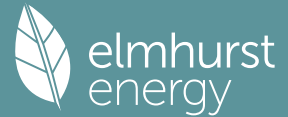


Full SAP Calculation Printout



Property Reference	OP-D320 A3LAUR				Issued on Date	29/11/2024		
Assessment Reference	A3LAUR			Prop Type Ref	A3LAUR			
Property	A3LAUR							
SAP Rating	82 B		DER	4.04		TER	10.38	
Environmental	96 A		% DER < TER				61.08	
CO ₂ Emissions (t/year)	0.36		DFEE	32.95		TFEE	34.35	
Compliance Check	See BREL		% DFEE < TFEE				4.09	
% DPER < TPER	21.07		DPER	42.76		TPER	54.18	
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	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 233.1096 (5)

2. Ventilation rate

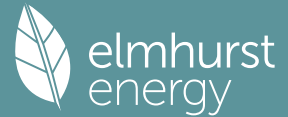
											m3 per hour		
Number of open chimneys											0 * 80 =	0.0000 (6a)	
Number of open flues											0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)	
Number of flues attached 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													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)			10.6500	1.2357	13.1606		(27)
Ground Floor			47.3800	0.1100	5.2118		(28a)
External Wall	95.7900	14.9300	80.8600	0.1700	13.7462		(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118		(30)
Total net area of external elements Aum(A, m ²)			190.5500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		41.6104		(33)
Party Wall			48.5600	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)				10.7900	0.0500		0.5395
E3 Sill				8.7500	0.0500		0.4375

6. Solar gains						
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.7200	10.6334	0.6300	0.7000	0.7700	18.5883 (74)
East	1.4500	19.6403	0.6300	0.7000	0.7700	8.7034 (76)
South	3.4800	46.7521	0.6300	0.7000	0.7700	49.7224 (78)

Full SAP Calculation Printout



Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181 (83)
Total gains	708.5243	780.1025	810.7570	851.3860	869.0421	820.7562	785.4402	749.9286	722.5302	711.7495	688.9102	684.4996 (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	34.2173	34.3451	34.4737	35.1319	35.2665	35.9556	35.9556	36.0966	35.6767	35.2665	34.9982	34.7340
alpha	3.2812	3.2897	3.2982	3.3421	3.3511	3.3970	3.3970	3.4064	3.3784	3.3511	3.3332	3.3156
util living area	0.9310	0.9054	0.8702	0.7933	0.6774	0.5310	0.3982	0.4309	0.6233	0.8024	0.8984	0.9366 (86)
Living	19.4763	19.7123	20.0186	20.4317	20.7405	20.9190	20.9768	20.9695	20.8549	20.4951	19.9529	19.4519
Non living	18.4521	18.7482	19.1309	19.6433	20.0054	20.2092	20.2623	20.2593	20.1426	19.7288	19.0623	18.4288
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	20.2205	19.7123	20.0186	20.4317	20.7405	20.9190	20.9768	20.9695	20.8549	20.4951	19.9529	19.6685 (87)
Th 2	20.2431	20.2457	20.2483	20.2614	20.2640	20.2772	20.2772	20.2798	20.2719	20.2640	20.2588	20.2536 (88)
util rest of house	0.9229	0.8947	0.8552	0.7696	0.6413	0.4803	0.3368	0.3687	0.5738	0.7753	0.8853	0.9291 (89)
MIT 2	19.5291	18.7482	19.1309	19.6433	20.0054	20.2092	20.2623	20.2593	20.1426	19.7288	19.0623	18.7577 (90)
Living area fraction	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	0.1857 (91)
MIT	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	18.9268 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	18.9268 (93)

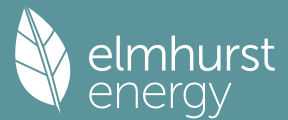
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9158	0.8722	0.8332	0.7530	0.6349	0.4849	0.3469	0.3785	0.5740	0.7592	0.8635	0.9130 (94)
Useful gains	648.8540	680.3852	675.5305	641.1360	551.7729	398.0013	272.5055	283.8467	414.7206	540.3655	594.8978	624.9409 (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	1181.4014	1075.0587	977.0146	815.8999	630.0866	420.2859	277.8200	291.0436	455.5838	691.9784	912.1279	1116.0318 (97)
Space heating kWh	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98a)
Space heating requirement - total per year (kWh/year)												1776.4127
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	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1776.4127
Space heating per m2										(98c) / (4) =		18.7464 (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 %)												253.6685 (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	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98)
Space heating efficiency (main heating system 1)	253.6685	253.6685	253.6685	253.6685	253.6685	0.0000	0.0000	0.0000	0.0000	253.6685	253.6685	253.6685 (210)
Space heating fuel (main heating system)	156.1941	104.5540	88.4241	49.6041	22.9691	0.0000	0.0000	0.0000	0.0000	44.4675	90.0410	144.0351 (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	369.2620	327.4152	349.1674	309.2487	301.5064	242.9077	239.2177	248.6916	251.4499	312.4045	329.7753	365.4460 (64)
Efficiency of water heater (217)m	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667 (216)
Fuel for water heating, kWh/month	137.1361	121.5951	129.6734	114.8485	111.9731	90.2108	88.8404	92.3588	93.3832	116.0205	122.4716	135.7190 (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	29.4196	26.5725	29.4196	28.4705	29.4196	28.4705	29.4196	29.4196	28.4705	29.4196	28.4705	29.4196 (231)
Lighting	29.2171	23.4391	21.1043	15.4619	11.9432	9.7577	10.8950	14.1617	18.3947	24.1348	27.2602	30.0292 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												700.2890 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.2667
Water heating fuel used												1354.2306 (219)

Full SAP Calculation Printout



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)	346.3915 (230a)
Total electricity for the above, kWh/year	346.3915 (231)
Electricity for lighting (calculated in Appendix L)	235.7990 (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	2636.7102 (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	700.2890	0.1556	108.9640 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1354.2306	0.1415	191.6699 (264)
Space and water heating			300.6339 (265)
Pumps, fans and electric keep-hot	346.3915	0.1387	48.0488 (267)
Energy for lighting	235.7990	0.1443	34.0331 (268)
Total CO2, kg/year			382.7158 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	700.2890	1.5760	1103.6711 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1354.2306	1.5234	2063.0162 (278)
Space and water heating			3166.6873 (279)
Pumps, fans and electric keep-hot	346.3915	1.5128	524.0211 (281)
Energy for lighting	235.7990	1.5338	361.6764 (282)
Total Primary energy kWh/year			4052.3848 (286)
Dwelling Primary energy Rate (DPER)			42.7600 (287)

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

1. Overall dwelling characteristics

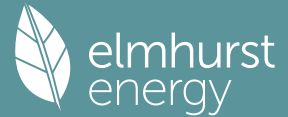
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	233.1096 (5)

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) = 0.1287 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3787 (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) = 0.3219 (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	0.4104	0.4024	0.3943	0.3541	0.3460	0.3058	0.3058	0.2977	0.3219	0.3460	0.3621	0.3782 (22b)
Effective ac	0.5842	0.5809	0.5777	0.5627	0.5599	0.5468	0.5468	0.5443	0.5518	0.5599	0.5656	0.5715 (25)

Full SAP Calculation Printout



3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Opaque door			4.2800	1.0000	4.2800			(26)
TER Opening Type (Uw = 1.20)			10.6500	1.1450	12.1947			(27)
Ground Floor			47.3800	0.1300	6.1594			(28a)
External Wall	95.7900	14.9300	80.8600	0.1800	14.5548			(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118			(30)
Total net area of external elements Aum(A, m2)			190.5500					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Party Wall			48.5600	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)	10.7900	0.0500	0.5395	
E3 Sill	8.7500	0.0500	0.4375	
E4 Jamb	24.9000	0.0500	1.2450	
E5 Ground floor (normal)	19.4700	0.1600	3.1152	
E6 Intermediate floor within a dwelling	19.4700	0.0000	0.0000	
E10 Baves (insulation at ceiling level)	9.8700	0.0600	0.5922	
E12 Gable (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	9.8700	0.0800	0.7896	
P2 Party wall - Intermediate floor within a dwelling	9.8700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.8700	0.1200	1.1844	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				9.9569 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 52.3576 (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	44.9417	44.6901	44.4435	43.2853	43.0686	42.0598	42.0598	41.8730	42.4484	43.0686	43.5070	43.9653	(38)
Average = Sum(39)m / 12 =	97.2992	97.0477	96.8011	95.6428	95.4261	94.4174	94.4174	94.2306	94.8059	95.4261	95.8645	96.3228	(39)
												95.6418	
HLP	1.0268	1.0241	1.0215	1.0093	1.0070	0.9964	0.9964	0.9944	1.0005	1.0070	1.0117	1.0165	(40)
HLP (average)												1.0093	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

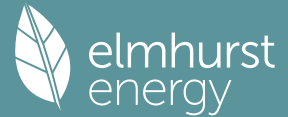
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6854 (42)
Hot water usage for mixer showers													
69.2457	68.2051	66.6887	63.7873	61.6462	59.2584	57.9012	59.4061	61.0558	63.6196	66.5832	68.9804	68.9804	(42a)
Hot water usage for baths													
29.9011	29.4571	28.8317	27.6787	26.8153	25.8580	25.3409	25.9618	26.6380	27.6623	28.8391	29.8001	29.8001	(42b)
Hot water usage for other uses													
42.1316	40.5995	39.0674	37.5354	36.0033	34.4713	34.4713	36.0033	37.5354	39.0674	40.5995	42.1316	42.1316	(42c)
Average daily hot water use (litres/day)													129.8667 (43)
Daily hot water use													
141.2784	138.2616	134.5878	129.0014	124.4648	119.5877	117.7133	121.3713	125.2292	130.3493	136.0218	140.9120	140.9120	(44)
Energy conte	223.7504	196.8827	206.8565	176.5965	167.5536	147.0470	142.3641	150.2830	154.4201	176.8828	193.7881	220.6341	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													2157.0589
33.5626	29.5324	31.0285	26.4895	25.1330	22.0570	21.3546	22.5425	23.1630	26.5324	29.0682	33.0951	33.0951	(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	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	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													
277.1001	245.0695	260.2061	228.2251	220.9032	198.6756	195.7137	203.6326	206.0487	230.2324	245.4167	273.9838	273.9838	(62)
WWHRS	-31.6562	-27.9970	-29.3169	-24.2755	-22.6239	-19.3595	-18.1464	-19.2969	-20.0300	-23.6132	-26.7509	-31.0700	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
245.4438	217.0724	230.8892	203.9496	198.2793	179.3162	177.5673	184.3357	186.0187	206.6192	218.6658	242.9137	242.9137	(64)
12Total per year (kWh/year)													2491.0711 (64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
117.0767	104.0129	111.4595	100.0213	98.3913	90.1961	90.0158	92.6488	92.6476	101.4932	105.7375	116.0406	116.0406	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
140.6156	155.6815	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
247.5678	250.1367	243.6630	229.8812	212.4841	196.1333	185.2099	182.6409	189.1147	202.8965	220.2936	236.6444	236.6444	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	(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)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	(71)
Total internal gains	157.3612	154.7811	149.8111	138.9184	132.2463	125.2723	120.9889	124.5280	128.6772	136.4156	146.8576	155.9685	(72)
	611.8261	626.8809	600.3712	580.3839	551.6275	529.9899	510.0959	511.0660	526.3762	546.2093	578.7355	599.5100	(73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF		Access factor Table 6d		Gains W
North	5.7200		10.6334		0.6300		0.7000		0.7700		18.5883		(74)
East	1.4500		19.6403		0.6300		0.7000		0.7700		8.7034		(76)
South	3.4800		46.7521		0.6300		0.7000		0.7700		49.7224		(78)
Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181	(83)
Total gains	688.8401	760.8622	792.5031	835.4725	854.5235	838.6865	804.3548	768.1483	739.9206	696.5299	671.4566	665.1281	(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	27.0529	27.1230	27.1921	27.5214	27.5839	27.8786	27.8786	27.9338	27.7643	27.5839	27.4577	27.3271	
alpha	2.8035	2.8082	2.8128	2.8348	2.8389	2.8586	2.8586	2.8623	2.8510	2.8389	2.8305	2.8218	
util living area	0.9460	0.9273	0.9017	0.8452	0.7533	0.6106	0.4755	0.5106	0.6932	0.8532	0.9231	0.9504	(86)
MIT	18.8122	19.0718	19.4481	19.9794	20.4482	20.7905	20.9251	20.9062	20.6794	20.0984	19.3891	18.7751	(87)
Th 2	20.0611	20.0633	20.0654	20.0756	20.0775	20.0863	20.0863	20.0880	20.0829	20.0775	20.0736	20.0696	(88)
util rest of house	0.9387	0.9176	0.8879	0.8223	0.7144	0.5471	0.3898	0.4256	0.6357	0.8270	0.9113	0.9437	(89)
MIT 2	17.5026	17.8301	18.3039	18.9671	19.5285	19.9137	20.0408	20.0278	19.8009	19.1235	18.2410	17.4611	(90)
Living area fraction									fLA = Living area / (4) =			0.1857	(91)
MIT	17.7458	18.0608	18.5164	19.1551	19.6993	20.0766	20.2050	20.1910	19.9640	19.3046	18.4543	17.7052	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7458	18.0608	18.5164	19.1551	19.6993	20.0766	20.2050	20.1910	19.9640	19.3046	18.4543	17.7052	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9141	0.8904	0.8591	0.7953	0.6965	0.5464	0.4015	0.4357	0.6275	0.8007	0.8842	0.9202	(94)
Useful gains	629.6804	677.4359	680.8252	664.4322	595.1560	458.2173	322.9438	334.6956	464.2704	557.6950	593.6937	612.0766	(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	1308.2697	1277.2214	1163.2008	980.8291	763.3415	517.0843	340.3775	357.2236	555.9453	830.6452	1088.4704	1300.8548	(97)
Space heating kWh	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98a)
Space heating requirement - total per year (kWh/year)												2691.5145	
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	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2691.5145	
Space heating per m2										(98c) / (4) =		28.4035	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													92.3000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	546.9885	436.6802	388.8271	246.8101	135.5688	0.0000	0.0000	0.0000	0.0000	220.0162	385.9579	555.2015	(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	245.4438	217.0724	230.8892	203.9496	198.2793	179.3162	177.5673	184.3357	186.0187	206.6192	218.6658	242.9137	(64)
Efficiency of water heater (217)m	85.6404	85.4274	85.0450	84.3085	83.0570	79.8000	79.8000	79.8000	79.8000	84.0210	85.1475	85.6920	(216)
Fuel for water heating, kWh/month	286.5981	254.1016	271.4905	241.9088	238.7268	224.7070	222.5154	230.9972	233.1061	245.9138	256.8084	283.4729	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	29.2171	23.4391	21.1043	15.4619	11.9432	9.7577	10.8950	14.1617	18.3947	24.1348	27.2602	30.0292	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.6508	-61.1768	-87.3958	-97.6087	-104.6651	-97.4491	-96.2327	-91.1478	-82.0670	-69.6584	-47.8578	-37.7804	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-25.7228	-54.0061	-107.1650	-160.7085	-212.2761	-213.2373	-210.7370	-178.5288	-130.9812	-77.1569	-34.3160	-20.3492	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2916.0504	(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													2990.3467	(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)													235.7990	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2341.8752	(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													3886.3209	(238)

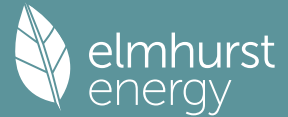
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2916.0504	0.2100	612.3706	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2990.3467	0.2100	627.9728	(264)
Space and water heating			1240.3434	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	235.7990	0.1443	34.0331	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-916.6904	0.1347	-123.5035	
PV Unit electricity exported	-1425.1848	0.1259	-179.4866	
Total			-302.9901	(269)
Total CO2, kg/year			983.3156	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3800	(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	2916.0504	1.1300	3295.1369	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2990.3467	1.1300	3379.0917	(278)
Space and water heating			6674.2286	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	235.7990	1.5338	361.6764	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-916.6904	1.4979	-1373.1458	
PV Unit electricity exported	-1425.1848	0.4623	-658.8418	
Total			-2031.9876	(283)
Total Primary energy kWh/year			5134.0183	(286)
Target Primary Energy Rate (TPER)			54.1800	(287)

Full SAP Calculation Printout



Property Reference	OP-D320 A3LAUR				Issued on Date	29/11/2024		
Assessment Reference	A3LAUR			Prop Type Ref	A3LAUR			
Property	A3LAUR							
SAP Rating	82 B		DER	4.04		TER	10.38	
Environmental	96 A		% DER < TER				61.08	
CO ₂ Emissions (t/year)	0.36		DFEE	32.95		TFEE	34.35	
Compliance Check	See BREL		% DFEE < TFEE				4.09	
% DPER < TPER	21.07		DPER	42.76		TPER	54.18	
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	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 233.1096 (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) = 0.1287 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3037 (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) = 0.2581 (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	0.3291	0.3227	0.3162	0.2840	0.2775	0.2452	0.2452	0.2388	0.2581	0.2775	0.2904	0.3033 (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	0.5542	0.5521	0.5500	0.5403	0.5385	0.5301	0.5301	0.5285	0.5333	0.5385	0.5422	0.5460 (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)			10.6500	1.2357	13.1606		(27)
Ground Floor			47.3800	0.1100	5.2118		(28a)
External Wall	95.7900	14.9300	80.8600	0.1700	13.7462		(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118		(30)
Total net area of external elements Aum(A, m ²)			190.5500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.6104		(33)
Party Wall			48.5600	0.0000	0.0000		(32)

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

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	10.7900	0.0500	0.5395
E2 Other lintels (including other steel lintels)	8.7500	0.0500	0.4375
E3 Sill	24.9000	0.0500	1.2450
E4 Jamb	19.4700	0.1600	3.1152
E5 Ground floor (normal)	19.4700	0.0000	0.0000
E6 Intermediate floor within a dwelling			

Full SAP Calculation Printout



E10 Eaves (insulation at ceiling level)	9.8700	0.0600	0.5922	
E12 Gable (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	9.8700	0.0800	0.7896	
P2 Party wall - Intermediate floor within a dwelling	9.8700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.8700	0.1200	1.1844	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				9.9569 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 51.5673 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	42.6296	42.4678	42.3093	41.5644	41.4250	40.7762	40.7762	40.6561	41.0261	41.4250	41.7069	42.0017	(38)
Average = Sum(39)m / 12 =	94.1970	94.0352	93.8766	93.1317	92.9924	92.3436	92.3436	92.2234	92.5935	92.9924	93.2743	93.5690	(39)
												93.1311	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9941	0.9924	0.9907	0.9828	0.9813	0.9745	0.9745	0.9732	0.9771	0.9813	0.9843	0.9874	(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													2.6854 (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	29.9011	29.4571	28.8317	27.6787	26.8153	25.8580	25.3409	25.9618	26.6380	27.6623	28.8391	29.8001	(42b)
Hot water usage for other uses	42.1316	40.5995	39.0674	37.5354	36.0033	34.4713	34.4713	36.0033	37.5354	39.0674	40.5995	42.1316	(42c)
Average daily hot water use (litres/day)												66.0245	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	72.0327	70.0566	67.8992	65.2141	62.8186	60.3292	59.8121	61.9652	64.1733	66.7298	69.4386	71.9316	(44)
Energy content (annual)	114.0822	99.7596	104.3585	89.2748	84.5660	74.1818	72.3376	76.7258	79.1321	90.5517	98.9280	112.6275	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water 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	(46)
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	96.9698	84.7957	88.7047	75.8836	71.8811	63.0546	61.4869	65.2169	67.2623	76.9689	84.0888	95.7334	(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	96.9698	84.7957	88.7047	75.8836	71.8811	63.0546	61.4869	65.2169	67.2623	76.9689	84.0888	95.7334	(64)
12Total per year (kWh/year)													
Electric shower(s)	55.4543	49.4102	53.9541	51.4877	52.4538	50.0359	51.7037	52.4538	51.4877	53.9541	52.9395	55.4543	(64a)
Heat gains from water heating, kWh/month	38.1060	33.5515	35.6647	31.8428	31.0837	28.2726	28.2977	29.4177	29.6875	32.7307	34.2571	37.7969	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												630.7891	(64a)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.6156	155.6815	140.6156	145.3028	140.6156	145.3028	140.6156	140.6156	145.3028	140.6156	145.3028	140.6156	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	247.5678	250.1367	243.6630	229.8812	212.4841	196.1333	185.2099	182.6409	189.1147	202.8965	220.2936	236.6444	(68)
Pumps, fans	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	(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)	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	(71)
Total internal gains	51.2178	49.9278	47.9364	44.2261	41.7792	39.2675	38.0345	39.5399	41.2326	43.9929	47.5793	50.8023	(72)
	502.6827	519.0276	495.4965	482.6916	458.1604	443.9851	427.1415	426.0780	438.9316	450.7866	476.4572	491.3438	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	Gains W	
North				5.7200	10.6334	0.6300		0.7000		0.7700	18.5883 (74)	
East				1.4500	19.6403	0.6300		0.7000		0.7700	8.7034 (76)	
South				3.4800	46.7521	0.6300		0.7000		0.7700	49.7224 (78)	
Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181 (83)
Total gains	579.6967	653.0088	687.6284	737.7802	761.0564	752.6817	721.4004	683.1602	652.4760	601.1072	569.1783	556.9619 (84)

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.9438	27.9919	28.0392	28.2634	28.3058	28.5047	28.5047	28.5418	28.4277	28.3058	28.2202	28.1313
alpha	2.8629	2.8661	2.8693	2.8842	2.8871	2.9003	2.9003	2.9028	2.8952	2.8871	2.8813	2.8754
util living area	0.9630	0.9469	0.9249	0.8739	0.7881	0.6482	0.5111	0.5511	0.7354	0.8862	0.9454	0.9667 (86)
MIT	18.6913	18.9612	19.3482	19.8986	20.3943	20.7638	20.9139	20.8905	20.6359	20.0071	19.2686	18.6431 (87)
Th 2	20.0883	20.0897	20.0911	20.0977	20.0989	20.1046	20.1046	20.1057	20.1024	20.0989	20.0964	20.0938 (88)
util rest of house	0.9578	0.9395	0.9139	0.8542	0.7523	0.5857	0.4233	0.4644	0.6810	0.8645	0.9366	0.9620 (89)
MIT 2	17.9681	18.2348	18.6163	19.1550	19.6224	19.9501	20.0628	20.0495	19.8474	19.2677	18.5459	17.9243 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.1024	18.3697	18.7523	19.2931	19.7657	20.1012	20.2209	20.2057	19.9938	19.4050	18.6801	18.0578 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1024	18.3697	18.7523	19.2931	19.7657	20.1012	20.2209	20.2057	19.9938	19.4050	18.6801	18.0578 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9426	0.9214	0.8935	0.8333	0.7373	0.5855	0.4354	0.4747	0.6737	0.8442	0.9185	0.9478 (94)
Useful gains	546.4205	601.6764	614.4291	614.7635	561.1281	440.6723	314.0693	324.3033	439.5639	507.4613	522.8113	527.8873 (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	1300.1464	1266.6246	1150.1997	967.9277	750.0508	508.0017	334.3658	350.9754	545.7301	818.8018	1080.1251	1296.6618 (97)
Space heating kWh	560.7721	446.8452	398.6134	254.2783	140.5585	0.0000	0.0000	0.0000	0.0000	231.6373	401.2659	571.9683 (98a)
Space heating requirement - total per year (kWh/year)	3005.9388											
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	560.7721	446.8452	398.6134	254.2783	140.5585	0.0000	0.0000	0.0000	0.0000	231.6373	401.2659	571.9683 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3005.9388											
Space heating per m2	(98c) / (4) = 31.7216 (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	868.0297	683.3425	700.8981	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7186	0.7902	0.7623	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	623.7688	539.9794	534.3246	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	812.6281	779.2071	737.4111	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	135.9786	177.9854	151.0964	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	33.9947	44.4963	37.7741	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	116.2651 (107)											
Energy for space heating	31.7216 (99)											
Energy for space cooling	1.2269 (108)											
Total	32.9485 (109)											
Fabric Energy Efficiency (DFEE)	32.9 (109)											

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

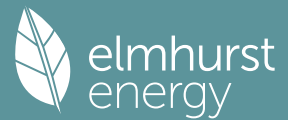
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	233.1096 (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) = 0.1287 (8)

Full SAP Calculation Printout



Pressure test		Yes
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3787	(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) =	0.3219 (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	0.4104	0.4024	0.3943	0.3541	0.3460	0.3058	0.3058	0.2977	0.3219	0.3460	0.3621	0.3782	(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	0.5842	0.5809	0.5777	0.5627	0.5599	0.5468	0.5468	0.5443	0.5518	0.5599	0.5656	0.5715	(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)			10.6500	1.1450	12.1947			(27)
Ground Floor			47.3800	0.1300	6.1594			(28a)
External Wall	95.7900	14.9300	80.8600	0.1800	14.5548			(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118			(30)
Total net area of external elements Aum(A, m2)			190.5500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.4007		(33)
Party Wall			48.5600	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)	10.7900	0.0500	0.5395	
E3 Sill	8.7500	0.0500	0.4375	
E4 Jamb	24.9000	0.0500	1.2450	
E5 Ground floor (normal)	19.4700	0.1600	3.1152	
E6 Intermediate floor within a dwelling	19.4700	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.8700	0.0600	0.5922	
E12 Gable (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	9.8700	0.0800	0.7896	
P2 Party wall - Intermediate floor within a dwelling	9.8700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.8700	0.1200	1.1844	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.9569	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			52.3576	(33) + (36) + (36a) = (37)

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

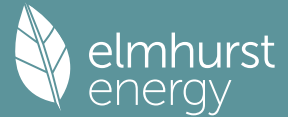
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.9417	44.6901	44.4435	43.2853	43.0686	42.0598	42.0598	41.8730	42.4484	43.0686	43.5070	43.9653	(38)
Heat transfer coeff	97.2992	97.0477	96.8011	95.6428	95.4261	94.4174	94.4174	94.2306	94.8059	95.4261	95.8645	96.3228	(39)
Average = Sum(39)m / 12 =												95.6418	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0268	1.0241	1.0215	1.0093	1.0070	0.9964	0.9964	0.9944	1.0005	1.0070	1.0117	1.0165	(40)
HLP (average)												1.0093	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6854 (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	0.0000 (42a)
Hot water usage for baths	29.9011	29.4571	28.8317	27.6787	26.8153	25.8580	25.3409	25.9618	26.6380	27.6623	28.8391	29.8001	(42b)
Hot water usage for other uses	42.1316	40.5995	39.0674	37.5354	36.0033	34.4713	34.4713	36.0033	37.5354	39.0674	40.5995	42.1316	(42c)
Average daily hot water use (litres/day)													66.0245 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.0327	70.0566	67.8992	65.2141	62.8186	60.3292	59.8121	61.9652	64.1733	66.7298	69.4386	71.9316	(44)
Energy content (annual)	114.0822	99.7596	104.3585	89.2748	84.5660	74.1818	72.3376	76.7258	79.1321	90.5517	98.9280	112.6275	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1096.5256	
	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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													(61)
	96.9698	84.7957	88.7047	75.8836	71.8811	63.0546	61.4869	65.2169	67.2623	76.9689	84.0888	95.7334	(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	96.9698	84.7957	88.7047	75.8836	71.8811	63.0546	61.4869	65.2169	67.2623	76.9689	84.0888	95.7334	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				932.0468	(64)
Electric shower(s)												932	(64)
	55.4543	49.4102	53.9541	51.4877	52.4538	50.0359	51.7037	52.4538	51.4877	53.9541	52.9395	55.4543	(64a)
Heat gains from water heating, kWh/month	38.1060	33.5515	35.6647	31.8428	31.0837	28.2726	28.2977	29.4177	29.6875	32.7307	34.2571	37.7969	(65)

Full SAP Calculation Printout



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	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	140.6156	155.6815	140.6156	145.3028	140.6156	145.3028	140.6156	140.6156	145.3028	140.6156	145.3028	140.6156 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.5678	250.1367	243.6630	229.8812	212.4841	196.1333	185.2099	182.6409	189.1147	202.8965	220.2936	236.6444 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272 (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)	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174 (71)
Water heating gains (Table 5)	51.2178	49.9278	47.9364	44.2261	41.7792	39.2675	38.0345	39.5399	41.2326	43.9929	47.5793	50.8023 (72)
Total internal gains	502.6827	519.0276	495.4965	482.6916	458.1604	443.9851	427.1415	426.0780	438.9316	450.7866	476.4572	491.3438 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b g		Specific data or Table 6c FF		Access factor Table 6d		Gains W	
North	5.7200		10.6334		0.6300		0.7000		0.7700		18.5883 (74)	
East	1.4500		19.6403		0.6300		0.7000		0.7700		8.7034 (76)	
South	3.4800		46.7521		0.6300		0.7000		0.7700		49.7224 (78)	
Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181 (83)
Total gains	579.6967	653.0088	687.6284	737.7802	761.0564	752.6817	721.4004	683.1602	652.4760	601.1072	569.1783	556.9619 (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	27.0529	27.1230	27.1921	27.5214	27.5839	27.8786	27.8786	27.9338	27.7643	27.5839	27.4577	27.3271
alpha	2.8035	2.8082	2.8128	2.8348	2.8389	2.8586	2.8586	2.8623	2.8510	2.8389	2.8305	2.8218
util living area	0.9635	0.9479	0.9266	0.8769	0.7934	0.6550	0.5186	0.5583	0.7413	0.8888	0.9464	0.9671 (86)
MIT	18.6029	18.8771	19.2738	19.8456	20.3577	20.7471	20.9061	20.8816	20.6131	19.9626	19.2056	18.5641 (87)
Th 2	20.0611	20.0633	20.0654	20.0756	20.0775	20.0863	20.0863	20.0880	20.0829	20.0775	20.0736	20.0696 (88)
util rest of house	0.9583	0.9405	0.9156	0.8572	0.7574	0.5916	0.4286	0.4697	0.6865	0.8672	0.9375	0.9624 (89)
MIT 2	17.8625	18.1340	18.5260	19.0883	19.5726	19.9211	20.0410	20.0274	19.8122	19.2100	18.4686	17.8300 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.0000	18.2720	18.6649	19.2290	19.7184	20.0745	20.2017	20.1861	19.9609	19.3498	18.6055	17.9663 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.0000	18.2720	18.6649	19.2290	19.7184	20.0745	20.2017	20.1861	19.9609	19.3498	18.6055	17.9663 (93)

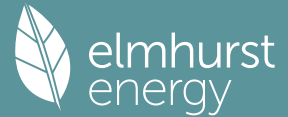
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9429	0.9221	0.8949	0.8357	0.7415	0.5907	0.4407	0.4799	0.6783	0.8463	0.9192	0.9479 (94)
Useful gains	546.5689	602.1334	615.3308	616.5569	564.3221	444.6393	317.9002	327.8643	442.5800	508.7020	523.1840	527.9706 (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	1333.0035	1297.7233	1177.5707	987.8917	765.1662	516.8895	340.0591	356.7634	555.6522	834.9565	1102.9668	1326.0115 (97)
Space heating kWh	585.1074	467.4364	418.3065	267.3610	149.4280	0.0000	0.0000	0.0000	0.0000	242.7333	417.4437	593.7424 (98a)
Space heating requirement - total per year (kWh/year)												3141.5588
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	585.1074	467.4364	418.3065	267.3610	149.4280	0.0000	0.0000	0.0000	0.0000	242.7333	417.4437	593.7424 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3141.5588
Space heating per m ²												(98c) / (4) = 33.1528 (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	887.5233	698.6885	716.1523	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7074	0.7798	0.7518	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	627.7908	544.8137	538.4196	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	812.6281	779.2071	737.4111	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	133.0828	174.3887	148.0497	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fC = cooled area / (4) =											
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	33.2707	43.5972	37.0124	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												113.8803 (107)
Energy for space heating												33.1528 (99)
Energy for space cooling												1.2018 (108)
Total												34.3546 (109)
Fabric Energy Efficiency (TFEE)												34.4 (109)

Full SAP Calculation Printout



Property Reference	OP-D320 A3LAUR				Issued on Date	29/11/2024		
Assessment Reference	A3LAUR			Prop Type Ref	A3LAUR			
Property	A3LAUR							
SAP Rating	82 B		DER	4.04		TER	10.38	
Environmental	96 A		% DER < TER				61.08	
CO ₂ Emissions (t/year)	0.36		DFEE	32.95		TFEE	34.35	
Compliance Check	See BREL		% DFEE < TFEE				4.09	
% DPER < TPER	21.07		DPER	42.76		TPER	54.18	
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	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 233.1096 (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													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)			10.6500	1.2357	13.1606		(27)
Ground Floor			47.3800	0.1100	5.2118		(28a)
External Wall	95.7900	14.9300	80.8600	0.1700	13.7462		(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118		(30)
Total net area of external elements Aum(A, m ²)			190.5500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		41.6104		(33)
Party Wall			48.5600	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)				10.7900	0.0500		0.5395
E3 Sill				8.7500	0.0500		0.4375

Full SAP Calculation Printout



E4 Jamb									24.9000	0.0500	1.2450	
E5 Ground floor (normal)									19.4700	0.1600	3.1152	
E6 Intermediate floor within a dwelling									19.4700	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)									9.8700	0.0600	0.5922	
E12 Gable (insulation at ceiling level)									9.6000	0.0600	0.5760	
E16 Corner (normal)									9.8500	0.0900	0.8865	
E18 Party wall between dwellings									9.8500	0.0600	0.5910	
P1 Party wall - Ground floor									9.8700	0.0800	0.7896	
P2 Party wall - Intermediate floor within a dwelling									9.8700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)									9.8700	0.1200	1.1844	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												9.9569 (36)
Point Thermal bridges												0.0000
Total fabric heat loss												(33) + (36) + (36a) = 51.5673 (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	25.3592	25.0731	24.7871	23.3567	23.0706	21.6403	21.6403	21.3542	22.2124	23.0706	23.6428	24.2149 (38)
Average = Sum(39)m / 12 =	76.9265	76.6405	76.3544	74.9241	74.6380	73.2076	73.2076	72.9216	73.7798	74.6380	75.2101	75.7823 (39)
	76.9265	76.6405	76.3544	74.9241	74.6380	73.2076	73.2076	72.9216	73.7798	74.6380	75.2101	75.7823 (39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8118	0.8088	0.8058	0.7907	0.7877	0.7726	0.7726	0.7695	0.7786	0.7877	0.7937	0.7997 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.6854 (42)
Hot water usage for mixer showers												
	95.2128	93.7820	91.6969	87.7076	84.7635	81.4803	79.6142	81.6834	83.9517	87.4769	91.5519	94.8480 (42a)
Hot water usage for baths												
	31.4749	31.0074	30.3492	29.1355	28.2266	27.2189	26.6746	27.3282	28.0400	29.1183	30.3570	31.3685 (42b)
Hot water usage for other uses												
	44.3490	42.7363	41.1236	39.5109	37.8982	36.2855	36.2855	37.8982	39.5109	41.1236	42.7363	44.3490 (42c)
Average daily hot water use (litres/day)												157.2825 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	171.0367	167.5257	163.1697	156.3540	150.8884	144.9848	142.5743	146.9099	151.5026	157.7188	164.6452	170.5655 (44)
Energy content (annual)	270.8804	238.5544	250.7858	214.0407	203.1248	178.2757	172.4313	181.9052	186.8179	214.0229	234.5673	267.0644 (45)
Distribution loss (46)m = 0.15 x (45)m												
	40.6321	35.7832	37.6179	32.1061	30.4687	26.7414	25.8647	27.2858	28.0227	32.1034	35.1851	40.0597 (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												
	369.2620	327.4152	349.1674	309.2487	301.5064	242.9077	239.2177	248.6916	251.4499	312.4045	329.7753	365.4460 (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	369.2620	327.4152	349.1674	309.2487	301.5064	242.9077	239.2177	248.6916	251.4499	312.4045	329.7753	365.4460 (64)
12Total per year (kWh/year)												3646.4923 (64)
Electric shower(s)												3646 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	133.9538	118.9584	127.2724	113.6389	111.4251	77.2863	75.9433	79.0934	80.1265	115.0487	120.4640	132.6850 (65)

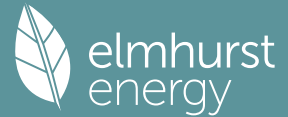
5. Internal gains (see Table 5 and 5a)												

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	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	140.6156	155.6815	140.6156	145.3028	140.6156	145.3028	140.6156	140.6156	145.3028	140.6156	145.3028	140.6156 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	247.5678	250.1367	243.6630	229.8812	212.4841	196.1333	185.2099	182.6409	189.1147	202.8965	220.2936	236.6444 (68)
Pumps, fans	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272 (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)	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174 (71)
Total internal gains	180.0454	177.0214	171.0650	157.8319	149.7649	107.3420	102.0743	106.3083	111.2869	154.6353	167.3112	178.3400 (72)
	631.5103	646.1212	618.6251	596.2973	566.1461	512.0596	491.1814	492.8464	508.9859	561.4290	596.1891	618.8816 (73)

6. Solar gains												

[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	5.7200											18.5883 (74)
East	1.4500											8.7034 (76)
South	3.4800											49.7224 (78)

Full SAP Calculation Printout



Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181 (83)
Total gains	708.5243	780.1025	810.7570	851.3860	869.0421	820.7562	785.4402	749.9286	722.5302	711.7495	688.9102	684.4996 (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	34.2173	34.3451	34.4737	35.1319	35.2665	35.9556	35.9556	36.0966	35.6767	35.2665	34.9982	34.7340
alpha	3.2812	3.2897	3.2982	3.3421	3.3511	3.3970	3.3970	3.4064	3.3784	3.3511	3.3332	3.3156
util living area	0.9310	0.9054	0.8702	0.7933	0.6774	0.5310	0.3982	0.4309	0.6233	0.8024	0.8984	0.9366 (86)
Living	19.4763	19.7123	20.0186	20.4317	20.7405	20.9190	20.9768	20.9695	20.8549	20.4951	19.9529	19.4519
Non living	18.4521	18.7482	19.1309	19.6433	20.0054	20.2092	20.2623	20.2593	20.1426	19.7288	19.0623	18.4288
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	20.2205	19.7123	20.0186	20.4317	20.7405	20.9190	20.9768	20.9695	20.8549	20.4951	19.9529	19.6685 (87)
Th 2	20.2431	20.2457	20.2483	20.2614	20.2640	20.2772	20.2772	20.2798	20.2719	20.2640	20.2588	20.2536 (88)
util rest of house	0.9229	0.8947	0.8552	0.7696	0.6413	0.4803	0.3368	0.3687	0.5738	0.7753	0.8853	0.9291 (89)
MIT 2	19.5291	18.7482	19.1309	19.6433	20.0054	20.2092	20.2623	20.2593	20.1426	19.7288	19.0623	18.7577 (90)
Living area fraction	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	0.1857 (91)
MIT	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	18.9268 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6575	18.9273	19.2958	19.7897	20.1419	20.3410	20.3950	20.3912	20.2749	19.8711	19.2277	18.9268 (93)

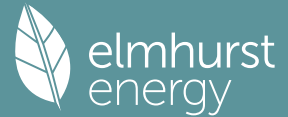
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9158	0.8722	0.8332	0.7530	0.6349	0.4849	0.3469	0.3785	0.5740	0.7592	0.8635	0.9130 (94)
Useful gains	648.8540	680.3852	675.5305	641.1360	551.7729	398.0013	272.5055	283.8467	414.7206	540.3655	594.8978	624.9409 (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	1181.4014	1075.0587	977.0146	815.8999	630.0866	420.2859	277.8200	291.0436	455.5838	691.9784	912.1279	1116.0318 (97)
Space heating kWh	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98a)
Space heating requirement - total per year (kWh/year)												1776.4127
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	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1776.4127
Space heating per m2										(98c) / (4) =		18.7464 (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 %)												253.6685 (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	396.2153	265.2206	224.3042	125.8301	58.2654	0.0000	0.0000	0.0000	0.0000	112.8000	228.4057	365.3716 (98)
Space heating efficiency (main heating system 1)	253.6685	253.6685	253.6685	253.6685	253.6685	0.0000	0.0000	0.0000	0.0000	253.6685	253.6685	253.6685 (210)
Space heating fuel (main heating system)	156.1941	104.5540	88.4241	49.6041	22.9691	0.0000	0.0000	0.0000	0.0000	44.4675	90.0410	144.0351 (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	369.2620	327.4152	349.1674	309.2487	301.5064	242.9077	239.2177	248.6916	251.4499	312.4045	329.7753	365.4460 (64)
Efficiency of water heater (217)m	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667	269.2667 (216)
Fuel for water heating, kWh/month	137.1361	121.5951	129.6734	114.8485	111.9731	90.2108	88.8404	92.3588	93.3832	116.0205	122.4716	135.7190 (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	29.4196	26.5725	29.4196	28.4705	29.4196	28.4705	29.4196	29.4196	28.4705	29.4196	28.4705	29.4196 (231)
Lighting	29.2171	23.4391	21.1043	15.4619	11.9432	9.7577	10.8950	14.1617	18.3947	24.1348	27.2602	30.0292 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												700.2890 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.2667
Water heating fuel used												1354.2306 (219)

Full SAP Calculation Printout



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)	346.3915 (230a)
Total electricity for the above, kWh/year	346.3915 (231)
Electricity for lighting (calculated in Appendix L)	235.7990 (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	2636.7102 (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	700.2890	0.1556	108.9640 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1354.2306	0.1415	191.6699 (264)
Space and water heating			300.6339 (265)
Pumps, fans and electric keep-hot	346.3915	0.1387	48.0488 (267)
Energy for lighting	235.7990	0.1443	34.0331 (268)
Total CO2, kg/year			382.7158 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0400 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	700.2890	1.5760	1103.6711 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1354.2306	1.5234	2063.0162 (278)
Space and water heating			3166.6873 (279)
Pumps, fans and electric keep-hot	346.3915	1.5128	524.0211 (281)
Energy for lighting	235.7990	1.5338	361.6764 (282)
Total Primary energy kWh/year			4052.3848 (286)
Dwelling Primary energy Rate (DPER)			42.7600 (287)

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

1. Overall dwelling characteristics

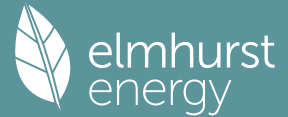
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.3800 (1b)	x 2.3100 (2b)	= 109.4478 (1b) - (3b)
First floor	47.3800 (1c)	x 2.6100 (2c)	= 123.6618 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	233.1096 (5)

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) = 0.1287 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3787 (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) = 0.3219 (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	0.4104	0.4024	0.3943	0.3541	0.3460	0.3058	0.3058	0.2977	0.3219	0.3460	0.3621	0.3782 (22b)
Effective ac	0.5842	0.5809	0.5777	0.5627	0.5599	0.5468	0.5468	0.5443	0.5518	0.5599	0.5656	0.5715 (25)

Full SAP Calculation Printout



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	
TER Opaque door			4.2800	1.0000	4.2800			(26)
TER Opening Type (Uw = 1.20)			10.6500	1.1450	12.1947			(27)
Ground Floor			47.3800	0.1300	6.1594			(28a)
External Wall	95.7900	14.9300	80.8600	0.1800	14.5548			(29a)
Roof - ceiling	47.3800		47.3800	0.1100	5.2118			(30)
Total net area of external elements Aum(A, m ²)			190.5500					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Party Wall			48.5600	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)	10.7900	0.0500	0.5395	
E3 Sill	8.7500	0.0500	0.4375	
E4 Jamb	24.9000	0.0500	1.2450	
E5 Ground floor (normal)	19.4700	0.1600	3.1152	
E6 Intermediate floor within a dwelling	19.4700	0.0000	0.0000	
E10 Baves (insulation at ceiling level)	9.8700	0.0600	0.5922	
E12 Gable (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	9.8700	0.0800	0.7896	
P2 Party wall - Intermediate floor within a dwelling	9.8700	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.8700	0.1200	1.1844	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				9.9569 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 52.3576 (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	44.9417	44.6901	44.4435	43.2853	43.0686	42.0598	42.0598	41.8730	42.4484	43.0686	43.5070	43.9653	(38)
Average = Sum(39)m / 12 =	97.2992	97.0477	96.8011	95.6428	95.4261	94.4174	94.4174	94.2306	94.8059	95.4261	95.8645	96.3228	(39)
												95.6418	
HLP	1.0268	1.0241	1.0215	1.0093	1.0070	0.9964	0.9964	0.9944	1.0005	1.0070	1.0117	1.0165	(40)
HLP (average)												1.0093	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

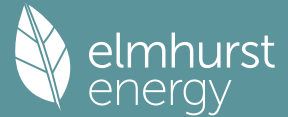
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6854 (42)
Hot water usage for mixer showers													
69.2457	68.2051	66.6887	63.7873	61.6462	59.2584	57.9012	59.4061	61.0558	63.6196	66.5832	68.9804	68.9804	(42a)
Hot water usage for baths													
29.9011	29.4571	28.8317	27.6787	26.8153	25.8580	25.3409	25.9618	26.6380	27.6623	28.8391	29.8001	29.8001	(42b)
Hot water usage for other uses													
42.1316	40.5995	39.0674	37.5354	36.0033	34.4713	34.4713	36.0033	37.5354	39.0674	40.5995	42.1316	42.1316	(42c)
Average daily hot water use (litres/day)													129.8667 (43)
Daily hot water use													
141.2784	138.2616	134.5878	129.0014	124.4648	119.5877	117.7133	121.3713	125.2292	130.3493	136.0218	140.9120	140.9120	(44)
Energy conte	223.7504	196.8827	206.8565	176.5965	167.5536	147.0470	142.3641	150.2830	154.4201	176.8828	193.7881	220.6341	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													2157.0589
33.5626	29.5324	31.0285	26.4895	25.1330	22.0570	21.3546	22.5425	23.1630	26.5324	29.0682	33.0951	33.0951	(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	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	30.0872	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
277.1001	245.0695	260.2061	228.2251	220.9032	198.6756	195.7137	203.6326	206.0487	230.2324	245.4167	273.9838	273.9838	(62)
WWHRS	-31.6562	-27.9970	-29.3169	-24.2755	-22.6239	-19.3595	-18.1464	-19.2969	-20.0300	-23.6132	-26.7509	-31.0700	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													
245.4438	217.0724	230.8892	203.9496	198.2793	179.3162	177.5673	184.3357	186.0187	206.6192	218.6658	242.9137	242.9137	(64)
12Total per year (kWh/year)													2491.0711 (64)
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
117.0767	104.0129	111.4595	100.0213	98.3913	90.1961	90.0158	92.6488	92.6476	101.4932	105.7375	116.0406	116.0406	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	134.2718	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
140.6156	155.6815	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	145.3028	140.6156	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
247.5678	250.1367	243.6630	229.8812	212.4841	196.1333	185.2099	182.6409	189.1147	202.8965	220.2936	236.6444	236.6444	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	36.4272	(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)													

Full SAP Calculation Printout



Water heating gains (Table 5)	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	-107.4174	(71)
Total internal gains	157.3612	154.7811	149.8111	138.9184	132.2463	125.2723	120.9889	124.5280	128.6772	136.4156	146.8576	155.9685	(72)
	611.8261	626.8809	600.3712	580.3839	551.6275	529.9899	510.0959	511.0660	526.3762	546.2093	578.7355	599.5100	(73)

6. Solar gains

[Jan]	Area m2			Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF	Access factor Table 6d	Gains W	
North	5.7200			10.6334		0.6300		0.7000			0.7700	18.5883	(74)
East	1.4500			19.6403		0.6300		0.7000			0.7700	8.7034	(76)
South	3.4800			46.7521		0.6300		0.7000			0.7700	49.7224	(78)
Solar gains	77.0140	133.9813	192.1318	255.0886	302.8960	308.6966	294.2589	257.0823	213.5444	150.3206	92.7211	65.6181	(83)
Total gains	688.8401	760.8622	792.5031	835.4725	854.5235	838.6865	804.3548	768.1483	739.9206	696.5299	671.4566	665.1281	(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	27.0529	27.1230	27.1921	27.5214	27.5839	27.8786	27.8786	27.9338	27.7643	27.5839	27.4577	27.3271	
alpha	2.8035	2.8082	2.8128	2.8348	2.8389	2.8586	2.8586	2.8623	2.8510	2.8389	2.8305	2.8218	
util living area	0.9460	0.9273	0.9017	0.8452	0.7533	0.6106	0.4755	0.5106	0.6932	0.8532	0.9231	0.9504	(86)
MIT	18.8122	19.0718	19.4481	19.9794	20.4482	20.7905	20.9251	20.9062	20.6794	20.0984	19.3891	18.7751	(87)
Th 2	20.0611	20.0633	20.0654	20.0756	20.0775	20.0863	20.0863	20.0880	20.0829	20.0775	20.0736	20.0696	(88)
util rest of house	0.9387	0.9176	0.8879	0.8223	0.7144	0.5471	0.3898	0.4256	0.6357	0.8270	0.9113	0.9437	(89)
MIT 2	17.5026	17.8301	18.3039	18.9671	19.5285	19.9137	20.0408	20.0278	19.8009	19.1235	18.2410	17.4611	(90)
Living area fraction									fLA = Living area / (4) =			0.1857	(91)
MIT	17.7458	18.0608	18.5164	19.1551	19.6993	20.0766	20.2050	20.1910	19.9640	19.3046	18.4543	17.7052	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.7458	18.0608	18.5164	19.1551	19.6993	20.0766	20.2050	20.1910	19.9640	19.3046	18.4543	17.7052	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9141	0.8904	0.8591	0.7953	0.6965	0.5464	0.4015	0.4357	0.6275	0.8007	0.8842	0.9202	(94)
Useful gains	629.6804	677.4359	680.8252	664.4322	595.1560	458.2173	322.9438	334.6956	464.2704	557.6950	593.6937	612.0766	(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	1308.2697	1277.2214	1163.2008	980.8291	763.3415	517.0843	340.3775	357.2236	555.9453	830.6452	1088.4704	1300.8548	(97)
Space heating kWh	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98a)
Space heating requirement - total per year (kWh/year)												2691.5145	
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	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2691.5145	
Space heating per m2										(98c) / (4) =		28.4035	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	504.8704	403.0558	358.8874	227.8057	125.1300	0.0000	0.0000	0.0000	0.0000	203.0749	356.2392	512.4510	(98)	
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating fuel (main heating system)	546.9885	436.6802	388.8271	246.8101	135.5688	0.0000	0.0000	0.0000	0.0000	220.0162	385.9579	555.2015	(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	245.4438	217.0724	230.8892	203.9496	198.2793	179.3162	177.5673	184.3357	186.0187	206.6192	218.6658	242.9137	(64)	
Efficiency of water heater (217)m	85.6404	85.4274	85.0450	84.3085	83.0570	79.8000	79.8000	79.8000	79.8000	84.0210	85.1475	85.6920	(216)	
Fuel for water heating, kWh/month	286.5981	254.1016	271.4905	241.9088	238.7268	224.7070	222.5154	230.9972	233.1061	245.9138	256.8084	283.4729	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	29.2171	23.4391	21.1043	15.4619	11.9432	9.7577	10.8950	14.1617	18.3947	24.1348	27.2602	30.0292	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-43.6508	-61.1768	-87.3958	-97.6087	-104.6651	-97.4491	-96.2327	-91.1478	-82.0670	-69.6584	-47.8578	-37.7804	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	

Full SAP Calculation Printout



Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-25.7228	-54.0061	-107.1650	-160.7085	-212.2761	-213.2373	-210.7370	-178.5288	-130.9812	-77.1569	-34.3160	-20.3492	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													2916.0504	(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													2990.3467	(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)													235.7990	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2341.8752	(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													3886.3209	(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	2916.0504	0.2100	612.3706	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2990.3467	0.2100	627.9728	(264)
Space and water heating			1240.3434	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	235.7990	0.1443	34.0331	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-916.6904	0.1347	-123.5035	
PV Unit electricity exported	-1425.1848	0.1259	-179.4866	
Total			-302.9901	(269)
Total CO2, kg/year			983.3156	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3800	(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	2916.0504	1.1300	3295.1369	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2990.3467	1.1300	3379.0917	(278)
Space and water heating			6674.2286	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	235.7990	1.5338	361.6764	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-916.6904	1.4979	-1373.1458	
PV Unit electricity exported	-1425.1848	0.4623	-658.8418	
Total			-2031.9876	(283)
Total Primary energy kWh/year			5134.0183	(286)
Target Primary Energy Rate (TPER)			54.1800	(287)