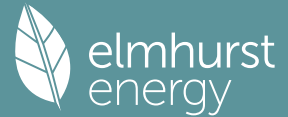


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Property Reference	OP-D320 A3MAPL				Issued on Date	29/11/2024	
Assessment Reference	A3MAPL			Prop Type Ref	A3MAPL		
Property	A3MAPL						
SAP Rating	81 B		DER	4.25		TER	10.95
Environmental	96 A		% DER < TER				61.19
CO ₂ Emissions (t/year)	0.38		DFEE	37.95		TFEE	38.90
Compliance Check	See BREL		% DFEE < TFEE				2.43
% DPER < TPER	21.44		DPER	44.84		TPER	57.08
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001	
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)
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 237.1575 (5)

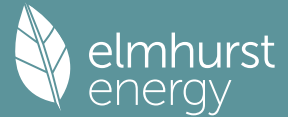
2. Ventilation rate

											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											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											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	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)
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)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3297	0.3259	0.3222	0.3036	0.2999	0.2813	0.2813	0.2776	0.2888	0.2999	0.3073	0.3148 (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
Front Door			4.2800	1.0000	4.2800		(26)
Windows (Uw = 1.30)			19.4500	1.2357	24.0352		(27)
Ground Floor			49.4600	0.1100	5.4406		(28a)
External Wall	99.4400	23.7300	75.7100	0.1700	12.8707		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607		(30)
Total net area of external elements Aum(A, m2)			198.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0671		(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0400	0.0500	0.6020	

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E3 Sill	14.4400	0.0500	0.7220
E4 Jamb	31.2000	0.0500	1.5600
E5 Ground floor (normal)	21.0500	0.1600	3.3680
E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200
E14 Flat roof	4.5800	0.0800	0.3664
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.7772 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	63.8443 (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	25.7995	25.5085	25.2175	23.7623	23.4713	22.0161	22.0161	21.7250	22.5981	23.4713	24.0533	24.6354 (38)
Average = Sum(39)m / 12 =	89.6438	89.3528	89.0617	87.6066	87.3155	85.8603	85.8603	85.5693	86.4424	87.3155	87.8976	88.4797 (39)
												87.5338
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9285	0.9255	0.9224	0.9074	0.9044	0.8893	0.8893	0.8863	0.8953	0.9044	0.9104	0.9164 (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													2.7052 (42)
Hot water usage for mixer showers	95.6687	94.2310	92.1360	88.1275	85.1694	81.8705	79.9954	82.0746	84.3537	87.8957	91.9903	95.3022 (42a)	
Hot water usage for baths	31.6250	31.1553	30.4939	29.2744	28.3612	27.3487	26.8018	27.4586	28.1737	29.2571	30.5017	31.5181 (42b)	
Hot water usage for other uses	44.5622	42.9417	41.3213	39.7008	38.0804	36.4600	36.4600	38.0804	39.7008	41.3213	42.9417	44.5622 (42c)	
Average daily hot water use (litres/day)												158.0358 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	171.8559	168.3281	163.9512	157.1028	151.6110	145.6791	143.2571	147.6135	152.2282	158.4741	165.4338	171.3824 (44)	
Distribution loss (46)m = 0.15 x (45)m	272.1777	239.6969	251.9868	215.0658	204.0976	179.1295	173.2571	182.7764	187.7126	215.0479	235.6907	268.3435 (45)	
	40.8267	35.9545	37.7980	32.2599	30.6146	26.8694	25.9886	27.4165	28.1569	32.2572	35.3536	40.2515 (46)	
Water storage loss:													
Store volume												230.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)	
Temperature factor from Table 2b												0.7800 (49)	
Enter (49) or (54) in (55)												1.4040 (55)	
Total storage loss	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)	
If cylinder contains dedicated solar storage	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)	
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (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	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (64)	
12Total per year (kWh/year)												3659.0041 (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	134.3852	119.3383	127.6717	113.9798	111.7485	77.5702	76.2179	79.3831	80.4240	115.3895	120.8376	133.1103 (65)	

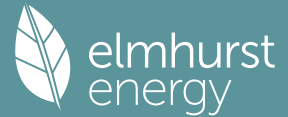
5. Internal gains (see Table 5 and 5a)

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	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	127.2091 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	239.5684 (68)
Pumps, fans	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261 (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)	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084 (71)
Total internal gains	180.6252	177.5867	171.6018	158.3053	150.1996	107.7363	102.4434	106.6977	111.7001	155.0934	167.8300	178.9117 (72)
	622.0391	635.2309	609.0627	586.0543	556.0964	501.3205	480.7290	482.3825	498.1790	551.2841	585.8730	609.2673 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
North	10.2300	10.6334	0.6300	0.7000	0.7700	33.2445 (74)

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East			5.3300		19.6403		0.6300		0.7000		0.7700		31.9924 (76)
South			1.0800		46.7521		0.6300		0.7000		0.7700		15.4311 (78)
West			2.8100		19.6403		0.6300		0.7000		0.7700		16.8665 (80)

Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273 (83)
Total gains	719.5736	819.6132	906.6150	1025.4080	1108.9433	1075.8773	1024.0389	937.7574	844.6731	767.5807	706.0967	690.4945 (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 from living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.9178	30.0152	30.1133	30.6135	30.7156	31.2361	31.2361	31.3424	31.0258	30.7156	30.5121	30.3114	
alpha	2.9945	3.0010	3.0076	3.0409	3.0477	3.0824	3.0824	3.0895	3.0684	3.0477	3.0341	3.0208	
util living area													
	0.9388	0.9111	0.8643	0.7649	0.6264	0.4771	0.3580	0.4026	0.6119	0.8122	0.9102	0.9446 (86)	
Living	19.1207	19.4155	19.8357	20.3642	20.7291	20.9159	20.9740	20.9626	20.8156	20.3428	19.6662	19.0830	
Non living	17.9408	18.3108	18.8335	19.4807	19.9010	20.1089	20.1609	20.1553	20.0112	19.4721	18.6391	17.9001	
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	20.0386	19.4155	19.8357	20.3642	20.7291	20.9159	20.9740	20.9626	20.8156	20.3428	19.6662	19.3511 (87)	
Th 2	20.1434	20.1459	20.1485	20.1612	20.1638	20.1766	20.1766	20.1792	20.1715	20.1638	20.1587	20.1536 (88)	
util rest of house													
	0.9310	0.9002	0.8478	0.7378	0.5864	0.4239	0.2947	0.3363	0.5575	0.7837	0.8974	0.9376 (89)	
MIT 2	19.2653	18.3108	18.8335	19.4807	19.9010	20.1089	20.1609	20.1553	20.0112	19.4721	18.6391	18.3062 (90)	
Living area fraction													
										fLA = Living area / (4) =		0.2077 (91)	
MIT	19.4259	18.5402	19.0416	19.6642	20.0729	20.2764	20.3297	20.3230	20.1782	19.6529	18.8524	18.5232 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4259	18.5402	19.0416	19.6642	20.0729	20.2764	20.3297	20.3230	20.1782	19.6529	18.8524	18.5232 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9235	0.8749	0.8226	0.7202	0.5818	0.4305	0.3067	0.3482	0.5580	0.7639	0.8728	0.9204 (94)	
Useful gains	664.5472	717.0406	745.7447	738.4700	645.2102	463.2098	314.0649	326.5305	471.3051	586.3470	616.3071	635.5136 (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													
	1355.9414	1218.7916	1116.9770	943.0108	731.0868	487.3817	320.2343	335.6852	525.4183	790.4580	1033.0056	1267.3095 (97)	
Space heating kWh													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98a)	
Space heating requirement - total per year (kWh/year)												2260.8700	
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													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2260.8700	
Space heating per m2										(98c) / (4) =		23.4166 (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 %)													254.4892 (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													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98)	
Space heating efficiency (main heating system 1)													
	254.4892	254.4892	254.4892	254.4892	254.4892	0.0000	0.0000	0.0000	0.0000	254.4892	254.4892	254.4892 (210)	
Space heating fuel (main heating system)													
	202.1293	132.4915	108.5299	57.8686	25.1061	0.0000	0.0000	0.0000	0.0000	59.6719	117.8922	184.7057 (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													
	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (64)	
Efficiency of water heater (217)m													
	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624 (216)	
Fuel for water heating, kWh/month													
	137.5180	121.9308	130.0250	115.1455	112.2528	90.4621	89.0823	92.6150	93.6474	116.3166	122.7996	136.0951 (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													
	29.9304	27.0339	29.9304	28.9649	29.9304	28.9649	29.9304	29.9304	28.9649	29.9304	28.9649	29.9304 (231)	
Lighting													
	26.4315	21.2044	19.0922	13.9877	10.8045	8.8274	9.8563	12.8115	16.6409	21.8338	24.6612	27.1661 (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													

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Space heating fuel - main system 1	888.3952 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	269.4624
Water heating fuel used	1357.8902 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)	
mechanical ventilation fans (SFP = 1.2180)	352.4066 (230a)
Total electricity for the above, kWh/year	352.4066 (231)
Electricity for lighting (calculated in Appendix L)	213.3176 (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	2812.0095 (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	888.3952	0.1557	138.3641 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1357.8902	0.1415	192.1881 (264)
Space and water heating			330.5522 (265)
Pumps, fans and electric keep-hot	352.4066	0.1387	48.8831 (267)
Energy for lighting	213.3176	0.1443	30.7883 (268)
Total CO2, kg/year			410.2237 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2500 (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	888.3952	1.5766	1400.6072 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1357.8902	1.5234	2068.5917 (278)
Space and water heating			3469.1990 (279)
Pumps, fans and electric keep-hot	352.4066	1.5128	533.1206 (281)
Energy for lighting	213.3176	1.5338	327.1937 (282)
Total Primary energy kWh/year			4329.5133 (286)
Dwelling Primary energy Rate (DPER)			44.8400 (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)
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 237.1575 (5)

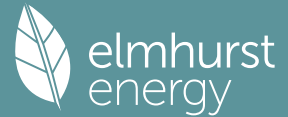
2. Ventilation rate

	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) =	0.1265 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3765	(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) =		0.3200 (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)

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Adj infilt rate	0.4080	0.4000	0.3920	0.3520	0.3440	0.3040	0.3040	0.2960	0.3200	0.3440	0.3600	0.3760 (22b)
Effective ac	0.5832	0.5800	0.5768	0.5620	0.5592	0.5462	0.5462	0.5438	0.5512	0.5592	0.5648	0.5707 (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
TER Opaque door			4.2800	1.0000	4.2800		(26)
TER Opening Type (Uw = 1.20)			19.4500	1.1450	22.2710		(27)
Ground Floor			49.4600	0.1300	6.4298		(28a)
External Wall	99.4400	23.7300	75.7100	0.1800	13.6278		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607		(30)
Total net area of external elements Aum(A, m2)			198.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0492		(33)
Party Wall			44.1300	0.0000	0.0000		(32)

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

List of Thermal Bridges 100.0000 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.0400	0.0500	0.6020
E3 Sill	14.4400	0.0500	0.7220
E4 Jamb	31.2000	0.0500	1.5600
E5 Ground floor (normal)	21.0500	0.1600	3.3680
E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200
E14 Flat roof	4.5800	0.0800	0.3664
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158

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

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 63.8264 (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	45.6458	45.3929	45.1449	43.9802	43.7623	42.7478	42.7478	42.5600	43.1386	43.7623	44.2031	44.6640 (38)
Average = Sum(39)m / 12 =	109.4722	109.2193	108.9713	107.8066	107.5887	106.5742	106.5742	106.3864	106.9650	107.5887	108.0295	108.4904 (39)
												107.8055

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1338	1.1312	1.1287	1.1166	1.1143	1.1038	1.1038	1.1019	1.1079	1.1143	1.1189	1.1237 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

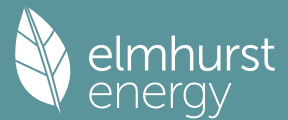
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7052 (42)
Hot water usage for mixer showers	69.5773	68.5317	67.0080	64.0927	61.9414	59.5422	58.1785	59.6906	61.3482	63.9242	66.9020	69.3107 (42a)
Hot water usage for baths	30.0437	29.5975	28.9692	27.8107	26.9432	25.9813	25.4617	26.0856	26.7650	27.7943	28.9766	29.9422 (42b)
Hot water usage for other uses	42.3341	40.7946	39.2552	37.7158	36.1764	34.6370	34.6370	36.1764	37.7158	39.2552	40.7946	42.3341 (42c)
Average daily hot water use (litres/day)												130.4887 (43)
Daily hot water use	141.9551	138.9238	135.2324	129.6192	125.0609	120.1604	118.2771	121.9526	125.8289	130.9737	136.6733	141.5869 (44)
Energy conte	224.8221	197.8257	207.8472	177.4422	168.3560	147.7512	143.0459	151.0028	155.1597	177.7300	194.7162	221.6909 (45)
Energy content (annual)										Total = Sum(45)m =		2167.3899
Distribution loss (46)m = 0.15 x (45)m	33.7233	29.6739	31.1771	26.6163	25.2534	22.1627	21.4569	22.6504	23.2739	26.6595	29.2074	33.2536 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7973 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9706 (55)
Total storage loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (56)
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (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	278.1717	246.0124	261.1968	229.0709	221.7057	199.3799	196.3955	204.3524	206.7883	231.0796	246.3449	275.0405 (62)
WWHRS	-31.8078	-28.1311	-29.4573	-24.3918	-22.7323	-19.4522	-18.2333	-19.3893	-20.1260	-23.7263	-26.8790	-31.2188 (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	246.3639	217.8813	231.7395	204.6791	198.9734	179.9277	178.1622	184.9631	186.6624	207.3534	219.4659	243.8217 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2499.9937 (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	117.4330	104.3264	111.7889	100.3025	98.6581	90.4302	90.2425	92.8881	92.8935	101.7749	106.0461	116.3919 (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
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(66)m	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	(71)
Water heating gains (Table 5)	157.8401	155.2477	150.2539	139.3090	132.6049	125.5975	121.2936	124.8496	129.0188	136.7943	147.2862	(72)
Total internal gains	602.2540	615.8919	590.7148	570.0581	541.5017	519.1817	499.5792	500.5345	515.4977	535.9850	568.3293	(73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
North						10.2300	10.6334	0.6300	0.7000	0.7700	33.2445 (74)	
East						5.3300	19.6403	0.6300	0.7000	0.7700	31.9924 (76)	
South						1.0800	46.7521	0.6300	0.7000	0.7700	15.4311 (78)	
West						2.8100	19.6403	0.6300	0.7000	0.7700	16.8665 (80)	
Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273 (83)
Total gains	699.7885	800.2742	888.2671	1009.4118	1094.3486	1093.7385	1042.8891	955.9093	861.9918	752.2815	688.5530	671.0236 (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	24.4989	24.5556	24.6115	24.8774	24.9278	25.1650	25.1650	25.2095	25.0731	24.9278	24.8260	24.7206
alpha	2.6333	2.6370	2.6408	2.6585	2.6619	2.6777	2.6777	2.6806	2.6715	2.6619	2.6551	2.6480
util living area	0.9492	0.9275	0.8909	0.8120	0.6936	0.5432	0.4189	0.4666	0.6690	0.8514	0.9275	0.9540 (86)
MIT	18.5278	18.8397	19.3218	19.9641	20.4835	20.8111	20.9312	20.9068	20.6542	19.9768	19.1574	18.4795 (87)
Th 2	19.9733	19.9754	19.9775	19.9873	19.9891	19.9977	19.9977	19.9993	19.9944	19.9891	19.9854	19.9815 (88)
util rest of house	0.9419	0.9173	0.8753	0.7848	0.6491	0.4767	0.3336	0.3792	0.6067	0.8236	0.9156	0.9474 (89)
MIT 2	17.0935	17.4864	18.0903	18.8822	19.4910	19.8493	19.9586	19.9429	19.6986	18.9172	17.8989	17.0373 (90)
Living area fraction									fLA = Living area / (4) =			0.2077 (91)
MIT	17.3914	17.7674	18.3460	19.1069	19.6971	20.0491	20.1606	20.1431	19.8971	19.1373	18.1603	17.3368 (92)
Temperature adjustment												0.0000
adjusted MIT	17.3914	17.7674	18.3460	19.1069	19.6971	20.0491	20.1606	20.1431	19.8971	19.1373	18.1603	17.3368 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9163	0.8880	0.8437	0.7572	0.6349	0.4803	0.3480	0.3924	0.6000	0.7949	0.8868	0.9231 (94)
Ext temp.	641.2338	710.6645	749.4280	764.3393	694.7941	525.3268	362.9553	375.0750	517.2042	597.9788	610.6334	619.4055 (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	1433.1404	1405.3718	1290.8756	1100.3658	860.4006	580.7285	379.4644	398.2114	620.0829	918.5142	1194.8356	1425.2175 (97)
Space heating requirement - total per year (kWh/year)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241 (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)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3082.6371
Space heating per m2										(98c) / (4) =		31.9279 (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)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241 (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)	638.3299	505.7890	436.4431	262.1225	133.4900	0.0000	0.0000	0.0000	0.0000	258.3730	455.7157	649.5386 (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)
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	246.3639	217.8813	231.7395	204.6791	198.9734	179.9277	178.1622	184.9631	186.6624	207.3534	219.4659	243.8217 (64)
Efficiency of water heater	85.9421	85.7236	85.2873	84.4358	83.0177	79.8000	79.8000	79.8000	79.8000	84.3742	85.4940	79.8000 (216)
Fuel for water heating, kWh/month	286.6628	254.1673	271.7163	242.4079	239.6759	225.4733	223.2609	231.7834	233.9128	245.7544	256.7032	283.5269 (219)

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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	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	7.3041	(231)
Lighting	26.4315	21.2044	19.0922	13.9877	10.8045	8.8274	9.8563	12.8115	16.6409	21.8338	24.6612	27.1661	27.1661	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-45.1227	-63.0352	-89.7886	-100.0020	-107.0160	-99.5623	-98.2825	-93.1461	-84.0108	-71.5766	-49.3808	-39.0754	-39.0754	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-27.2965	-57.2043	-113.3135	-169.6554	-223.8390	-224.7634	-222.1633	-188.3694	-138.3903	-81.6840	-36.4004	-21.6060	-21.6060	(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	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													3339.8019	(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													2995.0452	(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)													213.3176	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2444.6844	(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													4189.4803	(238)

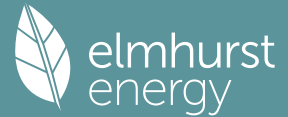
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3339.8019	0.2100	701.3584	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2995.0452	0.2100	628.9595	(264)
Space and water heating			1330.3179	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	213.3176	0.1443	30.7883	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-939.9989	0.1348	-126.7034	
PV Unit electricity exported	-1504.6856	0.1260	-189.5670	
Total			-316.2704	(269)
Total CO2, kg/year			1056.7651	(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	3339.8019	1.1300	3773.9761	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2995.0452	1.1300	3384.4011	(278)
Space and water heating			7158.3772	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	213.3176	1.5338	327.1937	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-939.9989	1.4982	-1408.2839	
PV Unit electricity exported	-1504.6856	0.4625	-695.8468	
Total			-2104.1307	(283)
Total Primary energy kWh/year			5511.5409	(286)
Target Primary Energy Rate (TPER)			57.0800	(287)

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Property Reference	OP-D320 A3MAPL				Issued on Date	29/11/2024	
Assessment Reference	A3MAPL		Prop Type Ref	A3MAPL			
Property	A3MAPL						
SAP Rating	81 B	DER	4.25	TER	10.95		
Environmental	96 A	% DER < TER				61.19	
CO ₂ Emissions (t/year)	0.38	DFEE	37.95	TFEE	38.90		
Compliance Check	See BREL	% DFEE < TFEE				2.43	
% DPER < TPER	21.44	DPER	44.84	TPER	57.08		
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001	
Client							

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 237.1575 (5)

2. Ventilation rate

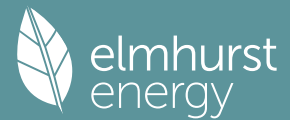
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	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) = 0.1265 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3015 (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) = 0.2563 (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	0.3267	0.3203	0.3139	0.2819	0.2755	0.2435	0.2435	0.2371	0.2563	0.2755	0.2883	0.3011 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5534	0.5513	0.5493	0.5397	0.5379	0.5296	0.5296	0.5281	0.5328	0.5379	0.5416	0.5453 (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
Front Door			4.2800	1.0000	4.2800		(26)
Windows (Uw = 1.30)			19.4500	1.2357	24.0352		(27)
Ground Floor			49.4600	0.1100	5.4406		(28a)
External Wall	99.4400	23.7300	75.7100	0.1700	12.8707		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607		(30)
Total net area of external elements Aum(A, m ²)			198.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0671		(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				12.0400	0.0500		0.6020
E3 Sill				14.4400	0.0500		0.7220
E4 Jamb				31.2000	0.0500		1.5600
E5 Ground floor (normal)				21.0500	0.1600		3.3680

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E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000										
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382										
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300										
E16 Corner (normal)	14.4600	0.0900	1.3014										
E18 Party wall between dwellings	9.8500	0.0600	0.5910										
P1 Party wall - Ground floor	8.9700	0.0800	0.7176										
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000										
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764										
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200										
E14 Flat roof	4.5800	0.0800	0.3664										
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.7772	(36)
Point Thermal bridges												0.0000	
Total fabric heat loss												63.8443	(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	43.3088	43.1466	42.9875	42.2407	42.1009	41.4504	41.4504	41.3299	41.7010	42.1009	42.3836	42.6792	(38)
Average = Sum(39)m / 12 =	107.1531	106.9908	106.8318	106.0849	105.9452	105.2947	105.2947	105.1742	105.5452	105.9452	106.2279	106.5234	(39)
												106.0843	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1098	1.1081	1.1065	1.0988	1.0973	1.0906	1.0906	1.0893	1.0932	1.0973	1.1002	1.1033	(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													2.7052 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	30.0437	29.5975	28.9692	27.8107	26.9432	25.9813	25.4617	26.0856	26.7650	27.7943	28.9766	29.9422	(42b)
Hot water usage for other uses	42.3341	40.7946	39.2552	37.7158	36.1764	34.6370	34.6370	36.1764	37.7158	39.2552	40.7946	42.3341	(42c)
Average daily hot water use (litres/day)												66.3408	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	72.3778	70.3922	68.2244	65.5265	63.1196	60.6182	60.0986	62.2620	64.4808	67.0495	69.7713	72.2762	(44)
Energy content (annual)	114.6287	100.2375	104.8584	89.7025	84.9711	74.5372	72.6841	77.0934	79.5112	90.9855	99.4020	113.1671	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage 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	(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	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	97.4344	85.2019	89.1296	76.2471	72.2254	63.3566	61.7815	65.5294	67.5846	77.3377	84.4917	96.1920	(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	97.4344	85.2019	89.1296	76.2471	72.2254	63.3566	61.7815	65.5294	67.5846	77.3377	84.4917	96.1920	(64)
12Total per year (kWh/year)												936.5118	(64)
Electric shower(s)	55.7198	49.6468	54.2124	51.7342	52.7050	50.2755	51.9513	52.7050	51.7342	54.2124	53.1930	55.7198	(64a)
												633.8094	(64a)
Heat gains from water heating, kWh/month	38.2886	33.7122	35.8355	31.9953	31.2326	28.4080	28.4332	29.5586	29.8297	32.8875	34.4212	37.9780	(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	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	127.2091	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	239.5684	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	(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)	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	(71)
Water heating gains (Table 5)	51.4631	50.1669	48.1660	44.4380	41.9793	39.4556	38.2167	39.7293	41.4301	44.2037	47.8072	51.0456	(72)
Total internal gains	492.8770	507.8111	485.6269	472.1870	447.8760	433.0398	416.5022	415.4142	427.9090	440.3944	465.8502	481.4012	(73)

6. Solar gains													

[Jan]			Area	Solar flux	g			FF		Access		Gains	
			m2	Table 6a	Specific data			Specific data		factor		W	
				W/m2	or Table 6b			or Table 6c		Table 6d			
North			10.2300	10.6334	0.6300			0.7000		0.7700		33.2445	(74)
East			5.3300	19.6403	0.6300			0.7000		0.7700		31.9924	(76)
South			1.0800	46.7521	0.6300			0.7000		0.7700		15.4311	(78)
West			2.8100	19.6403	0.6300			0.7000		0.7700		16.8665	(80)
Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273	(83)
Total gains	590.4114	692.1934	783.1792	911.5407	1000.7230	1007.5965	959.8121	870.7890	774.4032	656.6909	586.0739	562.6285	(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	25.0291	25.0670	25.1044	25.2811	25.3145	25.4709	25.4709	25.5000	25.4104	25.3145	25.2471	25.1770
alpha	2.6686	2.6711	2.6736	2.6854	2.6876	2.6981	2.6981	2.7000	2.6940	2.6876	2.6831	2.6785
util living area	0.9646	0.9457	0.9131	0.8387	0.7231	0.5721	0.4452	0.4986	0.7065	0.8820	0.9477	0.9686 (86)
MIT	18.3870	18.7112	19.2116	19.8838	20.4371	20.7900	20.9223	20.8929	20.6098	19.8756	19.0204	18.3281 (87)
Th 2	19.9928	19.9942	19.9955	20.0018	20.0030	20.0085	20.0085	20.0096	20.0064	20.0030	20.0006	19.9981 (88)
util rest of house	0.9594	0.9378	0.9000	0.8141	0.6803	0.5052	0.3570	0.4086	0.6463	0.8583	0.9387	0.9640 (89)
MIT 2	17.6044	17.9243	18.4154	19.0651	19.5752	19.8782	19.9735	19.9581	19.7416	19.0725	18.2378	17.5497 (90)
Living area fraction	17.7669	18.0877	18.5807	19.2351	19.7542	20.0675	20.1706	20.1522	19.9219	19.2392	18.4003	17.7113 (91)
MIT	17.7669	18.0877	18.5807	19.2351	19.7542	20.0675	20.1706	20.1522	19.9219	19.2392	18.4003	17.7113 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7669	18.0877	18.5807	19.2351	19.7542	20.0675	20.1706	20.1522	19.9219	19.2392	18.4003	17.7113 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9435	0.9180	0.8769	0.7920	0.6685	0.5095	0.3721	0.4223	0.6405	0.8361	0.9195	0.9492 (94)
Useful gains	557.0242	635.4169	686.8038	721.9202	668.9815	513.3284	357.1319	367.7285	496.0278	549.0351	538.9012	534.0370 (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	1443.0215	1410.9629	1290.6061	1096.3977	853.3045	575.7032	375.9604	394.6356	614.4689	915.2869	1200.4089	1439.2707 (97)
Space heating kWh	659.1820	521.1669	449.2289	269.6239	137.1363	0.0000	0.0000	0.0000	0.0000	272.4913	476.2855	673.4939 (98a)
Space heating requirement - total per year (kWh/year)												3458.6086
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	659.1820	521.1669	449.2289	269.6239	137.1363	0.0000	0.0000	0.0000	0.0000	272.4913	476.2855	673.4939 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3458.6086
Space heating per m2												(98c) / (4) = 35.8219 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	989.7698	779.1805	799.3238	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7749	0.8336	0.7965	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	766.9807	649.4954	636.6329	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1126.5396	1073.1698	971.6256	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	258.8824	315.2138	249.2346	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	64.7206	78.8034	62.3086	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												205.8327 (107)
Energy for space heating												35.8219 (99)
Energy for space cooling												2.1319 (108)
Total												37.9538 (109)
Fabric Energy Efficiency (DFEE)												38.0 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

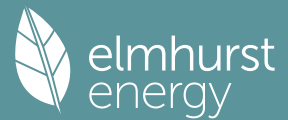
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526 (1b) - (3b)	
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 237.1575 (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)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
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
30.0000 / (5) = 0.1265 (8)
Yes
Blower Door
5.0000 (17)
0.3765 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3200 (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	0.4080	0.4000	0.3920	0.3520	0.3440	0.3040	0.3040	0.2960	0.3200	0.3440	0.3600	0.3760	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5832	0.5800	0.5768	0.5620	0.5592	0.5462	0.5462	0.5438	0.5512	0.5592	0.5648	0.5707	(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	
TER Opaque door			4.2800	1.0000	4.2800			(26)
TER Opening Type (Uw = 1.20)			19.4500	1.1450	22.2710			(27)
Ground Floor			49.4600	0.1300	6.4298			(28a)
External Wall	99.4400	23.7300	75.7100	0.1800	13.6278			(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799			(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607			(30)
Total net area of external elements Aum(A, m2)			198.3600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0492			(33)
Party Wall			44.1300	0.0000	0.0000			(32)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	12.0400	0.0500	0.6020	
E3 Sill	14.4400	0.0500	0.7220	
E4 Jamb	31.2000	0.0500	1.5600	
E5 Ground floor (normal)	21.0500	0.1600	3.3680	
E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382	
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300	
E16 Corner (normal)	14.4600	0.0900	1.3014	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	8.9700	0.0800	0.7176	
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764	
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200	
E14 Flat roof	4.5800	0.0800	0.3664	
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158	

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

11.7772 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 63.8264 (37)

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

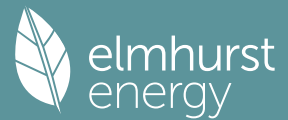
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	45.6458	45.3929	45.1449	43.9802	43.7623	42.7478	42.7478	42.5600	43.1386	43.7623	44.2031	44.6640	(38)
Heat transfer coeff	109.4722	109.2193	108.9713	107.8066	107.5887	106.5742	106.5742	106.3864	106.9650	107.5887	108.0295	108.4904	(39)
Average = Sum(39)m / 12 =												107.8055	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1338	1.1312	1.1287	1.1166	1.1143	1.1038	1.1038	1.1019	1.1079	1.1143	1.1189	1.1237	(40)
HLP (average)												1.1166	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7052 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	30.0437	29.5975	28.9692	27.8107	26.9432	25.9813	25.4617	26.0856	26.7650	27.7943	28.9766	29.9422	(42b)
Hot water usage for other uses	42.3341	40.7946	39.2552	37.7158	36.1764	34.6370	34.6370	36.1764	37.7158	39.2552	40.7946	42.3341	(42c)
Average daily hot water use (litres/day)												66.3408	(43)
Daily hot water use	72.3778	70.3922	68.2244	65.5265	63.1196	60.6182	60.0986	62.2620	64.4808	67.0495	69.7713	72.2762	(44)
Energy conte	114.6287	100.2375	104.8584	89.7025	84.9711	74.5372	72.6841	77.0934	79.5112	90.9855	99.4020	113.1671	(45)
Energy content (annual)										Total = Sum(45)m =		1101.7786	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage 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	(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	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	97.4344	85.2019	89.1296	76.2471	72.2254	63.3566	61.7815	65.5294	67.5846	77.3377	84.4917	96.1920	(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													

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97.4344	85.2019	89.1296	76.2471	72.2254	63.3566	61.7815	65.5294	67.5846	77.3377	84.4917	96.1920 (64)
Total per year (kWh/year)											936.5118 (64)
Electric shower(s)											937 (64)
55.7198	49.6468	54.2124	51.7342	52.7050	50.2755	51.9513	52.7050	51.7342	54.2124	53.1930	55.7198 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											633.8094 (64a)
Heat gains from water heating, kWh/month											
38.2886	33.7122	35.8355	31.9953	31.2326	28.4080	28.4332	29.5586	29.8297	32.8875	34.4212	37.9780 (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	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	127.2091 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	239.5684 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261 (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)												
	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084 (71)
Water heating gains (Table 5)												
	51.4631	50.1669	48.1660	44.4380	41.9793	39.4556	38.2167	39.7293	41.4301	44.2037	47.8072	51.0456 (72)
Total internal gains												
	492.8770	507.8111	485.6269	472.1870	447.8760	433.0398	416.5022	415.4142	427.9090	440.3944	465.8502	481.4012 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	10.2300	10.6334	0.6300	0.7000	0.7700	33.2445 (74)
East	5.3300	19.6403	0.6300	0.7000	0.7700	31.9924 (76)
South	1.0800	46.7521	0.6300	0.7000	0.7700	15.4311 (78)
West	2.8100	19.6403	0.6300	0.7000	0.7700	16.8665 (80)

Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273 (83)
Total gains	590.4114	692.1934	783.1792	911.5407	1000.7230	1007.5965	959.8121	870.7890	774.4032	656.6909	586.0739	562.6285 (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	24.4989	24.5556	24.6115	24.8774	24.9278	25.1650	25.1650	25.2095	25.0731	24.9278	24.8260	24.7206
alpha	2.6333	2.6370	2.6408	2.6585	2.6619	2.6777	2.6777	2.6806	2.6715	2.6619	2.6551	2.6480
util living area												
	0.9649	0.9463	0.9143	0.8410	0.7269	0.5760	0.4490	0.5023	0.7099	0.8834	0.9482	0.9688 (86)
MIT	18.3270	18.6543	19.1615	19.8507	20.4158	20.7816	20.9185	20.8884	20.5964	19.8478	18.9804	18.2769 (87)
Th 2	19.9733	19.9754	19.9775	19.9873	19.9891	19.9977	19.9977	19.9993	19.9944	19.9891	19.9854	19.9815 (88)
util rest of house												
	0.9596	0.9384	0.9013	0.8164	0.6838	0.5083	0.3595	0.4111	0.6493	0.8598	0.9392	0.9641 (89)
MIT 2	17.5324	17.8559	18.3544	19.0233	19.5454	19.8624	19.9611	19.9458	19.7208	19.0364	18.1886	17.4883 (90)
Living area fraction												
	17.6974	18.0217	18.5220	19.1951	19.7262	20.0533	20.1599	20.1415	19.9026	19.2049	18.3530	17.6521 (92)
Temperature adjustment												
	17.6974	18.0217	18.5220	19.1951	19.7262	20.0533	20.1599	20.1415	19.9026	19.2049	18.3530	17.6521 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9435	0.9184	0.8779	0.7937	0.6714	0.5123	0.3747	0.4249	0.6431	0.8372	0.9198	0.9492 (94)
Useful gains	557.0621	635.6760	687.5234	723.5331	671.8902	516.2367	359.6348	369.9693	498.0306	549.7777	539.0644	534.0405 (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												
	1466.6441	1433.1424	1310.0548	1109.8837	863.5241	581.1776	379.3972	398.0456	620.6767	925.7903	1215.6588	1459.4185 (97)
Space heating kWh												
	676.7290	535.8974	463.1634	278.1724	142.5756	0.0000	0.0000	0.0000	0.0000	279.7534	487.1479	688.4812 (98a)
Space heating requirement - total per year (kWh/year)												3551.9205
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												
	676.7290	535.8974	463.1634	278.1724	142.5756	0.0000	0.0000	0.0000	0.0000	279.7534	487.1479	688.4812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3551.9205
Space heating per m2												(98c) / (4) = 36.7884 (99)

8c. Space cooling requirement

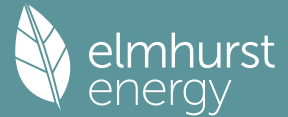
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1001.7979	788.6494	808.5365	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7693	0.8286	0.7913	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	770.6682	653.4639	639.8087	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1126.5396	1073.1698	971.6256	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	256.2274	312.2612	246.8718	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												
									fc = cooled area / (4) =			1.0000 (105)

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Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	64.0569	78.0653	61.7179	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												203.8401 (107)
Energy for space heating												36.7884 (99)
Energy for space cooling												2.1112 (108)
Total												38.8996 (109)
Fabric Energy Efficiency (TFEE)												38.9 (109)

Full SAP Calculation Printout



Property Reference	OP-D320 A3MAPL				Issued on Date	29/11/2024	
Assessment Reference	A3MAPL			Prop Type Ref	A3MAPL		
Property	A3MAPL						
SAP Rating	81 B		DER	4.25		TER	10.95
Environmental	96 A		% DER < TER				61.19
CO ₂ Emissions (t/year)	0.38		DFEE	37.95		TFEE	38.90
Compliance Check	See BREL		% DFEE < TFEE				2.43
% DPER < TPER	21.44		DPER	44.84		TPER	57.08
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001	
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)
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 237.1575 (5)

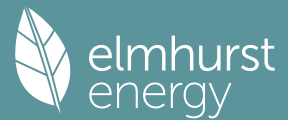
2. Ventilation rate

	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)
Balanced mechanical ventilation with heat recovery	
If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	72.0000 (23c)
Effective ac	0.3297 0.3259 0.3222 0.3036 0.2999 0.2813 0.2813 0.2776 0.2888 0.2999 0.3073 0.3148 (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
Front Door			4.2800	1.0000	4.2800		(26)
Windows (Uw = 1.30)			19.4500	1.2357	24.0352		(27)
Ground Floor			49.4600	0.1100	5.4406		(28a)
External Wall	99.4400	23.7300	75.7100	0.1700	12.8707		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607		(30)
Total net area of external elements Aum(A, m ²)			198.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0671		(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				12.0400	0.0500	0.6020	

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E3 Sill	14.4400	0.0500	0.7220
E4 Jamb	31.2000	0.0500	1.5600
E5 Ground floor (normal)	21.0500	0.1600	3.3680
E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200
E14 Flat roof	4.5800	0.0800	0.3664
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.7772 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	63.8443 (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	25.7995	25.5085	25.2175	23.7623	23.4713	22.0161	22.0161	21.7250	22.5981	23.4713	24.0533	24.6354 (38)
Average = Sum(39)m / 12 =	89.6438	89.3528	89.0617	87.6066	87.3155	85.8603	85.8603	85.5693	86.4424	87.3155	87.8976	88.4797 (39)
												87.5338
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9285	0.9255	0.9224	0.9074	0.9044	0.8893	0.8893	0.8863	0.8953	0.9044	0.9104	0.9164 (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	2.7052 (42)											
Hot water usage for mixer showers	95.6687	94.2310	92.1360	88.1275	85.1694	81.8705	79.9954	82.0746	84.3537	87.8957	91.9903	95.3022 (42a)
Hot water usage for baths	31.6250	31.1553	30.4939	29.2744	28.3612	27.3487	26.8018	27.4586	28.1737	29.2571	30.5017	31.5181 (42b)
Hot water usage for other uses	44.5622	42.9417	41.3213	39.7008	38.0804	36.4600	36.4600	38.0804	39.7008	41.3213	42.9417	44.5622 (42c)
Average daily hot water use (litres/day)												158.0358 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	171.8559	168.3281	163.9512	157.1028	151.6110	145.6791	143.2571	147.6135	152.2282	158.4741	165.4338	171.3824 (44)
Energy content (annual)	272.1777	239.6969	251.9868	215.0658	204.0976	179.1295	173.2571	182.7764	187.7126	215.0479	235.6907	268.3435 (45)
Distribution loss (46)m = 0.15 x (45)m	40.8267	35.9545	37.7980	32.2599	30.6146	26.8694	25.9886	27.4165	28.1569	32.2572	35.3536	40.2515 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.4040 (55)
Total storage loss	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)
If cylinder contains dedicated solar storage	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (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	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (64)
12Total per year (kWh/year)												3659.0041 (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	134.3852	119.3383	127.6717	113.9798	111.7485	77.5702	76.2179	79.3831	80.4240	115.3895	120.8376	133.1103 (65)

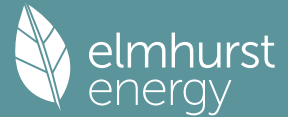
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	127.2091 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	239.5684 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261 (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)	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084 (71)
Water heating gains (Table 5)	180.6252	177.5867	171.6018	158.3053	150.1996	107.7363	102.4434	106.6977	111.7001	155.0934	167.8300	178.9117 (72)
Total internal gains	622.0391	635.2309	609.0627	586.0543	556.0964	501.3205	480.7290	482.3825	498.1790	551.2841	585.8730	609.2673 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	10.2300	10.6334	0.6300	0.7000	0.7700	33.2445 (74)

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East			5.3300		19.6403		0.6300		0.7000		0.7700		31.9924 (76)
South			1.0800		46.7521		0.6300		0.7000		0.7700		15.4311 (78)
West			2.8100		19.6403		0.6300		0.7000		0.7700		16.8665 (80)

Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273 (83)
Total gains	719.5736	819.6132	906.6150	1025.4080	1108.9433	1075.8773	1024.0389	937.7574	844.6731	767.5807	706.0967	690.4945 (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 from living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	29.9178	30.0152	30.1133	30.6135	30.7156	31.2361	31.2361	31.3424	31.0258	30.7156	30.5121	30.3114	
alpha	2.9945	3.0010	3.0076	3.0409	3.0477	3.0824	3.0824	3.0895	3.0684	3.0477	3.0341	3.0208	
util living area													
	0.9388	0.9111	0.8643	0.7649	0.6264	0.4771	0.3580	0.4026	0.6119	0.8122	0.9102	0.9446 (86)	
Living	19.1207	19.4155	19.8357	20.3642	20.7291	20.9159	20.9740	20.9626	20.8156	20.3428	19.6662	19.0830	
Non living	17.9408	18.3108	18.8335	19.4807	19.9010	20.1089	20.1609	20.1553	20.0112	19.4721	18.6391	17.9001	
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	20.0386	19.4155	19.8357	20.3642	20.7291	20.9159	20.9740	20.9626	20.8156	20.3428	19.6662	19.3511 (87)	
Th 2	20.1434	20.1459	20.1485	20.1612	20.1638	20.1766	20.1766	20.1792	20.1715	20.1638	20.1587	20.1536 (88)	
util rest of house													
	0.9310	0.9002	0.8478	0.7378	0.5864	0.4239	0.2947	0.3363	0.5575	0.7837	0.8974	0.9376 (89)	
MIT 2	19.2653	18.3108	18.8335	19.4807	19.9010	20.1089	20.1609	20.1553	20.0112	19.4721	18.6391	18.3062 (90)	
Living area fraction													
										fLA = Living area / (4) =		0.2077 (91)	
MIT	19.4259	18.5402	19.0416	19.6642	20.0729	20.2764	20.3297	20.3230	20.1782	19.6529	18.8524	18.5232 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4259	18.5402	19.0416	19.6642	20.0729	20.2764	20.3297	20.3230	20.1782	19.6529	18.8524	18.5232 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9235	0.8749	0.8226	0.7202	0.5818	0.4305	0.3067	0.3482	0.5580	0.7639	0.8728	0.9204 (94)	
Useful gains	664.5472	717.0406	745.7447	738.4700	645.2102	463.2098	314.0649	326.5305	471.3051	586.3470	616.3071	635.5136 (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													
	1355.9414	1218.7916	1116.9770	943.0108	731.0868	487.3817	320.2343	335.6852	525.4183	790.4580	1033.0056	1267.3095 (97)	
Space heating kWh													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98a)	
Space heating requirement - total per year (kWh/year)												2260.8700	
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													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2260.8700	
Space heating per m2										(98c) / (4) =		23.4166 (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 %)													254.4892 (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													
	514.3973	337.1766	276.1968	147.2694	63.8922	0.0000	0.0000	0.0000	0.0000	151.8586	300.0229	470.0561 (98)	
Space heating efficiency (main heating system 1)													
	254.4892	254.4892	254.4892	254.4892	254.4892	0.0000	0.0000	0.0000	0.0000	254.4892	254.4892	254.4892 (210)	
Space heating fuel (main heating system)													
	202.1293	132.4915	108.5299	57.8686	25.1061	0.0000	0.0000	0.0000	0.0000	59.6719	117.8922	184.7057 (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													
	370.5593	328.5577	350.3684	310.2738	302.4792	243.7615	240.0435	249.5628	252.3446	313.4295	330.8987	366.7251 (64)	
Efficiency of water heater (217)m													
	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624	269.4624 (216)	
Fuel for water heating, kWh/month													
	137.5180	121.9308	130.0250	115.1455	112.2528	90.4621	89.0823	92.6150	93.6474	116.3166	122.7996	136.0951 (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													
	29.9304	27.0339	29.9304	28.9649	29.9304	28.9649	29.9304	29.9304	28.9649	29.9304	28.9649	29.9304 (231)	
Lighting													
	26.4315	21.2044	19.0922	13.9877	10.8045	8.8274	9.8563	12.8115	16.6409	21.8338	24.6612	27.1661 (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													

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Space heating fuel - main system 1	888.3952 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	269.4624
Water heating fuel used	1357.8902 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)	
mechanical ventilation fans (SFP = 1.2180)	352.4066 (230a)
Total electricity for the above, kWh/year	352.4066 (231)
Electricity for lighting (calculated in Appendix L)	213.3176 (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	2812.0095 (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	888.3952	0.1557	138.3641	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1357.8902	0.1415	192.1881	(264)
Space and water heating			330.5522	(265)
Pumps, fans and electric keep-hot	352.4066	0.1387	48.8831	(267)
Energy for lighting	213.3176	0.1443	30.7883	(268)
Total CO2, kg/year			410.2237	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2500	(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	888.3952	1.5766	1400.6072	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1357.8902	1.5234	2068.5917	(278)
Space and water heating			3469.1990	(279)
Pumps, fans and electric keep-hot	352.4066	1.5128	533.1206	(281)
Energy for lighting	213.3176	1.5338	327.1937	(282)
Total Primary energy kWh/year			4329.5133	(286)
Dwelling Primary energy Rate (DPER)			44.8400	(287)

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

1. Overall dwelling characteristics

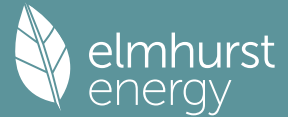
	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	49.4600 (1b)	x 2.3100 (2b)	= 114.2526	(1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.5500			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	237.1575 (5)

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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1265 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3765	(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) =	0.3200 (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)

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Adj infilt rate	0.4080	0.4000	0.3920	0.3520	0.3440	0.3040	0.3040	0.2960	0.3200	0.3440	0.3600	0.3760 (22b)
Effective ac	0.5832	0.5800	0.5768	0.5620	0.5592	0.5462	0.5462	0.5438	0.5512	0.5592	0.5648	0.5707 (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
TER Opaque door			4.2800	1.0000	4.2800		(26)
TER Opening Type (Uw = 1.20)			19.4500	1.1450	22.2710		(27)
Ground Floor			49.4600	0.1300	6.4298		(28a)
External Wall	99.4400	23.7300	75.7100	0.1800	13.6278		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Bay Roof	2.3700		2.3700	0.1100	0.2607		(30)
Total net area of external elements Aum(A, m2)			198.3600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.0492		(33)
Party Wall			44.1300	0.0000	0.0000		(32)

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

List of Thermal Bridges 100.0000 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	12.0400	0.0500	0.6020
E3 Sill	14.4400	0.0500	0.7220
E4 Jamb	31.2000	0.0500	1.5600
E5 Ground floor (normal)	21.0500	0.1600	3.3680
E6 Intermediate floor within a dwelling	16.4700	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.9700	0.0600	0.5382
E12 Gable (insulation at ceiling level)	10.5000	0.0600	0.6300
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	8.9700	0.0800	0.7176
P2 Party wall - Intermediate floor within a dwelling	8.9700	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.9700	0.1200	1.0764
E24 Eaves (insulation at ceiling level - inverted)	3.0000	0.2400	0.7200
E14 Flat roof	4.5800	0.0800	0.3664
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158

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

Point Thermal Bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 63.8264 (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	45.6458	45.3929	45.1449	43.9802	43.7623	42.7478	42.7478	42.5600	43.1386	43.7623	44.2031	44.6640 (38)
Average = Sum(39)m / 12 =	109.4722	109.2193	108.9713	107.8066	107.5887	106.5742	106.5742	106.3864	106.9650	107.5887	108.0295	108.4904 (39)
												107.8055

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1338	1.1312	1.1287	1.1166	1.1143	1.1038	1.1038	1.1019	1.1079	1.1143	1.1189	1.1237 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

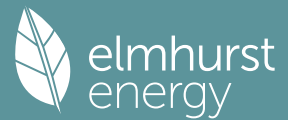
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7052 (42)
Hot water usage for mixer showers	69.5773	68.5317	67.0080	64.0927	61.9414	59.5422	58.1785	59.6906	61.3482	63.9242	66.9020	69.3107 (42a)
Hot water usage for baths	30.0437	29.5975	28.9692	27.8107	26.9432	25.9813	25.4617	26.0856	26.7650	27.7943	28.9766	29.9422 (42b)
Hot water usage for other uses	42.3341	40.7946	39.2552	37.7158	36.1764	34.6370	34.6370	36.1764	37.7158	39.2552	40.7946	42.3341 (42c)
Average daily hot water use (litres/day)												130.4887 (43)
Daily hot water use	141.9551	138.9238	135.2324	129.6192	125.0609	120.1604	118.2771	121.9526	125.8289	130.9737	136.6733	141.5869 (44)
Energy conte	224.8221	197.8257	207.8472	177.4422	168.3560	147.7512	143.0459	151.0028	155.1597	177.7300	194.7162	221.6909 (45)
Energy content (annual)										Total = Sum(45)m =		2167.3899
Distribution loss (46)m = 0.15 x (45)m	33.7233	29.6739	31.1771	26.6163	25.2534	22.1627	21.4569	22.6504	23.2739	26.6595	29.2074	33.2536 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7973 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9706 (55)
Total storage loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (56)
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (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	278.1717	246.0124	261.1968	229.0709	221.7057	199.3799	196.3955	204.3524	206.7883	231.0796	246.3449	275.0405 (62)
WWHRS	-31.8078	-28.1311	-29.4573	-24.3918	-22.7323	-19.4522	-18.2333	-19.3893	-20.1260	-23.7263	-26.8790	-31.2188 (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	246.3639	217.8813	231.7395	204.6791	198.9734	179.9277	178.1622	184.9631	186.6624	207.3534	219.4659	243.8217 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2499.9937 (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	117.4330	104.3264	111.7889	100.3025	98.6581	90.4302	90.2425	92.8881	92.8935	101.7749	106.0461	116.3919 (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
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(66)m	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	135.2605	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.2091	140.8386	127.2091	131.4494	127.2091	131.4494	127.2091	127.2091	131.4494	127.2091	131.4494	127.2091	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.6267	253.2274	246.6737	232.7215	215.1095	198.5567	187.4983	184.8976	191.4514	205.4035	223.0155	239.5684	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	36.5261	(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)	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	-108.2084	(71)
Water heating gains (Table 5)	157.8401	155.2477	150.2539	139.3090	132.6049	125.5975	121.2936	124.8496	129.0188	136.7943	147.2862	156.4407	(72)
Total internal gains	602.2540	615.8919	590.7148	570.0581	541.5017	519.1817	499.5792	500.5345	515.4977	535.9850	568.3293	589.7963	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				10.2300	10.6334	0.6300	0.7000	0.7700	33.2445 (74)			
East				5.3300	19.6403	0.6300	0.7000	0.7700	31.9924 (76)			
South				1.0800	46.7521	0.6300	0.7000	0.7700	15.4311 (78)			
West				2.8100	19.6403	0.6300	0.7000	0.7700	16.8665 (80)			
Solar gains	97.5344	184.3823	297.5523	439.3537	552.8470	574.5568	543.3099	455.3748	346.4941	216.2965	120.2237	81.2273 (83)
Total gains	699.7885	800.2742	888.2671	1009.4118	1094.3486	1093.7385	1042.8891	955.9093	861.9918	752.2815	688.5530	671.0236 (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	24.4989	24.5556	24.6115	24.8774	24.9278	25.1650	25.1650	25.2095	25.0731	24.9278	24.8260	24.7206		
alpha	2.6333	2.6370	2.6408	2.6585	2.6619	2.6777	2.6777	2.6806	2.6715	2.6619	2.6551	2.6480		
util living area	0.9492	0.9275	0.8909	0.8120	0.6936	0.5432	0.4189	0.4666	0.6690	0.8514	0.9275	0.9540	(86)	
MIT	18.5278	18.8397	19.3218	19.9641	20.4835	20.8111	20.9312	20.9068	20.6542	19.9768	19.1574	18.4795	(87)	
Th 2	19.9733	19.9754	19.9775	19.9873	19.9891	19.9977	19.9977	19.9993	19.9944	19.9891	19.9854	19.9815	(88)	
util rest of house	0.9419	0.9173	0.8753	0.7848	0.6491	0.4767	0.3336	0.3792	0.6067	0.8236	0.9156	0.9474	(89)	
MIT 2	17.0935	17.4864	18.0903	18.8822	19.4910	19.8493	19.9586	19.9429	19.6986	18.9172	17.8989	17.0373	(90)	
Living area fraction									fLA = Living area / (4) =			0.2077	(91)	
MIT	17.3914	17.7674	18.3460	19.1069	19.6971	20.0491	20.1606	20.1431	19.8971	19.1373	18.1603	17.3368	(92)	
Temperature adjustment												0.0000		
adjusted MIT	17.3914	17.7674	18.3460	19.1069	19.6971	20.0491	20.1606	20.1431	19.8971	19.1373	18.1603	17.3368	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.9163	0.8880	0.8437	0.7572	0.6349	0.4803	0.3480	0.3924	0.6000	0.7949	0.8868	0.9231	(94)	
Ext temp.	641.2338	710.6645	749.4280	764.3393	694.7941	525.3268	362.9553	375.0750	517.2042	597.9788	610.6334	619.4055	(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	1433.1404	1405.3718	1290.8756	1100.3658	860.4006	580.7285	379.4644	398.2114	620.0829	918.5142	1194.8356	1425.2175	(97)	
Space heating requirement - total per year (kWh/year)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241	(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)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												3082.6371		
Space heating per m2										(98c) / (4) =		31.9279	(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)	589.1785	466.8433	402.8370	241.9391	123.2113	0.0000	0.0000	0.0000	0.0000	238.4783	420.6256	599.5241	(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)	638.3299	505.7890	436.4431	262.1225	133.4900	0.0000	0.0000	0.0000	0.0000	258.3730	455.7157	649.5386	(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)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Water heating requirement	246.3639	217.8813	231.7395	204.6791	198.9734	179.9277	178.1622	184.9631	186.6624	207.3534	219.4659	243.8217	(64)	
Efficiency of water heater	85.9421	85.7236	85.2873	84.4358	83.0177	79.8000	79.8000	79.8000	79.8000	84.3742	85.4940	85.9960	(216)	
Fuel for water heating, kWh/month	286.6628	254.1673	271.7163	242.4079	239.6759	225.4733	223.2609	231.7834	233.9128	245.7544	256.7032	283.5269	(219)	

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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	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	7.3041	(231)
Lighting	26.4315	21.2044	19.0922	13.9877	10.8045	8.8274	9.8563	12.8115	16.6409	21.8338	24.6612	27.1661	27.1661	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-45.1227	-63.0352	-89.7886	-100.0020	-107.0160	-99.5623	-98.2825	-93.1461	-84.0108	-71.5766	-49.3808	-39.0754	-39.0754	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-27.2965	-57.2043	-113.3135	-169.6554	-223.8390	-224.7634	-222.1633	-188.3694	-138.3903	-81.6840	-36.4004	-21.6060	-21.6060	(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	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													3339.8019	(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													2995.0452	(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)													213.3176	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2444.6844	(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													4189.4803	(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	3339.8019	0.2100	701.3584	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2995.0452	0.2100	628.9595	(264)
Space and water heating			1330.3179	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	213.3176	0.1443	30.7883	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-939.9989	0.1348	-126.7034	
PV Unit electricity exported	-1504.6856	0.1260	-189.5670	
Total			-316.2704	(269)
Total CO2, kg/year			1056.7651	(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	3339.8019	1.1300	3773.9761	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2995.0452	1.1300	3384.4011	(278)
Space and water heating			7158.3772	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	213.3176	1.5338	327.1937	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-939.9989	1.4982	-1408.2839	
PV Unit electricity exported	-1504.6856	0.4625	-695.8468	
Total			-2104.1307	(283)
Total Primary energy kWh/year			5511.5409	(286)
Target Primary Energy Rate (TPER)			57.0800	(287)