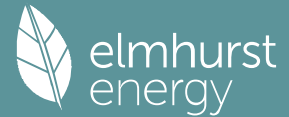


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FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	261.0059	230.7914	245.3895	216.5611	210.4021	190.1317	188.1803	195.4424	197.3235	219.3507	232.3508	258.2914 (64)
12Total per year (kWh/year)												2645.2208 (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	123.7462	109.9105	117.7193	105.5074	103.6983	94.9659	94.7123	97.5374	97.5963	107.0267	111.6405	122.6345 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216	149.3216 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	185.5867	205.4710	185.5867	191.7729	185.5867	191.7729	185.5867	185.5867	191.7729	185.5867	191.7729	185.5867 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	359.6032	363.3347	353.9313	333.9126	308.6425	284.8923	269.0256	265.2941	274.6975	294.7162	319.9862	343.7365 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322	37.9322 (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)	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573	-119.4573 (71)
Water heating gains (Table 5)	166.3256	163.5572	158.2248	146.5380	139.3795	131.8970	127.3015	131.0986	135.5505	143.8530	155.0562	164.8314 (72)
Total internal gains	782.3119	803.1595	768.5393	743.0200	704.4052	676.3587	649.7103	649.7759	669.8174	694.9524	737.6119	764.9511 (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		
South	26.2360				46.7521		0.6300		0.7000		0.7700		374.8610 (78)
Northwest	7.2490				11.2829		0.6300		0.7000		0.7700		24.9961 (81)
Solar gains	399.8571	664.8060	873.7025	1034.4150	1123.4104	1102.1236	1067.8708	1001.9478	928.6267	724.3562	475.7897	344.3275 (83)	
Total gains	1182.1690	1467.9654	1642.2419	1777.4351	1827.8156	1778.4823	1717.5812	1651.7237	1598.4440	1419.3087	1213.4016	1109.2785 (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	64.4074	64.5487	64.6877	65.3490	65.4742	66.0635	66.0635	66.1738	65.8353	65.4742	65.2214	64.9591
alpha	5.2938	5.3032	5.3125	5.3566	5.3649	5.4042	5.4042	5.4116	5.3890	5.3649	5.3481	5.3306
util living area	0.9972	0.9910	0.9769	0.9354	0.8391	0.6619	0.4889	0.5280	0.7595	0.9505	0.9925	0.9980 (86)
MIT	19.7415	19.9786	20.2575	20.5855	20.8352	20.9653	20.9943	20.9914	20.9272	20.5984	20.1025	19.7018 (87)
Th 2	20.0397	20.0416	20.0435	20.0522	20.0539	20.0615	20.0615	20.0629	20.0586	20.0539	20.0506	20.0471 (88)
util rest of house	0.9963	0.9882	0.9695	0.9144	0.7901	0.5780	0.3876	0.4249	0.6825	0.9299	0.9897	0.9974 (89)
MIT 2	18.5683	18.8716	19.2246	19.6328	19.9145	20.0414	20.0596	20.0596	20.0102	19.6567	19.0376	18.5229 (90)
Living area fraction	18.6822	18.9790	19.3249	19.7253	20.0039	20.1311	20.1504	20.1503	20.0993	19.7482	19.1410	18.6374 (92)
MIT	18.6822	18.9790	19.3249	19.7253	20.0039	20.1311	20.1504	20.1503	20.0993	19.7482	19.1410	18.6374 (93)
Temperature adjustment												0.0000
adjusted MIT	18.6822	18.9790	19.3249	19.7253	20.0039	20.1311	20.1504	20.1503	20.0993	19.7482	19.1410	18.6374 (93)

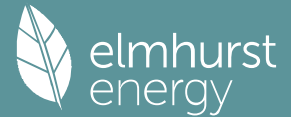
8. Space heating requirement

Utilisation	0.9944	0.9838	0.9621	0.9056	0.7872	0.5845	0.3974	0.4348	0.6861	0.9215	0.9858	0.9959 (94)
Useful gains	1175.5605	1444.1669	1580.0239	1609.7318	1438.8304	1039.6114	682.5059	718.1093	1096.6874	1307.9183	1196.1727	1104.7215 (95)
Ext temp.	4.3000	4.4000	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	2847.8375	2781.7129	2528.4715	2112.6411	1617.4717	1067.7669	685.3887	722.7740	1162.1582	1781.9250	2354.4950	2834.4869 (97)
Space heating kWh	1244.1740	898.8309	705.6450	362.0947	132.9091	0.0000	0.0000	0.0000	0.0000	352.6610	833.9921	1286.9454 (98a)
Space heating requirement - total per year (kWh/year)												5817.2523
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	1244.1740	898.8309	705.6450	362.0947	132.9091	0.0000	0.0000	0.0000	0.0000	352.6610	833.9921	1286.9454 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5817.2523
Space heating per m ²										(98c) / (4) =		30.9242 (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	1244.1740	898.8309	705.6450	362.0947	132.9091	0.0000	0.0000	0.0000	0.0000	352.6610	833.9921	1286.9454 (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)

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Space heating fuel (main heating system)	1347.9675	973.8147	764.5125	392.3020	143.9969	0.0000	0.0000	0.0000	0.0000	382.0813	903.5667	1394.3071	(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	261.0059	230.7914	245.3895	216.5611	210.4021	190.1317	188.1803	195.4424	197.3235	219.3507	232.3508	258.2914	(64)
Efficiency of water heater	87.0967	86.7999	86.2890	85.2037	83.0590	79.8000	79.8000	79.8000	79.8000	85.1187	86.6701	87.1569	(216)
Fuel for water heating, kWh/month	299.6738	265.8889	284.3811	254.1688	253.3164	238.2603	235.8149	244.9153	247.2725	257.6997	268.0864	296.3521	(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	38.5613	30.9353	27.8538	20.4069	15.7629	12.8784	14.3794	18.6909	24.2776	31.8536	35.9785	39.6330	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-48.4138	-69.5526	-101.8142	-116.5782	-127.3934	-119.3834	-117.7877	-110.3086	-97.4879	-80.3585	-53.6386	-41.6962	(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)	-23.5442	-49.9212	-99.9944	-151.3618	-201.3545	-202.8767	-200.6173	-169.4140	-123.4968	-71.9260	-31.5963	-18.5988	(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												6302.5486	(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												3145.8304	(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)												311.2114	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2429.1148	(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												7416.4756	(238)

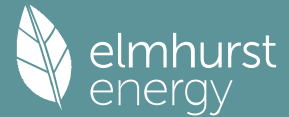
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6302.5486	0.2100	1323.5352 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3145.8304	0.2100	660.6244 (264)
Space and water heating			1984.1596 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	311.2114	0.1443	44.9174 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1084.4129	0.1342	-145.5572
PV Unit electricity exported	-1344.7018	0.1257	-168.9632
Total			-314.5204 (269)
Total CO2, kg/year			1726.4859 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.1800 (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	6302.5486	1.1300	7121.8799 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3145.8304	1.1300	3554.7883 (278)
Space and water heating			10676.6682 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	311.2114	1.5338	477.3465 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1084.4129	1.4961	-1622.3462
PV Unit electricity exported	-1344.7018	0.4612	-620.1936
Total			-2242.5398 (283)
Total Primary energy kWh/year			9041.5756 (286)
Target Primary Energy Rate (TPER)			48.0600 (287)

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Plot Reference	004 4			Issued on Date	16/07/2026
Assessment Reference	004 Be Lean	Plot Type Ref	004 4		
Plot Address	004 4, 004 4, 0			SAP Version	10.2
SAP Rating	87 B	DER	11.70	TER	11.33
Environmental	88 B	% DER < TER		-3.27	
CO ₂ Emissions (t/year)	1.63	DFEE	36.93	TFEE	43.15
Compliance Check	See BREL	% DFEE < TFEE		14.41	
% DPER < TPER	-8.81	DPER	64.83	TPER	59.58
Assessor Details	Mr. Scott Binstead			Assessor ID	U903-0001
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			
Basement floor	42.3490 (1a)	x 2.6250 (2a)	= 111.1661 (1a) - (3a)
Ground floor	42.3490 (1b)	x 3.1330 (2b)	= 132.6794 (1b) - (3b)
First floor	42.3490 (1c)	x 3.0560 (2c)	= 129.4185 (1c) - (3c)
Second floor	30.0050 (1d)	x 3.0000 (2d)	= 90.0150 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.0520		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 463.2791 (5)

2. Ventilation rate

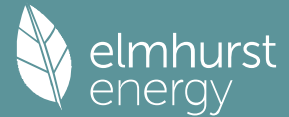
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked 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)
Air changes per hour		
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	4.0100	(17)
Infiltration rate	0.2005	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1855 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2365	0.2318	0.2272	0.2040	0.1994	0.1762	0.1762	0.1716	0.1855	0.1994	0.2086	0.2179 (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							
Solid Door			1.9890	1.2000	2.3880		(26)
Windows			36.9720	1.1450	42.3435		(27)
Fir - Basement			42.3490	0.1100	4.6584	75.0000	3176.1750 (28a)
Ext Wall	146.0520	33.8780	112.1740	0.1600	17.9478	60.0000	6730.4401 (29a)
Top floor	40.5280	3.3790	37.1490	0.1400	5.2009	9.0000	334.3410 (29a)
Below Ground	14.0960		14.0960	0.1600	2.2554	60.0000	845.7600 (29a)
Wl - Dormer	4.2050	1.7040	2.5010	0.1400	0.3501	9.0000	22.5090 (29a)
Rf - Flat Roof	36.4030		36.4030	0.1100	4.0043	9.0000	327.6270 (30)
Total net area of external elements Aum(A, m ²)			283.6420				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		79.1484		(33)
Main dwelling							
Party Wall			105.3250	0.0000	0.0000	150.0000	15798.7495 (32)
Stud			29.0115			9.0000	261.1035 (32c)

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Stud	94.2093	9.0000	847.8838 (32c)
Stud	120.3086	9.0000	1082.7775 (32c)
Stud	49.4220	9.0000	444.7980 (32c)
Internal Floor 1	72.3540	9.0000	651.1860 (32d)
Internal Ceiling 1	72.3540	9.0000	651.1860 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 31174.5364 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 198.4982 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	17.6710	0.2680	4.7358
E2 Other lintels (including other steel lintels)	12.1970	0.0220	0.2683
E3 Sill	51.0180	0.0170	0.8673
E4 Jamb	18.1700	0.0760	1.3809
E5 Ground floor (normal)	35.0750	0.0010	0.0351
E6 Intermediate floor within a dwelling	1.4240	0.0370	0.0527
E7 Party floor between dwellings (in blocks of flats)	7.7530	0.1600	1.2405
E14 Flat roof	17.8080	0.0800	1.4246
E15 Flat roof with parapet	47.1700	0.0460	2.1698
E16 Corner (normal)	5.8750	-0.0880	-0.5170
E17 Corner (inverted - internal area greater than external area)	11.9010	0.0400	0.4760
E18 Party wall between dwellings	17.8280	0.0750	1.3371
E24 Eaves (insulation at ceiling level - inverted)	11.8140	0.0290	0.3426
E25 Staggered party wall between dwellings	9.4310	0.1030	0.9714
P1 Party wall - Ground floor	26.6250	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	8.7050	0.0800	0.6964
P4 Party wall - Roof (insulation at ceiling level)	1.5480	0.2400	0.3715
R1 Head of roof window	1.5480	0.2400	0.3715
R2 Sill of roof window	6.6000	0.2400	1.5840
R3 Jamb of roof window	3.7330	0.1600	0.5973
R9 Roof to wall (flat ceiling)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 18.4060 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 97.5544 (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 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 76.4410 (38)
173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 173.9954 (39)
Average = Sum(39)m 12 = 173.9954

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

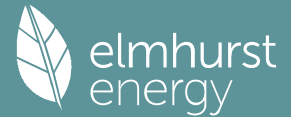
4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.9447 (42)											
Hot water usage for mixer showers	73.5931	72.4871	70.8755	67.7920	65.5165	62.9788	61.5364	63.1358	64.8890	67.6137	70.7635	73.3111 (42a)
Hot water usage for baths	31.7707	31.2988	30.6344	29.4093	28.4919	27.4747	26.9252	27.5850	28.3034	29.3919	30.6422	31.6633 (42b)
Hot water usage for other uses	44.7869	43.1583	41.5296	39.9010	38.2724	36.6438	36.6438	38.2724	39.9010	41.5296	43.1583	44.7869 (42c)
Average daily hot water use (litres/day)	138.0221 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	150.1506	146.9442	143.0395	137.1023	132.2808	127.0973	125.1054	128.9932	133.0935	138.5353	144.5640	149.7613 (44)
Energy content (annual)	237.8019	209.2466	219.8465	187.6862	178.0754	156.2809	151.3042	159.7206	164.1176	187.9910	205.9579	234.4899 (45)
Distribution loss (46)m = 0.15 x (45)m	35.6703	31.3870	32.9770	28.1529	26.7113	23.4421	22.6956	23.9581	24.6176	28.1987	30.8937	35.1735 (46)
Water storage loss (or HIU 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 (56)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (62)
Total heat required for water heating calculated for each month	288.7608	255.2740	270.8054	237.0013	229.0343	205.5960	202.2631	210.6795	213.4327	238.9499	255.2729	285.4488 (63a)
WVHRS	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)
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 (63c)
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 (63d)
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 (64)
Output from w/h	288.7608	255.2740	270.8054	237.0013	229.0343	205.5960	202.2631	210.6795	213.4327	238.9499	255.2729	285.4488 (64)
12Total per year (kWh/year)	2892.5187 (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	91.8089	81.0813	85.8387	74.7344	71.9498	64.2922	63.0484	65.8468	66.8979	75.2467	80.8098	90.7076 (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	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.4855	183.2161	165.4855	171.0017	165.4855	171.0017	165.4855	165.4855	171.0017	165.4855	171.0017	165.4855 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	328.0935	331.4981	322.9186	304.6540	281.5982	259.9290	245.4527	242.0481	250.6275	268.8921	291.9479	313.6171 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236 (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)	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888 (71)
Water heating gains (Table 5)	123.3990	120.6568	115.3746	103.7978	96.7067	89.2947	84.7424	88.5038	92.9137	101.1381	112.2358	121.9189 (72)
Total internal gains	687.1488	705.5417	673.9495	649.6243	613.9612	587.3962	562.8514	563.2082	581.7137	605.6865	645.3562	671.1923 (73)

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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	
South	26.2360		46.7521		0.6300		0.7200		0.7700		385.5713 (78)	
West	3.4870		19.6403		0.6300		0.7200		0.7700		21.5281 (80)	
Northwest	7.2490		11.2829		0.6300		0.7200		0.7700		25.7103 (81)	
Solar gains	432.8097	725.9140	968.0204	1165.1198	1279.4710	1260.5112	1219.1939	1134.3510	1035.8215	795.0233	516.2267	371.8691 (83)
Total gains	1119.9584	1431.4557	1641.9699	1814.7441	1893.4322	1847.9074	1782.0453	1697.5592	1617.5352	1400.7099	1161.5828	1043.0613 (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	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691
alpha	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179
util living area	0.9899	0.9723	0.9392	0.8669	0.7433	0.5738	0.4232	0.4616	0.6758	0.8995	0.9776	0.9925 (86)
MIT	19.5212	19.8401	20.1929	20.5621	20.8265	20.9562	20.9905	20.9862	20.9116	20.5477	19.9443	19.4465 (87)
Th 2	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944 (88)
util rest of house	0.9873	0.9655	0.9246	0.8361	0.6888	0.4941	0.3295	0.3653	0.5985	0.8688	0.9710	0.9905 (89)
MIT 2	18.6572	18.9705	19.3115	19.6546	19.8800	19.9734	19.9916	19.9900	19.9470	19.6508	19.0764	18.5831 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.7546	19.0685	19.4109	19.7569	19.9867	20.0842	20.1042	20.1023	20.0557	19.7519	19.1742	18.6804 (92)
Temperature adjustment	-0.1500											
adjusted MIT	18.6046	18.9185	19.2609	19.6069	19.8367	19.9342	19.9542	19.9523	19.9057	19.6019	19.0242	18.5304 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9823	0.9561	0.9114	0.8224	0.6794	0.4891	0.3257	0.3611	0.5911	0.8543	0.9623	0.9864 (94)
Useful gains	1100.0823	1368.5443	1496.5272	1492.5229	1286.4000	903.8867	580.4450	613.0513	956.0702	1196.6761	1117.8094	1028.8399 (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	2488.9359	2439.1633	2220.3301	1862.9442	1415.7415	928.1265	583.6195	618.0845	1010.1716	1566.2856	2074.7533	2493.4326 (97)
Space heating kWh	1033.3071	719.4559	538.5093	266.7034	96.2301	0.0000	0.0000	0.0000	0.0000	274.9894	688.9996	1089.6569 (98a)
Space heating requirement - total per year (kWh/year)	4707.8517											
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	1033.3071	719.4559	538.5093	266.7034	96.2301	0.0000	0.0000	0.0000	0.0000	274.9894	688.9996	1089.6569 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	4707.8517											
Space heating per m2	(98c) / (4) =											
	29.9764 (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 %)												89.5000 (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	1033.3071	719.4559	538.5093	266.7034	96.2301	0.0000	0.0000	0.0000	0.0000	274.9894	688.9996	1089.6569 (98)
Space heating efficiency (main heating system 1)	89.5000	89.5000	89.5000	89.5000	89.5000	0.0000	0.0000	0.0000	0.0000	89.5000	89.5000	89.5000 (210)
Space heating fuel (main heating system)	1154.5331	803.8614	601.6864	297.9926	107.5196	0.0000	0.0000	0.0000	0.0000	307.2507	769.8320	1217.4937 (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	288.7608	255.2740	270.8054	237.0013	229.0343	205.5960	202.2631	210.6795	213.4327	238.9499	255.2729	285.4488 (64)
Efficiency of water heater	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000	89.5000 (216)
Fuel for water heating, kWh/month	322.6378	285.2223	302.5758	264.8059	255.9042	229.7162	225.9923	235.3961	238.4723	266.9832	285.2212	318.9373 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	10.7072	9.6710	10.7072	10.3618	10.7072	10.3618	10.7072	10.7072	10.3618	10.7072	10.3618	10.7072 (231)
Lighting	31.8771	25.5730	23.0256	16.8696	13.0305	10.6461	11.8869	15.4510	20.0694	26.3321	29.7420	32.7630 (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)												

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(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												5260.1695	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												89.5000	
Water heating fuel used												3231.8644	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(KEV)Decentralised, Database: total watage = 6.7730, total flow = 45.0000, SFP = 0.1505)													
mechanical ventilation fans (SFP = 0.1505)												85.0690	(230a)
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												126.0690	(231)
Electricity for lighting (calculated in Appendix L)												257.2663	(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												8875.3692	(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	5260.1695	0.2100	1104.6356	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3231.8644	0.2100	678.6915	(264)
Space and water heating			1783.3271	(265)
Pumps, fans and electric keep-hot	126.0690	0.1387	17.4873	(267)
Energy for lighting	257.2663	0.1443	37.1315	(268)
Total CO2, kg/year			1837.9459	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.7000	(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	5260.1695	1.1300	5943.9916	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3231.8644	1.1300	3652.0068	(278)
Space and water heating			9595.9984	(279)
Pumps, fans and electric keep-hot	126.0690	1.5128	190.7171	(281)
Energy for lighting	257.2663	1.5338	394.6036	(282)
Total Primary energy kWh/year			10181.3191	(286)
Dwelling Primary energy Rate (DPER)			64.8300	(287)

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

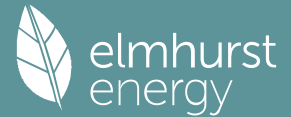
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Basement floor	42.3490 (1a)	x 2.6250 (2a)	= 111.1661 (1a) - (3a)	
Ground floor	42.3490 (1b)	x 3.1330 (2b)	= 132.6794 (1b) - (3b)	
First floor	42.3490 (1c)	x 3.0560 (2c)	= 129.4185 (1c) - (3c)	
Second floor	30.0050 (1d)	x 3.0000 (2d)	= 90.0150 (1d) - (3d)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.0520		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	463.2791 (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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0863 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3363 (18)

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Number of sides sheltered

1 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.9250 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.3111 \quad (21)$$

	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													
Effective ac	0.3967	0.3889	0.3811	0.3422	0.3344	0.2956	0.2956	0.2878	0.3111	0.3344	0.3500	0.3656	(22b)
	0.5787	0.5756	0.5726	0.5586	0.5559	0.5437	0.5437	0.5414	0.5484	0.5559	0.5613	0.5668	(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/s	K-value ku/m ² K	A x K ku/K	
Main dwelling								
TER Opaque door			1.9890	1.0000	1.9900			(26)
TER Opening Type			36.9720	1.1450	42.3435			(27)
F1r - Basement			42.3490	0.1300	5.5054			(28a)
Ext Wall	146.0520	33.8780	112.1740	0.1800	20.1913			(29a)
Top floor	40.5280	3.3790	37.1490	0.1800	6.6868			(29a)
Below Ground	14.0960		14.0960	0.1800	2.5373			(29a)
W1 - Dormer	4.2050	1.7040	2.5010	0.1800	0.4502			(29a)
Rf - Flat Roof	36.4030		36.4030	0.1100	4.0043			(30)
Total net area of external elements Aum(A, m ²)			283.6420					(31)
Fabric heat loss, W K - Sum (A x U)						83.7088		(33)
Main dwelling								
Party Wall			105.3250	0.0000	0.0000			(32)

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

198.4982 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	17.6710	0.0500	0.8836	
E2 Other lintels (including other steel lintels)	12.1970	0.0500	0.6099	
E3 Sill	51.0180	0.0500	2.5509	
E4 Jamb	18.1700	0.1600	2.9072	
E5 Ground floor (normal)	35.0750	0.0000	0.0000	
E6 Intermediate floor within a dwelling	1.4240	0.0700	0.0997	
E7 Party floor between dwellings (in blocks of flats)	7.7530	0.0800	0.6202	
E14 Flat roof	17.8080	0.5600	9.9725	
E15 Flat roof with parapet	47.1700	0.0900	4.2453	
E16 Corner (normal)	5.8750	-0.0900	-0.5287	
E17 Corner (inverted - internal area greater than external area)	11.9010	0.0600	0.7141	
E18 Party wall between dwellings	17.8280	0.2400	4.2787	
E24 Eaves (insulation at ceiling level - inverted)	11.8140	0.0600	0.7088	
E25 Staggered party wall between dwellings	9.4310	0.0800	0.7545	
P1 Party wall - Ground floor	26.6250	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	8.7050	0.1200	1.0446	
P4 Party wall - Roof (insulation at ceiling level)	1.5480	0.0800	0.1238	
R1 Head of roof window	1.5480	0.0600	0.0929	
R2 Sill of roof window	6.6000	0.0800	0.5280	
R3 Jamb of roof window	3.7330	0.0400	0.1493	
R9 Roof to wall (flat ceiling)				

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

29.7552 (36)

Point Thermal bridges

$$(36a) = 0.0000$$

Total fabric heat loss

$$(33) + (36) + (36a) = 113.4640 \quad (37)$$

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

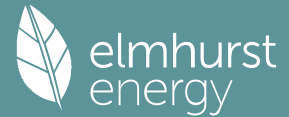
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	88.4690	88.0019	87.5441	85.3938	84.9915	83.1186	83.1186	82.7718	83.8400	84.9915	85.8053	86.6562	(38)
Heat transfer coeff	201.9330	201.4659	201.0081	198.8578	198.4555	196.5826	196.5826	196.2358	197.3040	198.4555	199.2693	200.1202	(39)
Average = Sum(39)m / 12 =													198.8558

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2858	1.2828	1.2799	1.2662	1.2636	1.2517	1.2517	1.2495	1.2563	1.2636	1.2688	1.2742	(40)
HLP (average)													1.2662
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9447 (42)
Hot water usage for mixer showers													
73.5931	72.4871	70.8755	67.7920	65.5165	62.9788	61.5364	63.1358	64.8890	67.6137	70.7635	73.3111	(42a)	
Hot water usage for baths													
31.7707	31.2988	30.6344	29.4093	28.4919	27.4747	26.9252	27.5850	28.3034	29.3919	30.6422	31.6633	(42b)	
Hot water usage for other uses													
44.7869	43.1583	41.5296	39.9010	38.2724	36.6438	36.6438	38.2724	39.9010	41.5296	43.1583	44.7869	(42c)	
Average daily hot water use (litres/day)													138.0221 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
150.1506	146.9442	143.0395	137.1023	132.2808	127.0973	125.1054	128.9932	133.0935	138.5353	144.5640	149.7613	(44)	
Energy conte	237.8019	209.2466	219.8465	187.6862	178.0754	156.2809	151.3042	159.7206	164.1176	187.9910	205.9579	234.4899	(45)
Energy content (annual)													Total = Sum(45)m = 2292.5187
Distribution loss (46)m = 0.15 x (45)m													
35.6703	31.3870	32.9770	28.1529	26.7113	23.4421	22.6956	23.9581	24.6176	28.1987	30.8937	35.1735	(46)	
Water storage loss (or HIU loss):													
Total storage 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	(56)
If cylinder contains dedicated solar storage													
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	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
288.7608	255.2740	270.8054	237.0013	229.0343	205.5960	202.2631	210.6795	213.4327	238.9499	255.2729	285.4488	(62)	
WVHRS	-33.6437	-29.7548	-31.1575	-25.7996	-24.0443	-20.5749	-19.2857	-20.5084	-21.2876	-25.0957	-28.4304	-33.0207	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
255.1171	225.5192	239.6479	211.2017	204.9899	185.0211	182.9774	190.1711	192.1451	213.8542	226.8426	252.4282	(64)	
													Total per year (kWh/year) = Sum(64)m = 2579.9155 (64)
12Total per year (kWh/year)													2580 (64)

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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	91.8089	81.0813	85.8387	74.7344	71.9498	64.2922	63.0484	65.8468	66.8979	75.2467	80.8098	90.7076 (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	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.4855	183.2161	165.4855	171.0017	165.4855	171.0017	165.4855	165.4855	171.0017	165.4855	171.0017	165.4855	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	328.0935	331.4981	322.9186	304.6540	281.5982	259.9290	245.4527	242.0481	250.6275	268.8921	291.9479	313.6171	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	(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)	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	(71)
Water heating gains (Table 5)	123.3990	120.6568	115.3746	103.7978	96.7067	89.2947	84.7424	88.5038	92.9137	101.1381	112.2358	121.9189	(72)
Total internal gains	687.1488	705.5417	673.9495	649.6243	613.9612	587.3962	562.8514	563.2082	581.7137	605.6865	645.3562	671.1923	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
South	26.2360	46.7521	0.6300	0.7000	0.7700	374.8610	(78)
West	3.4870	19.6403	0.6300	0.7000	0.7700	20.9301	(80)
Northwest	7.2490	11.2829	0.6300	0.7000	0.7700	24.9961	(81)

Solar gains	420.7872	705.7497	941.1310	1132.7554	1243.9302	1225.4970	1185.3274	1102.8412	1007.0487	772.9394	501.8870	361.5394	(83)
Total gains	1107.9359	1411.2914	1615.0804	1782.3797	1857.8914	1812.8932	1748.1788	1666.0494	1588.7624	1378.6259	1147.2432	1032.7316	(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	42.8835	42.9829	43.0808	43.5467	43.6349	44.0507	44.0507	44.1285	43.8896	43.6349	43.4567	43.2720	
alpha	3.8589	3.8655	3.8721	3.9031	3.9090	3.9367	3.9367	3.9419	3.9260	3.9090	3.8971	3.8848	
util living area	0.9908	0.9770	0.9520	0.8957	0.7936	0.6336	0.4786	0.5185	0.7314	0.9205	0.9809	0.9929	(86)
MIT	19.1987	19.5222	19.9080	20.3561	20.7047	20.9127	20.9775	20.9690	20.8411	20.3675	19.6929	19.1450	(87)
Th 2	19.8520	19.8543	19.8566	19.8674	19.8694	19.8789	19.8789	19.8806	19.8752	19.8694	19.8653	19.8611	(88)
util rest of house	0.9883	0.9709	0.9392	0.8677	0.7388	0.5433	0.3641	0.4027	0.6489	0.8929	0.9748	0.9910	(89)
MIT 2	17.7734	18.1841	18.6683	19.2200	19.6156	19.8249	19.8706	19.8662	19.7643	19.2480	18.4117	17.7109	(90)
Living area fraction	17.9340	18.3350	18.8080	19.3481	19.7384	19.9475	19.9954	19.9923	19.8857	19.3742	18.5561	17.8726	(91)
MIT	17.9340	18.3350	18.8080	19.3481	19.7384	19.9475	19.9954	19.9923	19.8857	19.3742	18.5561	17.8726	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.9340	18.3350	18.8080	19.3481	19.7384	19.9475	19.9954	19.9923	19.8857	19.3742	18.5561	17.8726	(93)

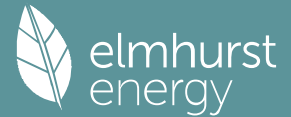
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	1087.9527	1354.4071	1492.1346	1518.8399	1359.3145	995.7816	658.0678	691.0301	1032.3447	1209.7057	1106.7789	1018.0071	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	2753.1558	2706.6844	2474.0163	2077.6794	1595.2592	1051.2298	667.4685	704.9298	1141.5332	1741.2834	2282.8438	2736.1561	(97)
Space heating kWh	1238.9111	908.7304	730.5200	402.3645	175.5429	0.0000	0.0000	0.0000	0.0000	395.4938	846.7667	1278.3029	(98a)
Space heating requirement - total per year (kWh/year)												5976.6322	
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	1238.9111	908.7304	730.5200	402.3645	175.5429	0.0000	0.0000	0.0000	0.0000	395.4938	846.7667	1278.3029	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5976.6322	
Space heating per m2										(98c) / (4) =		38.0551	(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 %)												92.4000 (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	1238.9111	908.7304	730.5200	402.3645	175.5429	0.0000	0.0000	0.0000	0.0000	395.4938	846.7667	1278.3029	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	1340.8129	983.4744	790.6060	435.4594	189.9815	0.0000	0.0000	0.0000	0.0000	428.0235	916.4142	1383.4447	(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)

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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	255.1171	225.5192	239.6479	211.2017	204.9899	185.0211	182.9774	190.1711	192.1451	213.8542	226.8426	252.4282	(64)
Efficiency of water heater	87.3034	87.0464	86.6088	85.7392	84.0509	80.3000	80.3000	80.3000	80.3000	85.6796	86.9328	80.3000	(216)
Fuel for water heating, kWh/month	292.2190	259.0793	276.7017	246.3304	243.8880	230.4124	227.8672	236.8258	239.2841	249.5977	260.9401	288.9611	(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	34.3846	27.5846	24.8369	18.1966	14.0556	11.4835	12.8219	16.6665	21.6481	28.4034	32.0816	35.3403	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-42.2245	-60.9318	-89.5989	-103.0864	-113.0933	-106.1628	-104.7595	-97.8955	-86.1873	-70.6287	-46.8812	-36.3359	(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)	-19.7827	-42.0205	-84.3027	-127.8016	-170.1938	-171.5337	-169.6149	-143.1457	-104.2386	-60.5972	-26.5671	-15.6213	(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												6468.2166	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												80.3000	
Water heating fuel used												3052.1065	(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)												277.5036	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2093.2054	(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												7790.6213	(238)

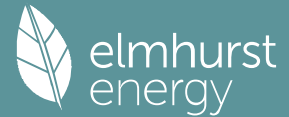
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6468.2166	0.2100	1358.3255 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3052.1065	0.2100	640.9424 (264)
Space and water heating			1999.2679 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	277.5036	0.1443	40.0523 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-957.7856	0.1341	-128.4643
PV Unit electricity exported	-1135.4198	0.1256	-142.6185
Total			-271.0828 (269)
Total CO2, kg/year			1780.1667 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	6468.2166	1.1300	7309.0848 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3052.1065	1.1300	3448.8804 (278)
Space and water heating			10757.9652 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	277.5036	1.5338	425.6442 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-957.7856	1.4957	-1432.5432
PV Unit electricity exported	-1135.4198	0.4611	-523.4912
Total			-1956.0344 (283)
Total Primary energy kWh/year			9357.6758 (286)
Target Primary Energy Rate (TPER)			59.5800 (287)

Full SAP Calculation Printout



Plot Reference	004 4				Issued on Date	16/07/2026	
Assessment Reference	004			Plot Type Ref	004 4		
Plot Address	004 4, 004 4, 0				SAP Version	10.2	
SAP Rating	86 B		DER	2.81		TER	11.23
Environmental	97 A		% DER < TER				74.98
CO ₂ Emissions (t/year)	0.4		DFEE	36.93		TFEE	43.15
Compliance Check	See BREL		% DFEE < TFEE				14.41
% DPER < TPER	50.50		DPER	29.22		TPER	59.04
Assessor Details	Mr. Scott Binstead				Assessor ID	U903-0001	
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			
Basement floor	42.3490 (1a)	x 2.6250 (2a)	= 111.1661 (1a) - (3a)
Ground floor	42.3490 (1b)	x 3.1330 (2b)	= 132.6794 (1b) - (3b)
First floor	42.3490 (1c)	x 3.0560 (2c)	= 129.4185 (1c) - (3c)
Second floor	30.0050 (1d)	x 3.0000 (2d)	= 90.0150 (1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	157.0520		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 463.2791 (5)

2. Ventilation rate

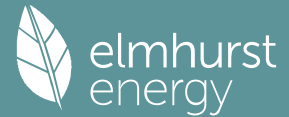
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked 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)
Air changes per hour		
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	4.0100	(17)
Infiltration rate	0.2005	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1855 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.2365	0.2318	0.2272	0.2040	0.1994	0.1762	0.1762	0.1716	0.1855	0.1994	0.2086	0.2179 (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							
Solid Door			1.9890	1.2000	2.3880		(26)
Windows			36.9720	1.1450	42.3435		(27)
Fir - Basement			42.3490	0.1100	4.6584	75.0000	3176.1750 (28a)
Ext Wall	146.0520	33.8780	112.1740	0.1600	17.9478	60.0000	6730.4401 (29a)
Top floor	40.5280	3.3790	37.1490	0.1400	5.2009	9.0000	334.3410 (29a)
Below Ground	14.0960		14.0960	0.1600	2.2554	60.0000	845.7600 (29a)
Wl - Dormer	4.2050	1.7040	2.5010	0.1400	0.3501	9.0000	22.5090 (29a)
Rf - Flat Roof	36.4030		36.4030	0.1100	4.0043	9.0000	327.6270 (30)
Total net area of external elements Aum(A, m ²)			283.6420				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		79.1484		(33)
Main dwelling							
Party Wall			105.3250	0.0000	0.0000	150.0000	15798.7495 (32)
Stud			29.0115			9.0000	261.1035 (32c)

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Stud	94.2093	9.0000	847.8838 (32c)
Stud	120.3086	9.0000	1082.7775 (32c)
Stud	49.4220	9.0000	444.7980 (32c)
Internal Floor 1	72.3540	9.0000	651.1860 (32d)
Internal Ceiling 1	72.3540	9.0000	651.1860 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 31174.5364 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 198.4982 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	17.6710	0.2680	4.7358
E2 Other lintels (including other steel lintels)	12.1970	0.0220	0.2683
E3 Sill	51.0180	0.0170	0.8673
E4 Jamb	18.1700	0.0760	1.3809
E5 Ground floor (normal)	35.0750	0.0010	0.0351
E6 Intermediate floor within a dwelling	1.4240	0.0370	0.0527
E7 Party floor between dwellings (in blocks of flats)	7.7530	0.1600	1.2405
E14 Flat roof	17.8080	0.0800	1.4246
E15 Flat roof with parapet	47.1700	0.0460	2.1698
E16 Corner (normal)	5.8750	-0.0880	-0.5170
E17 Corner (inverted - internal area greater than external area)	11.9010	0.0400	0.4760
E18 Party wall between dwellings	17.8280	0.0750	1.3371
E24 Eaves (insulation at ceiling level - inverted)	11.8140	0.0290	0.3426
E25 Staggered party wall between dwellings	9.4310	0.1030	0.9714
P1 Party wall - Ground floor	26.6250	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	8.7050	0.0800	0.6964
P4 Party wall - Roof (insulation at ceiling level)	1.5480	0.2400	0.3715
R1 Head of roof window	1.5480	0.2400	0.3715
R2 Sill of roof window	6.6000	0.2400	1.5840
R3 Jamb of roof window	3.7330	0.1600	0.5973
R9 Roof to wall (flat ceiling)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 18.4060 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 97.5544 (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	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	76.4410	(38)
Heat transfer coeff	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	173.9954	(39)
Average = Sum(39)m 12 =													173.9954
HLP	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	1.1079	(40)
HLP (average)													1.1079
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

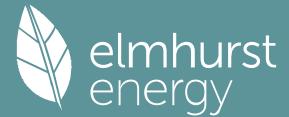
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9447 (42)
Hot water usage for mixer showers	73.5931	72.4871	70.8755	67.7920	65.5165	62.9788	61.5364	63.1358	64.8890	67.6137	70.7635	73.3111	(42a)
Hot water usage for baths	31.7707	31.2988	30.6344	29.4093	28.4919	27.4747	26.9252	27.5850	28.3034	29.3919	30.6422	31.6633	(42b)
Hot water usage for other uses	44.7869	43.1583	41.5296	39.9010	38.2724	36.6438	36.6438	38.2724	39.9010	41.5296	43.1583	44.7869	(42c)
Average daily hot water use (litres/day)													138.0221 (43)
Daily hot water use	150.1506	146.9442	143.0395	137.1023	132.2808	127.0973	125.1054	128.9932	133.0935	138.5353	144.5640	149.7613	(44)
Energy conte	237.8019	209.2466	219.8465	187.6862	178.0754	156.2809	151.3042	159.7206	164.1176	187.9910	205.9579	234.4899	(45)
Energy content (annual)										Total = Sum(45)m =			2292.5187
Distribution loss (46)m = 0.15 x (45)m	35.6703	31.3870	32.9770	28.1529	26.7113	23.4421	22.6956	23.9581	24.6176	28.1987	30.8937	35.1735	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5800 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8532 (55)
Total storage loss	26.4492	23.8896	26.4492	25.5960	26.4492	25.5960	26.4492	26.4492	25.5960	26.4492	25.5960	26.4492	(56)
If cylinder contains dedicated solar storage	26.4492	23.8896	26.4492	25.5960	26.4492	25.5960	26.4492	26.4492	25.5960	26.4492	25.5960	26.4492	(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	287.5135	254.1474	269.5581	235.7942	227.7870	204.3889	201.0158	209.4322	212.2256	237.7026	254.0659	284.2015	(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	287.5135	254.1474	269.5581	235.7942	227.7870	204.3889	201.0158	209.4322	212.2256	237.7026	254.0659	284.2015	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2877.8327 (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	118.8384	105.4951	112.8682	100.8921	98.9793	90.4498	90.0779	92.8764	93.0555	102.2763	106.9674	117.7372	(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	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	147.2359	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	165.4855	183.2161	165.4855	171.0017	165.4855	171.0017	165.4855	165.4855	171.0017	165.4855	171.0017	165.4855	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	328.0935	331.4981	322.9186	304.6540	281.5982	259.9290	245.4527	242.0481	250.6275	268.8921	291.9479	313.6171	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	37.7236	(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)	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	-117.7888	(71)

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Water heating gains (Table 5)	159.7290	156.9868	151.7046	140.1279	133.0367	125.6247	121.0725	124.8338	129.2438	137.4681	148.5658	158.2489 (72)
Total internal gains	720.4788	738.8718	707.2795	682.9543	647.2912	623.7262	599.1814	599.5382	618.0437	639.0166	678.6862	704.5223 (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
South			26.2360		46.7521		0.6300		0.7200		0.7700		385.5713 (78)
West			3.4870		19.6403		0.6300		0.7200		0.7700		21.5281 (80)
Northwest			7.2490		11.2829		0.6300		0.7200		0.7700		25.7103 (81)
Solar gains	432.8097	725.9140	968.0204	1165.1198	1279.4710	1260.5112	1219.1939	1134.3510	1035.8215	795.0233	516.2267	371.8691	(83)
Total gains	1153.2885	1464.7857	1675.2999	1848.0742	1926.7623	1884.2374	1818.3753	1733.8892	1653.8653	1434.0399	1194.9129	1076.3914	(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, nll,m (see Table 9a)												
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691	49.7691
alpha	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179	4.3179
util living area	0.9888	0.9700	0.9353	0.8608	0.7352	0.5644	0.4151	0.4526	0.6649	0.8929	0.9753	0.9915 (86)
Living	19.5473	19.8641	20.2133	20.5766	20.8340	20.9588	20.9912	20.9872	20.9170	20.5646	19.9688	19.4728
Non living	18.3115	18.7103	19.1426	19.5742	19.8545	19.9692	19.9911	19.9892	19.9377	19.5721	18.8469	18.2170
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	20.2568	19.8641	20.2133	20.5766	20.8340	20.9588	20.9912	20.9872	20.9170	20.5646	19.9688	19.6865 (87)
Th 2	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944	19.9944 (88)
util rest of house	0.9859	0.9628	0.9200	0.8292	0.6803	0.4855	0.3231	0.3579	0.5876	0.8610	0.9681	0.9893 (89)
MIT 2	19.3235	18.7103	19.1426	19.5742	19.8545	19.9692	19.9911	19.9892	19.9377	19.5721	18.8469	18.5373 (90)
Living area fraction									flA = Living area / (4) =			0.1127 (91)
MIT	19.4287	18.8404	19.2633	19.6872	19.9649	20.0808	20.1038	20.1017	20.0481	19.6840	18.9733	18.6668 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4287	18.8404	19.2633	19.6872	19.9649	20.0808	20.1038	20.1017	20.0481	19.6840	18.9733	18.6668 (93)

8. Space heating requirement

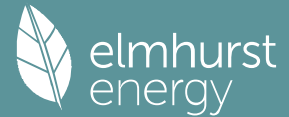
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9839	0.9518	0.9064	0.8182	0.6785	0.4925	0.3333	0.3682	0.5920	0.8492	0.9581	0.9852	(94)
Useful gains	1134.6913	1394.2240	1518.4125	1512.0780	1307.3392	928.0609	606.0234	638.4232	979.1575	1217.8018	1144.8132	1060.4929	(95)
Ext temp.	4.3000	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	2632.3256	2425.5611	2220.7599	1876.9226	1438.0556	953.6308	609.6519	644.0784	1034.9338	1580.5729	2065.9048	2517.1605	(97)
Space heating kWh	1114.2400	693.0586	522.5465	262.6881	97.2530	0.0000	0.0000	0.0000	0.0000	269.9017	663.1860	1083.7607	(98a)
Space heating requirement - total per year (kWh/year)												4706.6345	
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	1114.2400	693.0586	522.5465	262.6881	97.2530	0.0000	0.0000	0.0000	0.0000	269.9017	663.1860	1083.7607	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4706.6345	
Space heating per m2													(98c) / (4) =
												29.9686	(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 %)												291.3704 (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	1114.2400	693.0586	522.5465	262.6881	97.2530	0.0000	0.0000	0.0000	0.0000	269.9017	663.1860	1083.7607 (98)
Space heating efficiency (main heating system 1)	291.3704	291.3704	291.3704	291.3704	291.3704	0.0000	0.0000	0.0000	0.0000	291.3704	291.3704	291.3704 (210)
Space heating fuel (main heating system)	382.4136	237.8617	179.3410	90.1561	33.3778	0.0000	0.0000	0.0000	0.0000	92.6318	227.6092	371.9529 (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	287.5135	254.1474	269.5581	235.7942	227.7870	204.3889	201.0158	209.4322	212.2256	237.7026	254.0659	284.2015 (64)
Efficiency of water heater (217)m	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375	288.9375 (216)
Fuel for water heating, kWh/month	99.5072	87.9593	93.2929	81.6073	78.8361	70.7381	69.5707	72.4836	73.4504	82.2678	87.9311	98.3609 (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	7.2250	6.5258	7.2250	6.9920	7.2250	6.9920	7.2250	7.2250	6.9920	7.2250	6.9920	7.2250 (231)
Lighting	31.8771	25.5730	23.0256	16.8696	13.0305	10.6461	11.8869	15.4510	20.0694	26.3321	29.7420	32.7630 (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)

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)

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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) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
40.0000 / (5) = 0.0863 (8)
Yes
Blower Door
5.0000 (17)
0.3363 (18)
1 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3111 (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	0.3967	0.3889	0.3811	0.3422	0.3344	0.2956	0.2956	0.2878	0.3111	0.3344	0.3500	0.3656 (22b)
Effective ac	0.5787	0.5756	0.5726	0.5586	0.5559	0.5437	0.5437	0.5414	0.5484	0.5559	0.5613	0.5668 (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 Opaque door			1.9890	1.0000	1.9900		(26)
TER Opening Type			36.9720	1.1450	42.3435		(27)
Flr - Basement			42.3490	0.1300	5.5054		(28a)
Ext Wall	146.0520	33.8780	112.1740	0.1800	20.1913		(29a)
Top floor	40.5280	3.3790	37.1490	0.1800	6.6868		(29a)
Below Ground	14.0960		14.0960	0.1800	2.5373		(29a)
W1 - Dormer	4.2050	1.7040	2.5010	0.1800	0.4502		(29a)
Rf - Flat Roof	36.4030		36.4030	0.1100	4.0043		(30)
Total net area of external elements Aum(A, m2)			283.6420				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 83.7088		(33)
Main dwelling							
Party Wall			105.3250	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							198.4982 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	17.6710	0.0500	0.8836
E2 Other lintels (including other steel lintels)	12.1970	0.0500	0.6099
E3 Sill	51.0180	0.0500	2.5509
E4 Jamb	18.1700	0.1600	2.9072
E5 Ground floor (normal)	35.0750	0.0000	0.0000
E6 Intermediate floor within a dwelling	1.4240	0.0700	0.0997
E7 Party floor between dwellings (in blocks of flats)	7.7530	0.0800	0.6202
E14 Flat roof	17.8080	0.5600	9.9725
E15 Flat roof with parapet	47.1700	0.0900	4.2453
E16 Corner (normal)	5.8750	-0.0900	-0.5287
E17 Corner (inverted - internal area greater than external area)	11.9010	0.0600	0.7141
E18 Party wall between dwellings	17.8280	0.2400	4.2787
E24 Eaves (insulation at ceiling level - inverted)	11.8140	0.0600	0.7088
E25 Staggered party wall between dwellings	9.4310	0.0800	0.7545
P1 Party wall - Ground floor	26.6250	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	8.7050	0.1200	1.0446
P4 Party wall - Roof (insulation at ceiling level)	1.5480	0.0800	0.1238
R1 Head of roof window	1.5480	0.0600	0.0929
R2 Sill of roof window	6.6000	0.0800	0.5280
R3 Jamb of roof window	3.7330	0.0400	0.1493
R9 Roof to wall (flat ceiling)			29.7552 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000
Point Thermal bridges			(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 113.4640 (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	88.4690	88.0019	87.5441	85.3938	84.9915	83.1186	83.1186	82.7718	83.8400	84.9915	85.8053	86.6562 (38)
Heat transfer coeff	201.9330	201.4659	201.0081	198.8578	198.4555	196.5826	196.5826	196.2358	197.3040	198.4555	199.2693	200.1202 (39)
Average = Sum(39)m / 12 =												198.8558

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2858	1.2828	1.2799	1.2662	1.2636	1.2517	1.2517	1.2495	1.2563	1.2636	1.2688	1.2742 (40)
HLP (average)												1.2662
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9447 (42)
Hot water usage for mixer showers													
73.5931	72.4871	70.8755	67.7920	65.5165	62.9788	61.5364	63.1358	64.8890	67.6137	70.7635	73.3111	(42a)	
Hot water usage for baths													
31.7707	31.2988	30.6344	29.4093	28.4919	27.4747	26.9252	27.5850	28.3034	29.3919	30.6422	31.6633	(42b)	
Hot water usage for other uses													
44.7869	43.1583	41.5296	39.9010	38.2724	36.6438	36.6438	38.2724	39.9010	41.5296	43.1583	44.7869	(42c)	
Average daily hot water use (litres/day)												138.0221 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	150.1506	146.9442	143.0395	137.1023	132.2808	127.0973	125.1054	128.9932	133.0935	138.5353	144.5640	149.7613 (44)	
Energy content	237.8019	209.2466	219.8465	187.6862	178.0754	156.2809	151.3042	159.7206	164.1176	187.9910	205.9579	234.4899 (45)	
Energy content (annual)	Total = Sum(45)m =										2292.5187		
Distribution loss (46)m = 0.15 x (45)m													
	35.6703	31.3870	32.9770	28.1529	26.7113	23.4421	22.6956	23.9581	24.6176	28.1987	30.8937	35.1735 (46)	
Water storage loss (or HIU loss):													
Store volume												250.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8903 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												1.0208 (55)	
Total storage loss													
	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (56)	
If cylinder contains dedicated solar storage													
	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444 (57)	