090	101.5258	109.7631	109.9279	123.9808	132.0449	145.7729 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	36.8815	29.5877	26.6405	19.5180	15.0762	12.3174	13.7530	17.8767	23.2201	30.4660	34.4113	37.9066 (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	990.1862 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	178.8722											
Water heating fuel used	1485.0655 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												
Total electricity for the above, kWh/year	41.7926 (230a)											
	41.7926 (231)											

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Electricity for lighting (calculated in Appendix L)	297.6552	(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	2814.6995	(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	990.1862	0.1578	156.2383	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1485.0655	0.1409	209.2430	(264)
Space and water heating			365.4813	(265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972	(267)
Energy for lighting	297.6552	0.1443	42.9608	(268)
Total CO2, kg/year			414.2392	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0600	(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	990.1862	1.5841	1568.5199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1485.0655	1.5210	2258.7685	(278)
Space and water heating			3827.2884	(279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239	(281)
Energy for lighting	297.6552	1.5338	456.5535	(282)
Total Primary energy kWh/year			4347.0658	(286)
Dwelling Primary energy Rate (DPER)			42.6200	(287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)	
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000	(5)

2. Ventilation rate

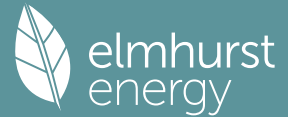
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1569 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4069	(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) =	0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064	(22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opening Type			15.6000	1.1450	17.8626		(27)
Heatloss Floor 1			51.0000	0.1300	6.6300		(28a)
External Wall 1	150.0000	15.6000	134.4000	0.1800	24.1920		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum(A, m2)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		54.2946		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 309.8529 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 63.6901 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226
Heat transfer coeff	113.9456	113.6279	113.3165	111.8541	111.5804	110.3067	110.3067	110.0708	110.7973	111.5804	112.1340	112.7127
Average = Sum(39)m / 12 =												111.8527

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1171	1.1140	1.1109	1.0966	1.0939	1.0814	1.0814	1.0791	1.0862	1.0939	1.0994	1.1050
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7573
Hot water usage for mixer showers												
70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for baths												
30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Hot water usage for other uses												
42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)
Average daily hot water use (litres/day)												132.1266

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss

35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
If cylinder contains dedicated solar storage												
35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664
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
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
Total heat required for water heating calculated for each month												
286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
WWHRS	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106
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
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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919
Total per year (kWh/year)												2585.6488

Electric shower(s) 2586 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

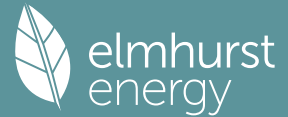
Heat gains from water heating, kWh/month	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405
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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
137.8146	152.5805	137.8146	142.4084	137.8146	142.4084	137.8146	137.8146	142.4084	137.8146	142.4084	137.8146	137.8146
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864
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
Losses e.g. evaporation (negative values) (Table 5)												
-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914
Water heating gains (Table 5)												
164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609	(72)
Total internal gains	629.4729	644.3067	617.6980	596.7623	567.1432	544.5014	524.0989	525.0066	540.6082	561.3347	594.7893	616.6052

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W	
Northeast				8.5000	11.2829	0.6300		0.7000		0.7700		29.3098 (75)	
Southwest				6.6000	36.7938	0.6300		0.7000		0.7700		74.2148 (79)	
Northwest				0.5000	11.2829	0.6300		0.7000		0.7700		1.7241 (81)	
Solar gains	105.2488	189.5858	286.7800	401.2282	491.2988	506.1719	480.3357	410.3220	325.9696	216.9152	127.9410	88.8563 (83)	
Total gains	734.7216	833.8925	904.4781	997.9905	1058.4420	1050.6733	1004.4346	935.3286	866.5778	778.2499	722.7302	705.4615 (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)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	77.0470	77.2624	77.4747	78.4877	78.6802	79.5887	79.5887	79.7593	79.2363	78.6802	78.2918	77.8898	
util living area	6.1365	6.1508	6.1650	6.2325	6.2453	6.3059	6.3059	6.3173	6.2824	6.2453	6.2195	6.1927	
	0.9982	0.9956	0.9885	0.9558	0.8533	0.6529	0.4806	0.5361	0.8032	0.9712	0.9955	0.9986 (86)	
MIT	19.9613	20.1122	20.3341	20.6440	20.8801	20.9822	20.9977	20.9957	20.9389	20.6394	20.2526	19.9419 (87)	
Th 2	19.9869	19.9894	19.9919	20.0036	20.0058	20.0160	20.0160	20.0179	20.0121	20.0058	20.0014	19.9967 (88)	
util rest of house	0.9975	0.9939	0.9836	0.9367	0.7987	0.5615	0.3747	0.4246	0.7193	0.9549	0.9933	0.9980 (89)	
MIT 2	18.7850	18.9794	19.2627	19.6525	19.9127	20.0075	20.0155	20.0167	19.9758	19.6554	19.1685	18.7677 (90)	
Living area fraction	fLA = Living area / (4) =												0.2451 (91)
MIT	19.0733	19.2570	19.5253	19.8955	20.1498	20.2464	20.2562	20.2567	20.2118	19.8966	19.4342	19.0555 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.0733	19.2570	19.5253	19.8955	20.1498	20.2464	20.2562	20.2567	20.2118	19.8966	19.4342	19.0555 (93)	
8. Space heating requirement													
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9965	0.9921	0.9805	0.9342	0.8075	0.5837	0.4008	0.4522	0.7379	0.9526	0.9915	0.9973 (94)	
Ext temp.	732.1585	827.2662	886.8441	932.3312	854.7047	613.2443	402.5381	422.9234	639.4878	741.3445	716.5807	703.5244 (95)	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)	
Space heating kWh	1683.3518	1631.3596	1475.9795	1229.8892	942.8361	622.8331	403.3042	424.5053	677.1763	1037.3155	1383.0812	1674.4002 (97)	
Space heating requirement - total per year (kWh/year)	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316 (98a)	
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	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													3388.5813
Space heating per m2	(98c) / (4) =												33.2214 (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	
Space heating efficiency (main heating system 1)	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316 (98)	
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	766.7257	585.4288	474.8827	232.1146	71.0398	0.0000	0.0000	0.0000	0.0000	238.5725	519.9137	782.5911 (211)	
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 (212)	
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 (213)	
Water heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)	
Water heating requirement	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919 (64)	
Efficiency of water heater	86.2309	85.9521	85.3990	84.0865	81.8012	79.8000	79.8000	79.8000	79.8000	84.1180	85.6991	86.2868 (217)	
Fuel for water heating, kWh/month	294.6346	261.5174	280.1647	251.7755	251.9286	233.8936	231.8398	240.4692	242.4390	255.0771	264.5087	291.4605 (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	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	28.6352	22.9722	20.6839	15.1539	11.7053	9.5633	10.6780	13.8797	18.0283	23.6541	26.7172	29.4310 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-46.5909	-65.1098	-92.7626	-103.3210	-110.5576	-102.8428	-101.5257	-96.2392	-86.8152	-73.9528	-50.9993	-40.3445 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0831	-58.8735	-116.6633	-174.7325	-230.5990	-231.5812	-228.8976	-194.0416	-142.5106	-84.0797	-37.4529	-22.2263 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													3671.2690 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	3099.7087	(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)	231.1021	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4567.2770	(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	3671.2690	0.2100	770.9665 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3099.7087	0.2100	650.9388 (264)
Space and water heating			1421.9053 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	231.1021	0.1443	33.3552 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.0615	0.1348	-130.8884
PV Unit electricity exported	-1549.7413	0.1260	-195.2270
Total			-326.1155 (269)
Total CO2, kg/year			1141.0743 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900 (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	3671.2690	1.1300	4148.5339 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3099.7087	1.1300	3502.6708 (278)
Space and water heating			7651.2048 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	231.1021	1.5338	354.4722 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.0615	1.4982	-1454.8141
PV Unit electricity exported	-1549.7413	0.4624	-716.6223
Total			-2171.4364 (283)
Total Primary energy kWh/year			5964.3413 (286)
Target Primary Energy Rate (TPER)			58.4700 (287)

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Property Reference	House Type 11				Issued on Date	24/10/2025
Assessment Reference	Plot 27		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.06	TER	11.19	
Environmental	96 A	% DER < TER				63.72
CO ₂ Emissions (t/year)	0.38	DFEE	33.21	TFEE	39.77	
Compliance Check	See BREL	% DFEE < TFEE				16.49
% DPER < TPER	27.11	DPER	42.62	TPER	58.47	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

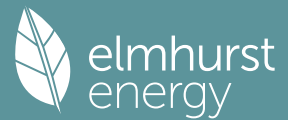
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			15.6000	1.3258	20.6918		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	150.0000	15.6000	134.4000	0.2000	26.8800	190.0000	25536.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.2918		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	31605.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							309.8529 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600	0.0190	0.1056	
E4 Jamb									20.4000	0.0150	0.3060	
E10 Eaves (insulation at ceiling level)									11.0000	0.0520	0.5720	
E12 Gable (insulation at ceiling level)									11.0000	0.0450	0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												(36a) = 0.0000
Total fabric heat loss												(33) + (36) + (36a) = 63.2308 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750 (38)
Average = Sum(39)m / 12 =	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058	105.3058 (39)
												105.3058
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324	1.0324 (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													2.7573	(42)
Hot water usage for mixer showers	68.6705	67.6191	66.0698	63.6862	61.5507	58.5631	56.2001	58.9626	60.3520	63.3111	66.3927	68.6086	(42a)	
Hot water usage for baths	29.7411	29.2921	28.6534	27.6969	26.8349	25.6483	24.7480	25.8489	26.4266	27.6024	28.8249	29.7175	(42b)	
Hot water usage for other uses	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)	
Average daily hot water use (litres/day)													129.8562	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934	(44)	
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529	(45)	
Distribution loss (46)m = 0.15 x (45)m	31.1980	27.4339	28.8239	25.3884	24.1647	20.6923	19.2311	21.4412	21.7438	25.2559	27.6780	31.1029	(46)	
Water storage loss:														
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)	
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473	(64)	
12Total per year (kWh/year)													2656.3699	(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	111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603	(65)	

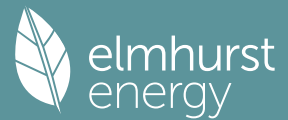
5. Internal gains (see Table 5 and 5a)

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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	137.8146	152.5805	137.8146	142.4084	137.8146	142.4084	137.8146	137.8146	142.4084	137.8146	142.4084	137.8146	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)	
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)	
Total internal gains	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811	(72)	
	612.0595	627.0610	600.8925	583.3250	554.3268	533.4897	511.0365	514.9283	529.3694	547.5275	580.3233	600.3253	(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				8.5000	11.2829		0.7600		0.0000		0.7700		56.1236 (75)
Southwest				6.6000	36.7938		0.7600		0.0000		0.7700		142.1096 (79)
Northwest				0.5000	11.2829		0.7600		0.0000		0.7700		3.3014 (81)
Solar gains	201.5346	363.0264	549.1379	768.2878	940.7586	969.2382	919.7660	785.7010	624.1797	415.3578	244.9865	170.1456	(83)
Total gains	813.5940	990.0874	1150.0304	1351.6128	1495.0854	1502.7279	1430.8025	1300.6293	1153.5491	962.8853	825.3098	770.4709	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683	83.3683
alpha	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579	6.5579
util living area	0.9966	0.9876	0.9564	0.8408	0.6403	0.4472	0.3237	0.3721	0.6183	0.9165	0.9897	0.9976 (86)
Living	20.3129	20.4683	20.6644	20.8596	20.9378	20.9513	20.9525	20.9523	20.9436	20.8091	20.5160	20.2773
Non living	19.2599	19.4562	19.6970	19.9144	19.9857	19.9951	19.9956	19.9955	19.9910	19.8685	19.5181	19.2145
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6485	20.4683	20.6644	20.8596	20.9378	20.9513	20.9525	20.9523	20.9436	20.8091	20.5160	20.3784 (87)
Th 2	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564	20.0564 (88)
util rest of house	0.9952	0.9830	0.9415	0.7998	0.5810	0.3819	0.2544	0.2960	0.5391	0.8818	0.9850	0.9966 (89)
MIT 2	19.7389	19.4562	19.6970	19.9144	19.9857	19.9951	19.9956	19.9955	19.9910	19.8685	19.5181	19.3662 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.9618	19.7043	19.9341	20.1460	20.2191	20.2294	20.2301	20.2300	20.2245	20.0991	19.7626	19.6143 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.9618	19.7043	19.9341	20.1460	20.2191	20.2294	20.2301	20.2300	20.2245	20.0991	19.7626	19.6143 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9951	0.9808	0.9392	0.8040	0.5914	0.3940	0.2671	0.3100	0.5536	0.8836	0.9832	0.9960 (94)
Useful gains	809.5695	971.0699	1080.0992	1086.7193	884.2426	592.0052	382.2235	403.1959	638.5854	850.8370	811.4121	767.4055 (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	1649.2789	1558.9729	1414.6860	1184.2736	897.1081	592.8111	382.2723	403.3247	644.9431	1000.3058	1333.4488	1623.2150 (97)
Space heating kWh	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98a)
Space heating requirement - total per year (kWh/year)	2472.3518											
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	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2472.3518											
Space heating per m2	(98c) / (4) = 24.2387 (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 %)	249.6855 (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	624.7438	395.0708	248.9326	70.2391	9.5720	0.0000	0.0000	0.0000	0.0000	111.2048	375.8664	636.7223 (98)
Space heating efficiency (main heating system 1)	249.6855	249.6855	249.6855	249.6855	249.6855	0.0000	0.0000	0.0000	0.0000	249.6855	249.6855	249.6855 (210)
Space heating fuel (main heating system)	250.2122	158.2273	99.6984	28.1310	3.8336	0.0000	0.0000	0.0000	0.0000	44.5379	150.5359	255.0097 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater (217)m	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722	178.8722 (216)
Fuel for water heating, kWh/month	146.1274	129.2095	137.2787	123.5117	119.9138	106.0090	101.5258	109.7631	109.9279	123.9808	132.0449	145.7729 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	36.8815	29.5877	26.6405	19.5180	15.0762	12.3174	13.7530	17.8767	23.2201	30.4660	34.4113	37.9066 (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	990.1862 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	178.8722											
Water heating fuel used	1485.0655 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												
Total electricity for the above, kWh/year	41.7926 (230a)											
	41.7926 (231)											

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Electricity for lighting (calculated in Appendix L)	297.6552	(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	2814.6995	(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	990.1862	0.1578	156.2383	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1485.0655	0.1409	209.2430	(264)
Space and water heating			365.4813	(265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972	(267)
Energy for lighting	297.6552	0.1443	42.9608	(268)
Total CO2, kg/year			414.2392	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0600	(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	990.1862	1.5841	1568.5199	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1485.0655	1.5210	2258.7685	(278)
Space and water heating			3827.2884	(279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239	(281)
Energy for lighting	297.6552	1.5338	456.5535	(282)
Total Primary energy kWh/year			4347.0658	(286)
Dwelling Primary energy Rate (DPER)			42.6200	(287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)	
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000	(5)

2. Ventilation rate

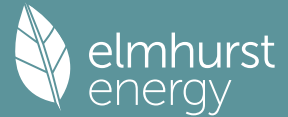
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1569 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4069	(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) =	0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064	(22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opening Type			15.6000	1.1450	17.8626		(27)
Heatloss Floor 1			51.0000	0.1300	6.6300		(28a)
External Wall 1	150.0000	15.6000	134.4000	0.1800	24.1920		(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100		(30)
Total net area of external elements Aum(A, m2)			252.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		54.2946		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 309.8529 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 63.6901 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226
Heat transfer coeff	113.9456	113.6279	113.3165	111.8541	111.5804	110.3067	110.3067	110.0708	110.7973	111.5804	112.1340	112.7127
Average = Sum(39)m / 12 =												111.8527

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1171	1.1140	1.1109	1.0966	1.0939	1.0814	1.0814	1.0791	1.0862	1.0939	1.0994	1.1050
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7573 (42)
Hot water usage for mixer showers												
70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for baths												
30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Hot water usage for other uses												
42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)
Average daily hot water use (litres/day)												132.1266 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642 (44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737 (45)
Energy content (annual)										Total = Sum(45)m =		2194.5956
Distribution loss (46)m = 0.15 x (45)m												
	34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710 (46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss

	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(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													
	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
WWHRS	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106	(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													
	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)

Electric shower(s) 2586 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

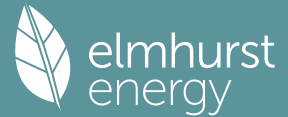
Heat gains from water heating, kWh/month	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405
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5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	137.8146	152.5805	137.8146	142.4084	137.8146	142.4084	137.8146	137.8146	142.4084	137.8146	142.4084	137.8146 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Water heating gains (Table 5)	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609 (72)
Total internal gains	629.4729	644.3067	617.6980	596.7623	567.1432	544.5014	524.0989	525.0066	540.6082	561.3347	594.7893	616.6052 (73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W		
Northeast				8.5000	11.2829	0.6300		0.7000		0.7700		29.3098 (75)		
Southwest				6.6000	36.7938	0.6300		0.7000		0.7700		74.2148 (79)		
Northwest				0.5000	11.2829	0.6300		0.7000		0.7700		1.7241 (81)		
Solar gains	105.2488	189.5858	286.7800	401.2282	491.2988	506.1719	480.3357	410.3220	325.9696	216.9152	127.9410	88.8563	(83)	
Total gains	734.7216	833.8925	904.4781	997.9905	1058.4420	1050.6733	1004.4346	935.3286	866.5778	778.2499	722.7302	705.4615	(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	77.0470	77.2624	77.4747	78.4877	78.6802	79.5887	79.5887	79.7593	79.2363	78.6802	78.2918	77.8898		
alpha	6.1365	6.1508	6.1650	6.2325	6.2453	6.3059	6.3059	6.3173	6.2824	6.2453	6.2195	6.1927		
util living area	0.9982	0.9956	0.9885	0.9558	0.8533	0.6529	0.4806	0.5361	0.8032	0.9712	0.9955	0.9986	(86)	
MIT	19.9613	20.1122	20.3341	20.6440	20.8801	20.9822	20.9977	20.9957	20.9389	20.6394	20.2526	19.9419	(87)	
Th 2	19.9869	19.9894	19.9919	20.0036	20.0058	20.0160	20.0160	20.0179	20.0121	20.0058	20.0014	19.9967	(88)	
util rest of house	0.9975	0.9939	0.9836	0.9367	0.7987	0.5615	0.3747	0.4246	0.7193	0.9549	0.9933	0.9980	(89)	
MIT 2	18.7850	18.9794	19.2627	19.6525	19.9127	20.0075	20.0155	20.0167	19.9758	19.6554	19.1685	18.7677	(90)	
Living area fraction	fLA = Living area / (4) =												0.2451	(91)
MIT	19.0733	19.2570	19.5253	19.8955	20.1498	20.2464	20.2562	20.2567	20.2118	19.8966	19.4342	19.0555	(92)	
Temperature adjustment													0.0000	
adjusted MIT	19.0733	19.2570	19.5253	19.8955	20.1498	20.2464	20.2562	20.2567	20.2118	19.8966	19.4342	19.0555	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9965	0.9921	0.9805	0.9342	0.8075	0.5837	0.4008	0.4522	0.7379	0.9526	0.9915	0.9973	(94)	
Useful gains	732.1585	827.2662	886.8441	932.3312	854.7047	613.2443	402.5381	422.9234	639.4878	741.3445	716.5807	703.5244	(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	1683.3518	1631.3596	1475.9795	1229.8892	942.8361	622.8331	403.3042	424.5053	677.1763	1037.3155	1383.0812	1674.4002	(97)	
Space heating kWh	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316	(98a)	
Space heating requirement - total per year (kWh/year)													3388.5813	
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	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)													3388.5813	
Space heating per m2	(98c) / (4) =												33.2214	(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	707.6878	540.3508	438.3168	214.2418	65.5698	0.0000	0.0000	0.0000	0.0000	220.2024	479.8804	722.3316	(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)	766.7257	585.4288	474.8827	232.1146	71.0398	0.0000	0.0000	0.0000	0.0000	238.5725	519.9137	782.5911	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)	
Efficiency of water heater	86.2309	85.9521	85.3990	84.0865	81.8012	79.8000	79.8000	79.8000	79.8000	84.1180	85.6991	86.2868	(216)	
Fuel for water heating, kWh/month	294.6346	261.5174	280.1647	251.7755	251.9286	233.8936	231.8398	240.4692	242.4390	255.0771	264.5087	291.4605	(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	28.6352	22.9722	20.6839	15.1539	11.7053	9.5633	10.6780	13.8797	18.0283	23.6541	26.7172	29.4310	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-46.5909	-65.1098	-92.7626	-103.3210	-110.5576	-102.8428	-101.5257	-96.2392	-86.8152	-73.9528	-50.9993	-40.3445	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0831	-58.8735	-116.6633	-174.7325	-230.5990	-231.5812	-228.8976	-194.0416	-142.5106	-84.0797	-37.4529	-22.2263	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													3671.2690	(211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	3099.7087	(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)	231.1021	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4567.2770	(238)

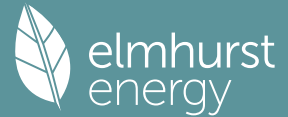
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3671.2690	0.2100	770.9665 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3099.7087	0.2100	650.9388 (264)
Space and water heating			1421.9053 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	231.1021	0.1443	33.3552 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.0615	0.1348	-130.8884
PV Unit electricity exported	-1549.7413	0.1260	-195.2270
Total			-326.1155 (269)
Total CO2, kg/year			1141.0743 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1900 (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	3671.2690	1.1300	4148.5339 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3099.7087	1.1300	3502.6708 (278)
Space and water heating			7651.2048 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	231.1021	1.5338	354.4722 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.0615	1.4982	-1454.8141
PV Unit electricity exported	-1549.7413	0.4624	-716.6223
Total			-2171.4364 (283)
Total Primary energy kWh/year			5964.3413 (286)
Target Primary Energy Rate (TPER)			58.4700 (287)

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Property Reference	House Type 8				Issued on Date	24/10/2025
Assessment Reference	Plot 28		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.03	TER	11.15	
Environmental	96 A	% DER < TER				63.86
CO ₂ Emissions (t/year)	0.37	DFEE	32.20	TFEE	39.43	
Compliance Check	See BREL	% DFEE < TFEE				18.34
% DPER < TPER	27.47	DPER	42.30	TPER	58.32	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

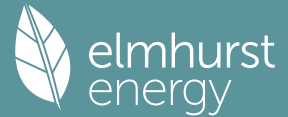
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.1897 0.1859 0.1822 0.1636 0.1599 0.1413 0.1413 0.1376 0.1487 0.1599 0.1673 0.1748 (22b)
Mechanical extract ventilation - decentralised	
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)
Effective ac	0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 0.5000 (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							
Opening Type 1			13.7000	1.3258	18.1629		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	160.0000	13.7000	146.3000	0.2000	29.2600	190.0000	27797.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.1529		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	33866.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							332.0196 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														3.9389 (36)
Point Thermal bridges														(36a) = 0.0000
Total fabric heat loss														(33) + (36) + (36a) = 63.0918 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	(38)	
Average = Sum(39)m / 12 =	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	(39)	105.1668
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	(40)	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7573	(42)
Hot water usage for mixer showers														
68.6705	67.6191	66.0698	63.6862	61.5507	58.5631	56.2001	58.9626	60.3520	63.3111	66.3927	68.6086			(42a)
Hot water usage for baths														
29.7411	29.2921	28.6534	27.6969	26.8349	25.6483	24.7480	25.8489	26.4266	27.6024	28.8249	29.7175			(42b)
Hot water usage for other uses														
42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674			(42c)
Average daily hot water use (litres/day)													129.8562	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934		(44)
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529		(45)
Distribution loss (46)m = 0.15 x (45)m													2027.6939	
31.1980	27.4339	28.8239	25.3884	24.1647	20.6923	19.2311	21.4412	21.7438	25.2559	27.6780	31.1029			(46)
Water storage loss:														
Store volume													300.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.9720	(55)
Total storage loss														
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320			(56)
If cylinder contains dedicated solar storage														
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320			(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														
261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473			(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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917			(64)
12Total per year (kWh/year)													2656.3699	(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														
111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603			(65)

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

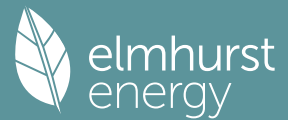
Metabolic gains (Table 5), Watts														
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642		(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112			(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703			(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864			(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)														
-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914			(71)
Water heating gains (Table 5)														
150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811			(72)
Total internal gains	615.9561	631.3751	604.7891	587.3515	558.2234	537.5162	514.9331	518.8249	533.3959	551.4241	584.3498	604.2219		(73)

6. Solar gains

[Jan]														
	Area													
	m2													
	Solar flux													
	Table 6a													
	W/m2													
	Specific data													
	or Table 6b													
	Specific data													
	or Table 6c													
	Access													
	factor													
	Table 6d													
	Gains													
	W													
Northeast	5.2000												34.3344	(75)
Southwest	8.5000												183.0199	(79)
Solar gains	217.3543	381.6393	552.4680	735.3094	869.9526	884.0471	843.8323	740.2658	615.2964	429.9604	262.4173	184.6661		(83)
Total gains	833.3104	1013.0144	1157.2572	1322.6609	1428.1760	1421.5633	1358.7653	1259.0907	1148.6923	981.3845	846.7670	788.8880		(84)

7. Mean internal temperature (heating season)

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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	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505
alpha	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634
util living area	0.9971	0.9886	0.9603	0.8569	0.6686	0.4721	0.3404	0.3839	0.6220	0.9165	0.9905	0.9980 (86)
Living	20.3660	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.3316
Non living	19.3242	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.2802
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6757	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.4251 (87)
Th 2	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9958	0.9841	0.9456	0.8164	0.6072	0.4033	0.2676	0.3054	0.5418	0.8802	0.9859	0.9971 (89)
MIT 2	19.7652	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.4203 (90)
Living area fraction									FLA = Living area / (4) =			0.2451 (91)
MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (93)

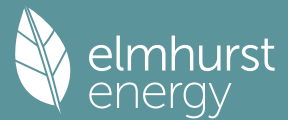
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9957	0.9822	0.9439	0.8209	0.6183	0.4162	0.2813	0.3202	0.5568	0.8831	0.9843	0.9967 (94)
Useful gains	829.7494	995.0208	1092.3850	1085.8339	883.0314	591.6935	382.1674	403.1359	639.5537	866.6906	833.5044	786.2462 (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	1649.8920	1562.5637	1416.1033	1183.6408	896.3860	592.4736	382.2075	403.2347	644.6718	1001.5371	1336.8213	1626.5708 (97)
Space heating kWh	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98a)
Space heating requirement - total per year (kWh/year)												2400.6936
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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2400.6936
Space heating per m2										(98c) / (4) =		23.5362 (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 %)												249.6295 (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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98)
Space heating efficiency (main heating system 1)	249.6295	249.6295	249.6295	249.6295	249.6295	0.0000	0.0000	0.0000	0.0000	249.6295	249.6295	249.6295 (210)
Space heating fuel (main heating system)	244.4367	152.7820	96.4816	28.2102	3.9802	0.0000	0.0000	0.0000	0.0000	40.1899	145.1704	250.4518 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955 (216)
Fuel for water heating, kWh/month	146.1084	129.1927	137.2608	123.4957	119.8982	105.9953	101.5126	109.7488	109.9136	123.9647	132.0277	145.7539 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	37.9243	30.4243	27.3937	20.0698	15.5025	12.6657	14.1419	18.3822	23.8766	31.3274	35.3843	38.9784 (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												961.7028 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.8955
Water heating fuel used												1484.8723 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												41.7926 (230a)
Total electricity for the above, kWh/year												41.7926 (231)
Electricity for lighting (calculated in Appendix L)												306.0712 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2794.4389 (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	961.7028	0.1579	151.8196 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1484.8723	0.1409	209.2158 (264)
Space and water heating			361.0354 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	306.0712	0.1443	44.1755 (268)
Total CO2, kg/year			411.0081 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0300 (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	961.7028	1.5844	1523.6784 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1484.8723	1.5210	2258.4746 (278)
Space and water heating			3782.1530 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	306.0712	1.5338	469.4622 (282)
Total Primary energy kWh/year			4314.8391 (286)
Dwelling Primary energy Rate (DPER)			42.3000 (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			
Ground floor	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

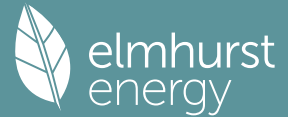
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (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							

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TER Opening Type			13.7000	1.1450	15.6870	(27)
Heatloss Floor 1			51.0000	0.1300	6.6300	(28a)
External Wall 1	160.0000	13.7000	146.3000	0.1800	26.3340	(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	(30)
Total net area of external elements Aum(A, m2)			262.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	54.2610		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 332.0196 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E5 Ground floor (normal)			36.0000	0.1600	5.7600	
E6 Intermediate floor within a dwelling			36.0000	0.0000	0.0000	
E18 Party wall between dwellings			10.0000	0.0600	0.6000	
E2 Other lintels (including other steel lintels)			8.3500	0.0500	0.4175	
E3 Sill			5.5600	0.0500	0.2780	
E4 Jamb			20.4000	0.0500	1.0200	
E10 Eaves (insulation at ceiling level)			11.0000	0.0600	0.6600	
E12 Gable (insulation at ceiling level)			11.0000	0.0600	0.6600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 63.6565 (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	50.2555	49.9378	49.6264	48.1640	47.8903	46.6166	46.6166	46.3807	47.1072	47.8903	48.4439	49.0226
Average = Sum(39)m / 12 =	113.9120	113.5943	113.2830	111.8205	111.5469	110.2731	110.2731	110.0372	110.7637	111.5469	112.1004	112.6791
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1168	1.1137	1.1106	1.0963	1.0936	1.0811	1.0811	1.0788	1.0859	1.0936	1.0990	1.1047
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7573 (42)
Hot water usage for mixer showers													
Hot water usage for baths	70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)
Hot water usage for other uses	30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)
Average daily hot water use (litres/day)	42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)
Daily hot water use	143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737	(45)
Energy content (annual)										Total = Sum(45)m =	2194.5956		
Distribution loss (46)m = 0.15 x (45)m	34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)
Water storage loss:													
Store volume													300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													2.1127 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.1409 (55)
Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(56)
If cylinder contains dedicated solar storage													
Primary loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664	(57)
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025	(62)
PV diverter	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	2585.6488	2586	(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	122.5947	108.9667	116.8797	105.1302	103.5841	95.1340	95.0628	97.7417	97.6282	106.7401	110.9459	121.5405	(65)

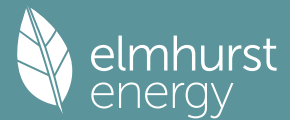
5. Internal gains (see Table 5 and 5a)

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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703	(68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	(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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	(71)
Total internal gains	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609	(72)
	633.3695	648.6208	621.5946	600.7888	571.0398	548.5279	527.9955	528.9032	544.6347	565.2313	598.8157	620.5018	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	5.2000		11.2829		0.6300		0.7000		0.7700		17.9307	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	113.5104	199.3061	288.5192	384.0057	454.3213	461.6820	440.6803	386.5941	321.3305	224.5412	137.0440	96.4394	(83)
Total gains	746.8799	847.9269	910.1138	984.7945	1025.3612	1010.2099	968.6758	915.4972	865.9651	789.7725	735.8597	716.9412	(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	82.5832	82.8142	83.0418	84.1279	84.3343	85.3084	85.3084	85.4913	84.9305	84.3343	83.9178	83.4868	
alpha	6.5055	6.5209	6.5361	6.6085	6.6223	6.6872	6.6872	6.6994	6.6620	6.6223	6.5945	6.5658	
util living area	0.9986	0.9964	0.9905	0.9634	0.8738	0.6782	0.4984	0.5482	0.8094	0.9736	0.9962	0.9989	(86)
MIT	20.0302	20.1745	20.3780	20.6600	20.8810	20.9826	20.9980	20.9964	20.9466	20.6709	20.3063	20.0114	(87)
Th 2	19.9871	19.9897	19.9922	20.0039	20.0061	20.0163	20.0163	20.0182	20.0123	20.0061	20.0016	19.9970	(88)
util rest of house	0.9980	0.9948	0.9861	0.9460	0.8209	0.5839	0.3885	0.4340	0.7238	0.9574	0.9943	0.9985	(89)
MIT 2	18.8664	19.0525	19.3126	19.6693	19.9145	20.0083	20.0158	20.0173	19.9820	19.6897	19.2307	18.8500	(90)
Living area fraction									FLA = Living area / (4) =			0.2451	(91)
MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9973	0.9934	0.9836	0.9440	0.8296	0.6069	0.4156	0.4622	0.7434	0.9558	0.9928	0.9979	(94)
Useful gains	744.8327	842.3190	895.1812	929.6912	850.6384	613.0907	402.5492	423.1158	643.7272	754.8845	730.5823	715.4204	(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	1691.7831	1638.8868	1481.0295	1231.3805	942.7266	622.7223	403.2204	424.4399	677.6954	1040.7487	1389.4086	1682.8216	(97)
Space heating kWh	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98a)
Space heating requirement - total per year (kWh/year)												3368.2100	
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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3368.2100	
Space heating per m2										(98c) / (4) =		33.0217	(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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(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)	763.3056	579.9496	472.2331	235.3373	74.2293	0.0000	0.0000	0.0000	0.0000	230.4258	513.9273	779.7903	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
Efficiency of water heater (217)m	86.2227	85.9338	85.3872	84.1174	81.8703	79.8000	79.8000	79.8000	79.8000	84.0400	85.6756	86.2803	(216)
Fuel for water heating, kWh/month	294.6627	261.5732	280.2036	251.6829	251.7157	233.8936	231.8398	240.4692	242.4390	255.3138	264.5815	291.4825	(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	7.0685	7.3041	7.3041	7.3041	7.3041	7.3041	7.0685	7.3041	(231)
Lighting	29.4448	23.6217	21.2687	15.5824	12.0363	9.8337	10.9799	14.2721	18.5380	24.3229	27.4727	30.2632	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-46.6174	-65.1548	-92.8310	-103.3959	-110.6315	-102.9084	-101.5991	-96.3236	-86.9010	-74.0200	-51.0354	-40.3673	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0566	-58.8285	-116.5949	-174.6576	-230.5250	-231.5156	-228.8242	-193.9572	-142.4248	-84.0125	-37.4168	-22.2036	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3649.1983	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	3099.8574	(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)	237.6364	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4551.8892	(238)

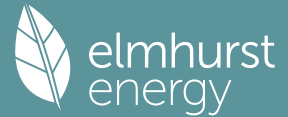
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3649.1983	0.2100	766.3316 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3099.8574	0.2100	650.9700 (264)
Space and water heating			1417.3017 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	237.6364	0.1443	34.2983 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	0.1348	-130.9851
PV Unit electricity exported	-1549.0174	0.1260	-195.1295
Total			-326.1146 (269)
Total CO2, kg/year			1137.4146 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1500 (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	3649.1983	1.1300	4123.5941 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3099.8574	1.1300	3502.8388 (278)
Space and water heating			7626.4329 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	237.6364	1.5338	364.4946 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	1.4982	-1455.8954
PV Unit electricity exported	-1549.0174	0.4624	-716.2640
Total			-2172.1593 (283)
Total Primary energy kWh/year			5948.8689 (286)
Target Primary Energy Rate (TPER)			58.3200 (287)

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Property Reference	House Type 8				Issued on Date	24/10/2025
Assessment Reference	Plot 29		Prop Type Ref			
Property						
SAP Rating	82 B	DER	4.03	TER	11.15	
Environmental	96 A	% DER < TER				63.86
CO ₂ Emissions (t/year)	0.37	DFEE	32.20	TFEE	39.43	
Compliance Check	See BREL	% DFEE < TFEE				18.34
% DPER < TPER	27.47	DPER	42.30	TPER	58.32	
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001
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	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 255.0000 (5)

2. Ventilation rate

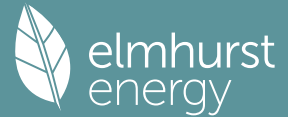
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			13.7000	1.3258	18.1629		(27)
Heatloss Floor 1			51.0000	0.1200	6.1200	110.0000	5610.0000 (28a)
External Wall 1	160.0000	13.7000	146.3000	0.2000	29.2600	190.0000	27797.0000 (29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	9.0000	459.0000 (30)
Total net area of external elements Aum(A, m ²)			262.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.1529		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	33866.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							332.0196 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill					5.5600	0.0190	0.1056					
E4 Jamb					20.4000	0.0150	0.3060					
E10 Eaves (insulation at ceiling level)					11.0000	0.0520	0.5720					
E12 Gable (insulation at ceiling level)					11.0000	0.0450	0.4950					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												3.9389 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												63.0918 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750	42.0750 (38)
Average = Sum(39)m / 12 =	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668	105.1668 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310	1.0310 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

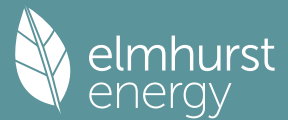
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7573 (42)
Hot water usage for mixer showers												68.6086 (42a)
Hot water usage for baths												29.7175 (42b)
Hot water usage for other uses												42.8674 (42c)
Average daily hot water use (litres/day)												129.8562 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.2789	138.2198	134.4729	129.5741	125.0178	119.2847	116.0214	121.4436	124.9696	130.6633	136.5262	141.1934 (44)
Energy content (annual)	207.9870	182.8927	192.1590	169.2562	161.0980	137.9487	128.2071	142.9413	144.9585	168.3728	184.5197	207.3529 (45)
Distribution loss (46)m = 0.15 x (45)m												2027.6939
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (56)
Combi loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320 (57)
Total heat required for water heating calculated for each month	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)
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 (61)
PV diverter	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (62)
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 (63a)
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 (63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
12Total per year (kWh/year)	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Electric shower(s)												2656.3699 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	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												
111.8712	99.3936	106.6084	97.6153	96.2806	87.2056	85.3444	90.2435	89.5363	98.6995	102.6904	111.6603	(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	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Pumps, fans	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Total internal gains	150.3645	147.9071	143.2909	135.5768	129.4094	121.1188	114.7102	121.2950	124.3560	132.6606	142.6255	150.0811 (72)
615.9561	631.3751	604.7891	587.3515	558.2234	537.5162	514.9331	518.8249	533.3959	551.4241	584.3498	604.2219	(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	5.2000	11.2829	0.7600	0.0000	0.7700	34.3344 (75)						
Southwest	8.5000	36.7938	0.7600	0.0000	0.7700	183.0199 (79)						
Solar gains	217.3543	381.6393	552.4680	735.3094	869.9526	884.0471	843.8323	740.2658	615.2964	429.9604	262.4173	184.6661 (83)
Total gains	833.3104	1013.0144	1157.2572	1322.6609	1428.1760	1421.5633	1358.7653	1259.0907	1148.6923	981.3845	846.7670	788.8880 (84)

7. Mean internal temperature (heating season)

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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	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505	89.4505
alpha	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634	6.9634
util living area	0.9971	0.9886	0.9603	0.8569	0.6686	0.4721	0.3404	0.3839	0.6220	0.9165	0.9905	0.9980 (86)
Living	20.3660	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.3316
Non living	19.3242	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.2802
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.6757	20.5148	20.6919	20.8667	20.9406	20.9541	20.9552	20.9551	20.9482	20.8316	20.5585	20.4251 (87)
Th 2	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575	20.0575 (88)
util rest of house	0.9958	0.9841	0.9456	0.8164	0.6072	0.4033	0.2676	0.3054	0.5418	0.8802	0.9859	0.9971 (89)
MIT 2	19.7652	19.5122	19.7294	19.9238	19.9906	19.9997	20.0002	20.0002	19.9968	19.8934	19.5689	19.4203 (90)
Living area fraction									FLA = Living area / (4) =			0.2451 (91)
MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9883	19.7580	19.9653	20.1549	20.2235	20.2337	20.2343	20.2342	20.2300	20.1233	19.8114	19.6666 (93)

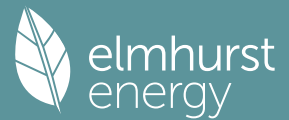
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9957	0.9822	0.9439	0.8209	0.6183	0.4162	0.2813	0.3202	0.5568	0.8831	0.9843	0.9967 (94)
Useful gains	829.7494	995.0208	1092.3850	1085.8339	883.0314	591.6935	382.1674	403.1359	639.5537	866.6906	833.5044	786.2462 (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	1649.8920	1562.5637	1416.1033	1183.6408	896.3860	592.4736	382.2075	403.2347	644.6718	1001.5371	1336.8213	1626.5708 (97)
Space heating kWh	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98a)
Space heating requirement - total per year (kWh/year)												2400.6936
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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2400.6936
Space heating per m2										(98c) / (4) =		23.5362 (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 %)												249.6295 (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	610.1861	381.3888	240.8464	70.4209	9.9358	0.0000	0.0000	0.0000	0.0000	100.3258	362.3882	625.2015 (98)
Space heating efficiency (main heating system 1)	249.6295	249.6295	249.6295	249.6295	249.6295	0.0000	0.0000	0.0000	0.0000	249.6295	249.6295	249.6295 (210)
Space heating fuel (main heating system)	244.4367	152.7820	96.4816	28.2102	3.9802	0.0000	0.0000	0.0000	0.0000	40.1899	145.1704	250.4518 (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	261.3814	231.1199	245.5534	220.9282	214.4924	189.6207	181.6015	196.3357	196.6305	221.7672	236.1917	260.7473 (64)
Efficiency of water heater	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955	178.8955 (216)
Fuel for water heating, kWh/month	146.1084	129.1927	137.2608	123.4957	119.8982	105.9953	101.5126	109.7488	109.9136	123.9647	132.0277	145.7539 (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	3.5495	3.2060	3.5495	3.4350	3.5495	3.4350	3.5495	3.5495	3.4350	3.5495	3.4350	3.5495 (231)
Lighting	37.9243	30.4243	27.3937	20.0698	15.5025	12.6657	14.1419	18.3822	23.8766	31.3274	35.3843	38.9784 (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												961.7028 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.8955
Water heating fuel used												1484.8723 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)												
mechanical ventilation fans (SFP = 0.1343)												41.7926 (230a)
Total electricity for the above, kWh/year												41.7926 (231)
Electricity for lighting (calculated in Appendix L)												306.0712 (232)

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Energy saving/generation technologies (Appendices M ,N and Q)

PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2794.4389 (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	961.7028	0.1579	151.8196 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1484.8723	0.1409	209.2158 (264)
Space and water heating			361.0354 (265)
Pumps, fans and electric keep-hot	41.7926	0.1387	5.7972 (267)
Energy for lighting	306.0712	0.1443	44.1755 (268)
Total CO2, kg/year			411.0081 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0300 (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	961.7028	1.5844	1523.6784 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1484.8723	1.5210	2258.4746 (278)
Space and water heating			3782.1530 (279)
Pumps, fans and electric keep-hot	41.7926	1.5128	63.2239 (281)
Energy for lighting	306.0712	1.5338	469.4622 (282)
Total Primary energy kWh/year			4314.8391 (286)
Dwelling Primary energy Rate (DPER)			42.3000 (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			
Ground floor	51.0000 (1b)	x 2.3000 (2b)	= 117.3000 (1b) - (3b)
First floor	51.0000 (1c)	x 2.7000 (2c)	= 137.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	102.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	255.0000 (5)

2. Ventilation rate

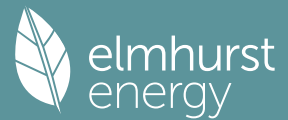
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1569 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4069 (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) = 0.3458 (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	0.4409	0.4323	0.4236	0.3804	0.3718	0.3285	0.3285	0.3199	0.3458	0.3718	0.3891	0.4064 (22b)
Effective ac	0.5972	0.5934	0.5897	0.5724	0.5691	0.5540	0.5540	0.5512	0.5598	0.5691	0.5757	0.5826 (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							

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TER Opening Type			13.7000	1.1450	15.6870	(27)
Heatloss Floor 1			51.0000	0.1300	6.6300	(28a)
External Wall 1	160.0000	13.7000	146.3000	0.1800	26.3340	(29a)
External Roof 1	51.0000		51.0000	0.1100	5.6100	(30)
Total net area of external elements Aum(A, m2)			262.0000			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	54.2610		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 332.0196 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E5 Ground floor (normal)			36.0000	0.1600	5.7600	
E6 Intermediate floor within a dwelling			36.0000	0.0000	0.0000	
E18 Party wall between dwellings			10.0000	0.0600	0.6000	
E2 Other lintels (including other steel lintels)			8.3500	0.0500	0.4175	
E3 Sill			5.5600	0.0500	0.2780	
E4 Jamb			20.4000	0.0500	1.0200	
E10 Eaves (insulation at ceiling level)			11.0000	0.0600	0.6600	
E12 Gable (insulation at ceiling level)			11.0000	0.0600	0.6600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 63.6565 (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 50.2555 49.9378 49.6264 48.1640 47.8903 46.6166 46.6166 46.3807 47.1072 47.8903 48.4439 49.0226 (38)
Average = Sum(39)m / 12 = 113.9120 113.5943 113.2830 111.8205 111.5469 110.2731 110.2731 110.0372 110.7637 111.5469 112.1004 112.6791 (39)
111.8192

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1168	1.1137	1.1106	1.0963	1.0936	1.0811	1.0811	1.0788	1.0859	1.0936	1.0990	1.1047 (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													2.7573 (42)
Hot water usage for mixer showers													
70.4504	69.3917	67.8489	64.8970	62.7187	60.2894	58.9085	60.4396	62.1180	64.7264	67.7416	70.1805	(42a)	
Hot water usage for baths													
30.4192	29.9674	29.3312	28.1582	27.2799	26.3060	25.7799	26.4116	27.0995	28.1416	29.3388	30.3164	(42b)	
Hot water usage for other uses													
42.8674	41.3085	39.7497	38.1909	36.6321	35.0733	35.0733	36.6321	38.1909	39.7497	41.3085	42.8674	(42c)	
Average daily hot water use (litres/day)													132.1266 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
143.7369	140.6676	136.9299	131.2462	126.6307	121.6686	119.7617	123.4834	127.4084	132.6177	138.3889	143.3642	(44)
Energy conte	227.6442	200.3088	210.4561	179.6695	170.4692	149.6058	144.8414	152.8982	157.1073	179.9610	197.1604	224.4737 (45)
Energy content (annual)										Total = Sum(45)m =	2194.5956	
Distribution loss (46)m = 0.15 x (45)m												
34.1466	30.0463	31.5684	26.9504	25.5704	22.4409	21.7262	22.9347	23.5661	26.9941	29.5741	33.6710	(46)

Water storage loss:
Store volume 300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 2.1127 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 1.1409 (55)
Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)

Total storage loss	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (56)
If cylinder contains dedicated solar storage	35.3664	31.9439	35.3664	34.2256	35.3664	34.2256	35.3664	35.3664	34.2256	35.3664	34.2256	35.3664 (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												
	286.2730	253.2639	269.0849	236.4070	229.0980	206.3433	203.4702	211.5270	213.8449	238.5898	253.8979	283.1025 (62)
WWHRS	-32.2070	-28.4841	-29.8269	-24.6979	-23.0175	-19.6963	-18.4621	-19.6326	-20.3785	-24.0240	-27.2163	-31.6106 (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												
	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919 (64)

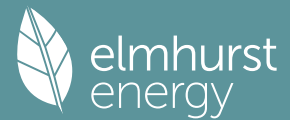
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642	137.8642 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	141.7112	156.8946	141.7112	146.4349	141.7112	146.4349	141.7112	141.7112	146.4349	141.7112	146.4349	141.7112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.5211	262.2141	255.4278	240.9805	222.7434	205.6032	194.1524	191.4594	198.2457	212.6930	230.9300	248.0703 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864	36.7864 (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)	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914	-110.2914 (71)
Water heating gains (Table 5)	164.7779	162.1529	157.0964	146.0141	139.2259	132.1305	127.7726	131.3733	135.5948	143.4678	154.0915	163.3609 (72)
Total internal gains	633.3695	648.6208	621.5946	600.7888	571.0398	548.5279	527.9955	528.9032	544.6347	565.2313	598.8157	620.5018 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
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	m2		Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		factor Table 6d		W	
Northeast	5.2000		11.2829		0.6300		0.7000		0.7700		17.9307	(75)
Southwest	8.5000		36.7938		0.6300		0.7000		0.7700		95.5797	(79)

Solar gains	113.5104	199.3061	288.5192	384.0057	454.3213	461.6820	440.6803	386.5941	321.3305	224.5412	137.0440	96.4394	(83)
Total gains	746.8799	847.9269	910.1138	984.7945	1025.3612	1010.2099	968.6758	915.4972	865.9651	789.7725	735.8597	716.9412	(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	82.5832	82.8142	83.0418	84.1279	84.3343	85.3084	85.3084	85.4913	84.9305	84.3343	83.9178	83.4868
alpha	6.5055	6.5209	6.5361	6.6085	6.6223	6.6872	6.6872	6.6994	6.6620	6.6223	6.5945	6.5658
util living area	0.9986	0.9964	0.9905	0.9634	0.8738	0.6782	0.4984	0.5482	0.8094	0.9736	0.9962	0.9989 (86)
MIT	20.0302	20.1745	20.3780	20.6600	20.8810	20.9826	20.9980	20.9964	20.9466	20.6709	20.3063	20.0114 (87)
Th 2	19.9871	19.9897	19.9922	20.0039	20.0061	20.0163	20.0163	20.0182	20.0123	20.0061	20.0016	19.9970 (88)
util rest of house	0.9980	0.9948	0.9861	0.9460	0.8209	0.5839	0.3885	0.4340	0.7238	0.9574	0.9943	0.9985 (89)
MIT 2	18.8664	19.0525	19.3126	19.6693	19.9145	20.0083	20.0158	20.0173	19.9820	19.6897	19.2307	18.8500 (90)
Living area fraction	fLA = Living area / (4) =											0.2451 (91)
MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1517	19.3275	19.5737	19.9121	20.1514	20.2471	20.2566	20.2572	20.2184	19.9301	19.4943	19.1346 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9973	0.9934	0.9836	0.9440	0.8296	0.6069	0.4156	0.4622	0.7434	0.9558	0.9928	0.9979	(94)	
Useful gains	744.8327	842.3190	895.1812	929.6912	850.6384	613.0907	402.5492	423.1158	643.7272	754.8845	730.5823	715.4204	(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	1691.7831	1638.8868	1481.0295	1231.3805	942.7266	622.7223	403.2204	424.4399	677.6954	1040.7487	1389.4086	1682.8216	(97)	
Space heating kWh	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98a)	
Space heating requirement - total per year (kWh/year)												3368.2100		
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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3368.2100		
Space heating per m2												(98c) / (4) =	33.0217	(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	704.5310	535.2935	435.8712	217.2163	68.5136	0.0000	0.0000	0.0000	0.0000	212.6830	474.3549	719.7464	(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)	763.3056	579.9496	472.2331	235.3373	74.2293	0.0000	0.0000	0.0000	0.0000	230.4258	513.9273	779.7903	(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	254.0660	224.7798	239.2580	211.7092	206.0805	186.6471	185.0081	191.8944	193.4664	214.5658	226.6817	251.4919	(64)
Efficiency of water heater (217)m	86.2227	85.9338	85.3872	84.1174	81.8703	79.8000	79.8000	79.8000	79.8000	84.0400	85.6756	86.2803	(216)
Fuel for water heating, kWh/month	294.6627	261.5732	280.2036	251.6829	251.7157	233.8936	231.8398	240.4692	242.4390	255.3138	264.5815	291.4825	(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	7.0685	7.3041	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	29.4448	23.6217	21.2687	15.5824	12.0363	9.8337	10.9799	14.2721	18.5380	24.3229	27.4727	30.2632	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-46.6174	-65.1548	-92.8310	-103.3959	-110.6315	-102.9084	-101.5991	-96.3236	-86.9010	-74.0200	-51.0354	-40.3673	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-28.0566	-58.8285	-116.5949	-174.6576	-230.5250	-231.5156	-228.8242	-193.9572	-142.4248	-84.0125	-37.4168	-22.2036	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												3649.1983	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

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Efficiency of water heater	79.8000	
Water heating fuel used	3099.8574	(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)	237.6364	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2520.8028	(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	4551.8892	(238)

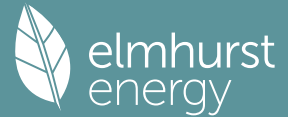
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3649.1983	0.2100	766.3316 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3099.8574	0.2100	650.9700 (264)
Space and water heating			1417.3017 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	237.6364	0.1443	34.2983 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	0.1348	-130.9851
PV Unit electricity exported	-1549.0174	0.1260	-195.1295
Total			-326.1146 (269)
Total CO2, kg/year			1137.4146 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1500 (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	3649.1983	1.1300	4123.5941 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3099.8574	1.1300	3502.8388 (278)
Space and water heating			7626.4329 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	237.6364	1.5338	364.4946 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-971.7854	1.4982	-1455.8954
PV Unit electricity exported	-1549.0174	0.4624	-716.2640
Total			-2172.1593 (283)
Total Primary energy kWh/year			5948.8689 (286)
Target Primary Energy Rate (TPER)			58.3200 (287)

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Property Reference	House Type 12				Issued on Date	24/10/2025	
Assessment Reference	Plot 30			Prop Type Ref			
Property							
SAP Rating	84 B	DER	3.39	TER	8.80		
Environmental	97 A	% DER < TER				61.48	
CO ₂ Emissions (t/year)	0.38	DFEE	29.42	TFEE	33.89		
Compliance Check	See BREL	% DFEE < TFEE				13.19	
% DPER < TPER	22.06	DPER	35.61	TPER	45.69		
Assessor Details	Mr. Joe Mountain				Assessor ID	AV71-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 305.0000 (5)

2. Ventilation rate

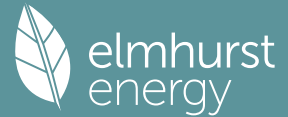
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (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) = 0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Mechanical extract ventilation - decentralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Opening Type 1			30.3200	1.3258	40.1970		(27)
Heatloss Floor 1			61.0000	0.1200	7.3200	110.0000	6710.0000 (28a)
External Wall 1	95.0000	30.3200	64.6800	0.2000	12.9360	190.0000	12289.2000 (29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100	9.0000	549.0000 (30)
Total net area of external elements Aum(A, m ²)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.1630		(33)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	19548.2000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							160.2311 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E5 Ground floor (normal)				36.0000	0.0540	1.9440	
E6 Intermediate floor within a dwelling				36.0000	0.0010	0.0360	
E18 Party wall between dwellings				10.0000	0.0330	0.3300	
E2 Other lintels (including other steel lintels)				8.3500	0.0180	0.1503	

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E3 Sill									5.5600		0.0190		0.1056	
E4 Jamb									20.4000		0.0150		0.3060	
E10 Eaves (insulation at ceiling level)									11.0000		0.0520		0.5720	
E12 Gable (insulation at ceiling level)									11.0000		0.0450		0.4950	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)														
Point Thermal bridges													(36a) =	3.9389 (36)
Total fabric heat loss													(33) + (36) + (36a) =	71.1019 (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		
	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	50.3250	(38)	
Heat transfer coeff	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	121.4269	(39)	
Average = Sum(39)m / 12 =													121.4269	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	0.9953	(40)	
HLP (average)													0.9953	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.8707 (42)
Hot water usage for mixer showers												
70.5244	69.4447	67.8535	65.4056	63.2124	60.1442	57.7174	60.5544	61.9814	65.0204	68.1852	70.4608	(42a)
Hot water usage for baths												
30.5408	30.0797	29.4239	28.4417	27.5565	26.3379	25.4134	26.5439	27.1372	28.3446	29.5999	30.5165	(42b)
Hot water usage for other uses												
44.0291	42.4280	40.8269	39.2259	37.6248	36.0238	36.0238	37.6248	39.2259	40.8269	42.4280	44.0291	(42c)
Average daily hot water use (litres/day)												133.3630 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	145.0942	141.9524	138.1043	133.0732	128.3938	122.5059	119.1546	124.7232	128.3445	134.1919	140.2131	145.0064 (44)
Energy content (annual)	213.6038	187.8318	197.3482	173.8268	165.4483	141.6739	131.6693	146.8015	148.8732	172.9199	189.5027	212.9526 (45)
Distribution loss (46)m = 0.15 x (45)m												2082.4520
Water storage loss:												
Store volume												300.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9720 (55)
Total storage loss												
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage												
30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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												
266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470	(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												
266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470	(64)
12Total per year (kWh/year)												2711.1280 (64)
Electric shower(s)												2711 (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												
113.7388	101.0358	108.3338	99.1350	97.7271	88.4442	86.4956	91.5270	90.8379	100.2114	104.3473	113.5222	(65)

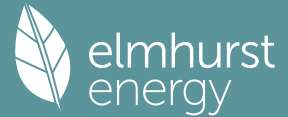
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361	143.5361 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
145.1593	160.7121	145.1593	149.9979	145.1593	149.9979	145.1593	145.1593	149.9979	145.1593	149.9979	145.1593	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
287.7945	290.7809	283.2553	267.2340	247.0101	228.0025	215.3043	212.3179	219.8435	235.8647	256.0886	275.0962	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	37.3536	(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)												
-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	-114.8289	(71)
Water heating gains (Table 5)												
152.8747	150.3509	145.6099	137.6875	131.3536	122.8391	116.2575	123.0202	126.1638	134.6927	144.9267	152.5837	(72)
Total internal gains												
651.8893	667.9047	640.0853	620.9803	589.5839	566.9004	542.7819	546.5581	562.0660	581.7775	617.0741	638.9000	(73)

6. Solar gains

[Jan]												Gains			
				Area	Solar flux		g	FF		Access			W		
				m2	Table 6a		Specific data	Specific data		factor					
					W/m2		or Table 6b	or Table 6c		Table 6d					
Northeast				8.9200	11.2829		0.7600	0.0000		0.7700			58.8968 (75)		
Southeast				15.5000	36.7938		0.7600	0.0000		0.7700			333.7421 (77)		
Southwest				0.5000	36.7938		0.7600	0.0000		0.7700			10.7659 (79)		
Northwest				5.4000	11.2829		0.7600	0.0000		0.7700			35.6550 (81)		
Solar gains				439.0598	779.2875	1149.6759	1564.3300	1879.8065	1922.3513	1829.9895	1586.0473	1291.9201	883.7711	531.6118	372.0428 (83)
Total gains				1090.9491	1447.1922	1789.7612	2185.3103	2469.3903	2489.2518	2372.7713	2132.6054	1853.9862	1465.5486	1148.6859	1010.9428 (84)

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7. Mean internal temperature (heating season)

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

21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187	44.7187
alpha	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812	3.9812
util living area	0.9590	0.8990	0.7927	0.6197	0.4461	0.3101	0.2247	0.2610	0.4412	0.7358	0.9191	0.9682 (86)
Living	19.9821	20.2960	20.5948	20.8123	20.8959	20.9175	20.9214	20.9205	20.9035	20.7458	20.3170	19.9060
Non living	18.9072	19.2917	19.6438	19.8827	19.9658	19.9846	19.9873	19.9869	19.9746	19.8214	19.3245	18.8121
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4793	20.2960	20.5948	20.8123	20.8959	20.9175	20.9214	20.9205	20.9035	20.7458	20.3170	20.0590 (87)
Th 2	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872	20.0872 (88)
util rest of house	0.9514	0.8830	0.7655	0.5825	0.4052	0.2666	0.1783	0.2096	0.3863	0.6937	0.9031	0.9622 (89)
MIT 2	19.6168	19.2917	19.6438	19.8827	19.9658	19.9846	19.9873	19.9869	19.9746	19.8214	19.3245	19.0419 (90)
Living area fraction									FLA = Living area / (4) =			0.2049 (91)
MIT	19.7936	19.4975	19.8387	20.0732	20.1564	20.1758	20.1787	20.1782	20.1649	20.0108	19.5278	19.2503 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7936	19.4975	19.8387	20.0732	20.1564	20.1758	20.1787	20.1782	20.1649	20.0108	19.5278	19.2503 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9486	0.8712	0.7575	0.5819	0.4083	0.2709	0.1830	0.2148	0.3911	0.6899	0.8916	0.9554 (94)
Useful gains	1034.8785	1260.8497	1355.7532	1271.7048	1008.3717	674.2779	434.1399	457.9814	725.0836	1011.1540	1024.1289	965.8080 (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	1881.3340	1772.5337	1619.6740	1356.7285	1026.8372	677.0463	434.5523	458.7755	736.4425	1142.7299	1509.0747	1827.5126 (97)
Space heating kWh	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98a)
Space heating requirement - total per year (kWh/year)												2333.0886
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	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2333.0886
Space heating per m2										(98c) / (4) =		19.1237 (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 %)

255.4521 (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	629.7629	343.8516	196.3570	61.2171	13.7383	0.0000	0.0000	0.0000	0.0000	97.8925	349.1610	641.1082 (98)
Space heating efficiency (main heating system 1)	255.4521	255.4521	255.4521	255.4521	255.4521	0.0000	0.0000	0.0000	0.0000	255.4521	255.4521	255.4521 (210)
Space heating fuel (main heating system)	246.5287	134.6051	76.8665	23.9642	5.3780	0.0000	0.0000	0.0000	0.0000	38.3213	136.6836	250.9700 (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	266.9982	236.0590	250.7426	225.4988	218.8427	193.3459	185.0637	200.1959	200.5452	226.3143	241.1747	266.3470 (64)
Efficiency of water heater	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639	176.5639 (216)
Fuel for water heating, kWh/month	151.2190	133.6961	142.0124	127.7152	123.9454	109.5048	104.8140	113.3844	113.5822	128.1770	136.5935	150.8502 (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	4.2455	3.8346	4.2455	4.1085	4.2455	4.1085	4.2455	4.2455	4.1085	4.2455	4.1085	4.2455 (231)
Lighting	39.2305	31.4722	28.3372	20.7610	16.0364	13.1019	14.6290	19.0153	24.6990	32.4064	36.6029	40.3208 (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												913.3174 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												176.5639
Water heating fuel used												1535.4940 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(MEV)Decentralised, Database: total watage = 4.5675, total flow = 34.0000, SFP = 0.1343)
mechanical ventilation fans (SFP = 0.1343)

49.9873 (230a)

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Total electricity for the above, kWh/year	49.9873	(231)
Electricity for lighting (calculated in Appendix L)	316.6127	(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	2815.4114	(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	913.3174	0.1581	144.3774 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1535.4940	0.1409	216.3693 (264)
Space and water heating			360.7467 (265)
Pumps, fans and electric keep-hot	49.9873	0.1387	6.9338 (267)
Energy for lighting	316.6127	0.1443	45.6970 (268)
Total CO2, kg/year			413.3775 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3900 (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	913.3174	1.5851	1447.6981 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1535.4940	1.5210	2335.5485 (278)
Space and water heating			3783.2466 (279)
Pumps, fans and electric keep-hot	49.9873	1.5128	75.6207 (281)
Energy for lighting	316.6127	1.5338	485.6311 (282)
Total Primary energy kWh/year			4344.4984 (286)
Dwelling Primary energy Rate (DPER)			35.6100 (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	61.0000 (1b)	x 2.3000 (2b)	= 140.3000 (1b) - (3b)
First floor	61.0000 (1c)	x 2.7000 (2c)	= 164.7000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	305.0000 (5)

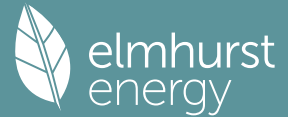
2. Ventilation rate

	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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1311 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3811 (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) = 0.3240 (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	0.4131	0.4050	0.3969	0.3564	0.3483	0.3078	0.3078	0.2997	0.3240	0.3483	0.3645	0.3807 (22b)
Effective ac	0.5853	0.5820	0.5788	0.5635	0.5606	0.5474	0.5474	0.5449	0.5525	0.5606	0.5664	0.5725 (25)

3. Heat losses and heat loss parameter

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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			30.3200	1.1450	34.7176		(27)
Heatloss Floor 1			61.0000	0.1300	7.9300		(28a)
External Wall 1	95.0000	30.3200	64.6800	0.1800	11.6424		(29a)
External Roof 1	61.0000		61.0000	0.1100	6.7100		(30)
Total net area of external elements Aum(A, m2)			217.0000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		61.0000		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.2311 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E5 Ground floor (normal)	36.0000	0.1600	5.7600
E6 Intermediate floor within a dwelling	36.0000	0.0000	0.0000
E18 Party wall between dwellings	10.0000	0.0600	0.6000
E2 Other lintels (including other steel lintels)	8.3500	0.0500	0.4175
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	20.4000	0.0500	1.0200
E10 Eaves (insulation at ceiling level)	11.0000	0.0600	0.6600
E12 Gable (insulation at ceiling level)	11.0000	0.0600	0.6600

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3955 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 70.3955 (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	58.9117	58.5783	58.2515	56.7164	56.4291	55.0921	55.0921	54.8445	55.6071	56.4291	57.0102	57.6176
Heat transfer coeff	129.3072	128.9738	128.6469	127.1118	126.8246	125.4876	125.4876	125.2400	126.0026	126.8246	127.4056	128.0131
Average = Sum(39)m / 12 =												127.1104

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0599	1.0572	1.0545	1.0419	1.0395	1.0286	1.0286	1.0266	1.0328	1.0395	1.0443	1.0493
HLP (average)												1.0419
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8707 (42)

Hot water usage for mixer showers 72.3524 71.2651 69.6806 66.6491 64.4119 61.9170 60.4989 62.0714 63.7951 66.4738 69.5705 72.0752 (42a)

Hot water usage for baths 31.2371 30.7732 30.1199 28.9154 28.0134 27.0133 26.4731 27.1218 27.8281 28.8983 30.1276 31.1315 (42b)

Hot water usage for other uses 44.0291 42.4280 40.8269 39.2259 37.6248 36.0238 36.0238 37.6248 39.2259 40.8269 42.4280 44.0291 (42c)

Average daily hot water use (litres/day) 135.6946 (43)

Daily hot water use 147.6186 144.4663 140.6275 134.7904 130.0502 124.9541 122.9958 126.8180 130.8491 136.1991 142.1261 147.2357 (44)

Energy conte 233.7917 205.7181 216.1392 184.5213 175.0725 153.6456 148.7527 157.0272 161.3500 184.8208 202.4847 230.5356 (45)

Energy content (annual) 2253.8595

Distribution loss (46)m = 0.15 x (45)m 35.0688 30.8577 32.4209 27.6782 26.2609 23.0468 22.3129 23.5541 24.2025 27.7231 30.3727 34.5803 (46)

Water storage loss: 300.0000 (47)

Store volume 2.1127 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 1.1409 (55)

Enter (49) or (54) in (55) 1.1409 (55)

Total storage loss 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (56)

If cylinder contains dedicated solar storage 35.3664 31.9439 35.3664 34.2256 35.3664 34.2256 35.3664 35.3664 34.2256 35.3664 34.2256 35.3664 (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 292.4205 258.6731 274.7680 241.2588 233.7013 210.3832 207.3816 215.6560 218.0876 243.4497 259.2223 289.1644 (62)

WWHRS -33.0765 -29.2531 -30.6322 -25.3647 -23.6389 -20.2280 -18.9605 -20.1626 -20.9287 -24.6726 -27.9511 -32.4640 (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 259.3440 229.4200 244.1359 215.8942 210.0624 190.1552 188.4210 195.4934 197.1589 218.7770 231.2712 256.7005 (64)

Total per year (kWh/year) 2636.8336 (64)

12Total per year (kWh/year) 2637 (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 124.6388 110.7653 118.7693 106.7434 105.1147 96.4772 96.3633 99.1146 99.0389 108.3560 112.7162 123.5561 (65)

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

Metabolic gains (Table 5), Watts 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 143.5361 (66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 145.1593 160.7121 145.1593 149.9979 145.1593 149.9979 145.1593 145.1593 149.9979 145.1593 149.9979 145.1593 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 287.7945 290.7809 283.2553 267.2340 247.0101 228.0025 215.3043 212.3179 219.8435 235.8647 256.0886 275.0962 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 37.3536 (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)

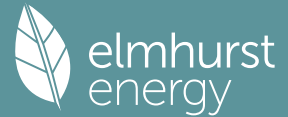
Losses e.g. evaporation (negative values) (Table 5) -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 -114.8289 (71)

Water heating gains (Table 5) 167.5253 164.8293 159.6362 148.2547 141.2832 133.9961 129.5206 133.2185 137.5541 145.6398 156.5503 166.0701 (72)

Total internal gains 669.5399 685.3831 657.1116 634.5475 602.5134 578.0574 556.0450 556.7565 573.4563 595.7246 631.6977 655.3864 (73)

6. Solar gains

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[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Northeast				8.9200	11.2829	0.6300		0.7000		0.7700		30.7581 (75)
Southeast				15.5000	36.7938	0.6300		0.7000		0.7700		174.2924 (77)
Southwest				0.5000	36.7938	0.6300		0.7000		0.7700		5.6223 (79)
Northwest				5.4000	11.2829	0.6300		0.7000		0.7700		18.6204 (81)
Solar gains	229.2932	406.9726	600.4031	816.9507	981.7042	1003.9227	955.6879	828.2923	674.6883	461.5378	277.6273	194.2945 (83)
Total gains	898.8331	1092.3557	1257.5147	1451.4982	1584.2176	1581.9801	1511.7329	1385.0488	1248.1446	1057.2624	909.3249	849.6809 (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	41.9935	42.1020	42.2090	42.7187	42.8155	43.2717	43.2717	43.3572	43.0948	42.8155	42.6202	42.4180
alpha	3.7996	3.8068	3.8139	3.8479	3.8544	3.8848	3.8848	3.8905	3.8730	3.8544	3.8413	3.8279
util living area	0.9788	0.9569	0.9148	0.8161	0.6644	0.4890	0.3606	0.4078	0.6337	0.8715	0.9609	0.9825 (86)
MIT	19.3931	19.7042	20.1009	20.5540	20.8397	20.9627	20.9911	20.9858	20.9007	20.4981	19.8688	19.3431 (87)
Th 2	20.0337	20.0360	20.0382	20.0486	20.0505	20.0596	20.0596	20.0613	20.0561	20.0505	20.0466	20.0425 (88)
util rest of house	0.9744	0.9485	0.8986	0.7841	0.6138	0.4234	0.2856	0.3280	0.5648	0.8406	0.9517	0.9789 (89)
MIT 2	18.1668	18.5589	19.0512	19.5969	19.9102	20.0347	20.0556	20.0545	19.9822	19.5486	18.7781	18.1095 (90)
Living area fraction	fLA = Living area / (4) = 0.2049 (91)											
MIT	18.4181	18.7936	19.2663	19.7930	20.1007	20.2249	20.2473	20.2453	20.1704	19.7432	19.0016	18.3623 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.4181	18.7936	19.2663	19.7930	20.1007	20.2249	20.2473	20.2453	20.1704	19.7432	19.0016	18.3623 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9644	0.9346	0.8830	0.7746	0.6166	0.4352	0.3007	0.3440	0.5736	0.8290	0.9387	0.9700 (94)
Useful gains	866.8612	1020.9382	1110.3868	1124.3361	976.8957	688.5131	454.6062	476.4021	715.9366	876.4381	853.5796	824.2077 (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	1825.5704	1791.9128	1642.3466	1384.6318	1065.4127	705.8522	457.6923	481.5863	764.8867	1159.5811	1516.3317	1812.9579 (97)
Space heating kWh	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (98a)
Space heating requirement - total per year (kWh/year)												3303.8922
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	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3303.8922
Space heating per m2	(98c) / (4) =											27.0811 (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	713.2796	518.0950	395.7781	187.4130	65.8566	0.0000	0.0000	0.0000	0.0000	210.6584	477.1815	735.6301 (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)	772.7840	561.3163	428.7953	203.0476	71.3506	0.0000	0.0000	0.0000	0.0000	228.2323	516.9897	796.9990 (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	259.3440	229.4200	244.1359	215.8942	210.0624	190.1552	188.4210	195.4934	197.1589	218.7770	231.2712	256.7005 (64)
Efficiency of water heater	86.2075	85.8291	85.1367	83.7441	81.7783	79.8000	79.8000	79.8000	79.8000	83.9750	85.6467	79.8000 (216)
Fuel for water heating, kWh/month	300.8369	267.2986	286.7573	257.8023	256.8682	238.2897	236.1166	244.9791	247.0663	260.5263	270.0292	86.2827 (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	30.1612	24.1965	21.7862	15.9615	12.3291	10.0730	11.2471	14.6193	18.9891	24.9147	28.1411	30.9995 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-54.5506	-75.6538	-106.9788	-118.2303	-125.7285	-116.6478	-115.1015	-109.4441	-99.3091	-85.4234	-59.4821	-47.3016 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-34.7654	-72.6399	-143.5110	-214.3436	-282.3215	-283.3495	-280.1107	-237.7545	-174.9825	-103.5959	-46.3136	-27.5381 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	3579.5148 (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	3164.0814 (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)	243.4184 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3015.0778 (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	4057.9367 (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	3579.5148	0.2100	751.6981 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3164.0814	0.2100	664.4571 (264)
Space and water heating			1416.1552 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	243.4184	0.1443	35.1328 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	0.1350	-150.3242
PV Unit electricity exported	-1901.2262	0.1261	-239.6568
Total			-389.9810 (269)
Total CO2, kg/year			1073.2363 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			8.8000 (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	3579.5148	1.1300	4044.8517 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3164.0814	1.1300	3575.4119 (278)
Space and water heating			7620.2637 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	243.4184	1.5338	373.3633 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1113.8517	1.4988	-1669.4477
PV Unit electricity exported	-1901.2262	0.4627	-879.7177
Total			-2549.1654 (283)
Total Primary energy kWh/year			5574.5624 (286)
Target Primary Energy Rate (TPER)			45.6900 (287)