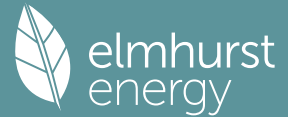


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Property Reference	OP-D320 S2JAY				Issued on Date	29/11/2024
Assessment Reference	S2AY	Prop Type Ref	S2JAY			
Property	S2JAY					
SAP Rating	82 B	DER	4.57	TER	11.76	
Environmental	96 A	% DER < TER				61.14
CO ₂ Emissions (t/year)	0.31	DFEE	34.18	TFEE	35.44	
Compliance Check	See BREL	% DFEE < TFEE				3.54
% DPER < TPER	21.27	DPER	48.38	TPER	61.45	
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	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.5972 (5)

2. Ventilation rate

	m ³ per hour											
Number of open chimneys	0 * 80 = 0.0000 (6a)											
Number of open flues	0 * 20 = 0.0000 (6b)											
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)											
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)											
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)											
Number of blocked chimneys	0 * 20 = 0.0000 (6f)											
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)											
Number of passive vents	0 * 10 = 0.0000 (7b)											
Number of flueless gas fires	0 * 40 = 0.0000 (7c)											
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)											
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	3.5000 (17)											
Infiltration rate	0.1750 (18)											
Number of sides sheltered	2 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)											
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1487 (21)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation	0.5000 (23a)											
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)											
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	72.0000 (23c)											
Effective ac	0.3297	0.3259	0.3222	0.3036	0.2999	0.2813	0.2813	0.2776	0.2888	0.2999	0.3073	0.3148 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			12.5200	1.2357	15.4715		(27)
Ground Floor			36.9100	0.1100	4.0601		(28a)
External Wall	84.7200	14.6600	70.0600	0.1700	11.9102		(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601		(30)
Total net area of external elements Aum(A, m ²)			158.5400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.6419		(33)
Party Wall			39.6600	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)				9.6400	0.0500	0.4820	
E3 Sill				6.8100	0.0500	0.3405	

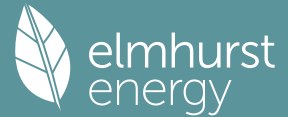
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	19.7553	19.5325	19.3096	18.1954	17.9725	16.8582	16.8582	16.6354	17.3039	17.9725	18.4182	18.8639 (38)
Heat transfer coeff	66.1476	65.9248	65.7019	64.5876	64.3648	63.2505	63.2505	63.0277	63.6962	64.3648	64.8105	65.2562 (39)
Average = Sum(39)m / 12 =												64.5319
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8961	0.8930	0.8900	0.8749	0.8719	0.8568	0.8568	0.8538	0.8629	0.8719	0.8780	0.8840 (40)
HLP (average)												0.8742
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.3352 (42)
Hot water usage for mixer showers	87.1379	85.8284	83.9202	80.2692	77.5748	74.5701	72.8622	74.7559	76.8319	80.0580	83.7875	86.8041 (42a)
Hot water usage for baths	28.8165	28.3886	27.7859	26.6747	25.8426	24.9200	24.4217	25.0201	25.6717	26.6589	27.7930	28.7191 (42b)
Hot water usage for other uses	40.5733	39.0979	37.6225	36.1471	34.6717	33.1963	33.1963	34.6717	36.1471	37.6225	39.0979	40.5733 (42c)
Average daily hot water use (litres/day)												143.9405 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	156.5277	153.3149	149.3286	143.0910	138.0891	132.6864	130.4801	134.4478	138.6507	144.3395	150.6784	156.0965 (44)
Energy content (annual)	247.9017	218.3183	229.5125	195.8844	185.8945	163.1534	157.8044	166.4744	170.9702	195.8673	214.6690	244.4093 (45)
Distribution loss (46)m = 0.15 x (45)m	37.1852	32.7477	34.4269	29.3827	27.8842	24.4730	23.6707	24.9712	25.6455	29.3801	32.2004	36.6614 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (64)
12Total per year (kWh/year)												3424.8810 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	126.3134	112.2299	120.1990	107.6020	105.6960	72.2581	71.0799	73.9627	74.8572	109.0120	113.8479	125.1522 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	118.7197	107.2307	110.8050	107.2307	110.8050	107.2307	107.2307	110.8050	107.2307	110.8050	107.2307 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	208.1818	202.7939	191.3236	176.8445	163.2362	154.1450	152.0069	157.3948	168.8651	183.3442	196.9525 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759 (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)	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	169.7761	167.0088	161.5578	149.4472	142.0645	100.3585	95.5375	99.4122	103.9683	146.5215	158.1220	168.2153 (72)
Total internal gains	541.0782	551.9379	529.6100	509.6036	484.1675	432.4275	414.9409	416.6775	430.1959	480.6449	510.2990	530.4262 (73)

[Jan]	Area m ²	Solar flux Table 6a W/m ²	G Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.8900	10.6334	0.6300	0.7000	0.7700	15.8910 (74)
East	1.6600	19.6403	0.6300	0.7000	0.7700	9.9639 (76)
South	5.9700	46.7521	0.6300	0.7000	0.7700	85.2996 (78)

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Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480 (83)
Total gains	652.2326	741.4967	791.2647	840.4314	862.7835	812.3893	779.5256	744.6299	715.4647	690.6012	643.4355	625.5743 (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	30.9997	31.1045	31.2100	31.7484	31.8583	32.4196	32.4196	32.5342	32.1927	31.8583	31.6393	31.4232	
alpha	3.0666	3.0736	3.0807	3.1166	3.1239	3.1613	3.1613	3.1689	3.1462	3.1239	3.1093	3.0949	
util living area	0.9078	0.8697	0.8200	0.7289	0.6067	0.4690	0.3480	0.3772	0.5553	0.7456	0.8660	0.9159 (86)	
Living	19.4474	19.7369	20.0775	20.4842	20.7703	20.9269	20.9785	20.9720	20.8706	20.5277	19.9520	19.4075	
Non living	18.3649	18.7239	19.1435	19.6401	19.9688	20.1452	20.1912	20.1890	20.0880	19.7027	19.0058	18.3225	
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	20.2058	19.7369	20.0775	20.4842	20.7703	20.9269	20.9785	20.9720	20.8706	20.5277	19.9520	19.6303 (87)	
Th 2	20.1708	20.1734	20.1760	20.1889	20.1914	20.2044	20.2044	20.2069	20.1992	20.1914	20.1863	20.1811 (88)	
util rest of house	0.8972	0.8555	0.8006	0.7009	0.5677	0.4179	0.2882	0.3161	0.5035	0.7135	0.8493	0.9061 (89)	
MIT 2	19.4509	18.7239	19.1435	19.6401	19.9688	20.1452	20.1912	20.1890	20.0880	19.7027	19.0058	18.6574 (90)	
Living area fraction	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	fLA = Living area / (4) =				0.2005 (91)
MIT	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	20.2449	19.8681	19.1955	18.8525 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	20.2449	19.8681	19.1955	18.8525 (93)	

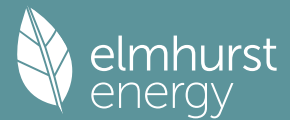
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8890	0.8306	0.7783	0.6868	0.5646	0.4243	0.2992	0.3270	0.5066	0.6995	0.8255	0.8871 (94)
Useful gains	579.8457	615.8716	615.8439	577.2005	487.0909	344.7148	233.2696	243.5265	362.4571	483.0840	531.1658	554.9647 (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	1012.2056	924.7269	843.0075	704.6078	542.5615	360.6493	237.1301	248.7081	391.4074	596.5372	783.9128	956.1653 (97)
Space heating kWh	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98a)
Space heating requirement - total per year (kWh/year)												1396.1200
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	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1396.1200
Space heating per m2										(98c) / (4) =		18.9125 (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 %)												237.0522 (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	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98)
Space heating efficiency (main heating system 1)	237.0522	237.0522	237.0522	237.0522	237.0522	0.0000	0.0000	0.0000	0.0000	237.0522	237.0522	237.0522 (210)
Space heating fuel (main heating system)	135.6983	87.5549	71.2964	38.6975	17.4097	0.0000	0.0000	0.0000	0.0000	35.6079	76.7670	125.9188 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (64)
Efficiency of water heater (217)m	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562 (216)
Fuel for water heating, kWh/month	129.0387	114.4670	122.1862	108.4724	105.9324	84.8817	83.6913	86.9221	87.7946	109.6487	115.4723	127.7373 (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	22.9184	20.7005	22.9184	22.1791	22.9184	22.1791	22.9184	22.9184	22.1791	22.9184	22.1791	22.9184 (231)
Lighting	23.4370	18.8020	16.9292	12.4030	9.5805	7.8273	8.7396	11.3601	14.7556	19.3602	21.8673	24.0884 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												588.9505 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												268.3562
Water heating fuel used												1276.2446 (219)

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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)	269.8462 (230a)
Total electricity for the above, kWh/year	269.8462 (231)
Electricity for lighting (calculated in Appendix L)	189.1502 (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	2324.1915 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	588.9505	0.1559	91.8270 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1276.2446	0.1415	180.6286 (264)
Space and water heating			272.4556 (265)
Pumps, fans and electric keep-hot	269.8462	0.1387	37.4310 (267)
Energy for lighting	189.1502	0.1443	27.3002 (268)
Total CO2, kg/year			337.1869 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.5700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	588.9505	1.5772	928.8829 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1276.2446	1.5234	1944.2007 (278)
Space and water heating			2873.0836 (279)
Pumps, fans and electric keep-hot	269.8462	1.5128	408.2233 (281)
Energy for lighting	189.1502	1.5338	290.1248 (282)
Total Primary energy kWh/year			3571.4317 (286)
Dwelling Primary energy Rate (DPER)			48.3800 (287)

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

1. Overall dwelling characteristics

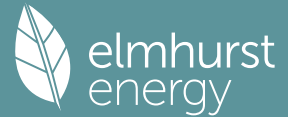
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	181.5972 (5)

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) = 0.1652 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4152 (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) = 0.3529 (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	0.4500	0.4412	0.4323	0.3882	0.3794	0.3353	0.3353	0.3265	0.3529	0.3794	0.3970	0.4147 (22b)
Effective ac	0.6012	0.5973	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5788	0.5860 (25)

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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			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			12.5200	1.1450	14.3359			(27)
Ground Floor			36.9100	0.1300	4.7983			(28a)
External Wall	84.7200	14.6600	70.0600	0.1800	12.6108			(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601			(30)
Total net area of external elements Aum(A, m2)			158.5400					(31)
Fabric heat loss, W/K = Sum (A x U)					37.9451			(33)
Party Wall			39.6600	0.0000	0.0000			(32)

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

100.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	9.6400	0.0500	0.4820	
E2 Other lintels (including other steel lintels)	6.8100	0.0500	0.3405	
E3 Sill	21.0000	0.0500	1.0500	
E4 Jamb	17.2200	0.1600	2.7552	
E5 Ground floor (normal)	17.2200	0.0000	0.0000	
E6 Intermediate floor within a dwelling	9.1600	0.0600	0.5496	
E10 Eaves (insulation at ceiling level)	8.0600	0.0600	0.4836	
E12 Gable (insulation at ceiling level)	9.8500	0.0900	0.8865	
E16 Corner (normal)	9.8500	0.0600	0.5910	
E18 Party wall between dwellings	8.0600	0.0800	0.6448	
P1 Party wall - Ground floor	8.0600	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	8.0600	0.1200	0.9672	
P4 Party wall - Roof (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.7504 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 46.6955 (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	36.0304	35.7949	35.5639	34.4793	34.2764	33.3317	33.3317	33.1568	33.6956	34.2764	34.6869	35.1161	(38)
Heat transfer coeff	82.7259	82.4903	82.2594	81.1748	80.9719	80.0272	80.0272	79.8522	80.3911	80.9719	81.3824	81.8116	(39)
Average = Sum(39)m / 12 =												81.1738	
HLP	1.1206	1.1175	1.1143	1.0996	1.0969	1.0841	1.0841	1.0817	1.0890	1.0969	1.1024	1.1083	(40)
HLP (average)												1.0996	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

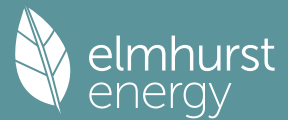
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3352 (42)
Hot water usage for mixer showers	63.3730	62.4207	61.0329	58.3776	56.4180	54.2328	52.9907	54.3680	55.8777	58.2240	60.9364	63.1302	(42a)
Hot water usage for baths	27.3757	26.9691	26.3966	25.3410	24.5505	23.6740	23.2006	23.7691	24.3881	25.3260	26.4034	27.2832	(42b)
Hot water usage for other uses	38.5446	37.1430	35.7414	34.3398	32.9381	31.5365	31.5365	32.9381	34.3398	35.7414	37.1430	38.5446	(42c)
Average daily hot water use (litres/day)												118.8500	(43)
Daily hot water use	129.2934	126.5328	123.1708	118.0583	113.9067	109.4433	107.7277	111.0752	114.6056	119.2914	124.4827	128.9580	(44)
Energy conte	204.7691	180.1810	189.3090	161.6159	153.3403	134.5733	130.2874	137.5343	141.3202	161.8773	177.3485	201.9171	(45)
Energy content (annual)										Total = Sum(45)m =		1974.0731	
Distribution loss (46)m = 0.15 x (45)m	30.7154	27.0272	28.3963	24.2424	23.0010	20.1860	19.5431	20.6301	21.1980	24.2816	26.6023	30.2876	(46)
Water storage loss:													
Store volume												230.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7973	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9706	(55)
Total storage loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(56)
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	258.1187	228.3678	242.6586	213.2445	206.6899	186.2020	183.6370	190.8839	192.9488	215.2269	228.9772	255.2667	(62)
WWHRS	-28.9715	-25.6226	-26.8305	-22.2168	-20.7052	-17.7176	-16.6074	-17.6603	-18.3313	-21.6106	-24.4822	-28.4350	(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	229.1472	202.7451	215.8281	191.0278	185.9847	168.4844	167.0296	173.2236	174.6175	193.6163	204.4950	226.8317	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2333.0308	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	110.7654	98.4596	105.6249	95.0402	93.6653	86.0486	86.0002	88.4098	88.2919	96.5039	100.2713	109.8171	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	118.7197	107.2307	110.8050	107.2307	110.8050	107.2307	107.2307	110.8050	107.2307	110.8050	107.2307	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	208.1818	202.7939	191.3236	176.8445	163.2362	154.1450	152.0069	157.3948	168.8651	183.3442	196.9525	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	(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)													

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	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	148.8782	146.5172	141.9690	132.0003	125.8943	119.5119	115.5917	118.8304	122.6276	129.7095	139.2657	147.6037 (72)
Total internal gains	523.1803	534.4464	513.0213	495.1567	470.9972	451.5808	434.9952	436.0958	448.8552	466.8330	494.4426	512.8146 (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	4.8900		10.6334		0.6300		0.7000		0.7700		15.8910		(74)	
East	1.6600		19.6403		0.6300		0.7000		0.7700		9.9639		(76)	
South	5.9700		46.7521		0.6300		0.7000		0.7700		85.2996		(78)	
Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480	(83)	
Total gains	634.3348	724.0052	774.6760	825.9845	849.6132	831.5427	799.5798	764.0481	734.1240	676.7893	627.5792	607.9626	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	24.7873	24.8581	24.9279	25.2610	25.3243	25.6232	25.6232	25.6794	25.5073	25.3243	25.1966	25.0644		
alpha	2.6525	2.6572	2.6619	2.6841	2.6883	2.7082	2.7082	2.7120	2.7005	2.6883	2.6798	2.6710		
util living area	0.9271	0.8982	0.8601	0.7882	0.6836	0.5396	0.4123	0.4441	0.6214	0.8029	0.8963	0.9335	(86)	
MIT	18.7858	19.1063	19.5274	20.0689	20.5152	20.8206	20.9365	20.9207	20.7219	20.1593	19.4027	18.7384	(87)	
Th 2	19.9840	19.9866	19.9892	20.0011	20.0034	20.0139	20.0139	20.0158	20.0098	20.0034	19.9988	19.9941	(88)	
util rest of house	0.9174	0.8850	0.8415	0.7595	0.6391	0.4742	0.3292	0.3606	0.5590	0.7703	0.8807	0.9246	(89)	
MIT 2	17.4215	17.8220	18.3463	19.0132	19.5363	19.8725	19.9776	19.9679	19.7756	19.1363	18.2075	17.3684	(90)	
Living area fraction										fLA = Living area / (4) =		0.2005	(91)	
MIT	17.6950	18.0795	18.5831	19.2249	19.7325	20.0625	20.1698	20.1589	19.9653	19.3414	18.4471	17.6431	(92)	
Temperature adjustment												0.0000		
adjusted MIT	17.6950	18.0795	18.5831	19.2249	19.7325	20.0625	20.1698	20.1589	19.9653	19.3414	18.4471	17.6431	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.8880	0.8535	0.8102	0.7339	0.6259	0.4776	0.3428	0.3733	0.5560	0.7450	0.8500	0.8964	(94)	
Useful gains	563.3182	617.9068	627.6126	606.1505	531.7636	397.1225	274.1210	285.2334	408.1832	504.2010	533.4291	544.9974	(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	1108.1143	1087.1820	993.9516	838.1205	650.4102	437.1524	285.6836	300.1605	471.5180	707.8079	923.4576	1099.7972	(97)	
Space heating kWh	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711	(98a)	
Space heating requirement - total per year (kWh/year)												2093.6041		
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	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2093.6041		
Space heating per m2										(98c) / (4) =		28.3609	(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	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711	(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)	439.1423	341.6608	295.2938	180.9517	95.6372	0.0000	0.0000	0.0000	0.0000	164.1209	304.2476	447.2059	(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	229.1472	202.7451	215.8281	191.0278	185.9847	168.4844	167.0296	173.2236	174.6175	193.6163	204.4950	226.8317	(64)	
Efficiency of water heater (217)m	85.3245	85.0465	84.5842	83.7600	82.4909	79.8000	79.8000	79.8000	79.8000	83.5155	84.7715	85.3848	(216)	
Fuel for water heating, kWh/month	268.5596	238.3932	255.1634	228.0658	225.4607	211.1333	209.3102	217.0721	218.8189	231.8328	241.2309	265.6581	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	22.2804	17.8742	16.0937	11.7909	9.1077	7.4410	8.3083	10.7995	14.0274	18.4048	20.7881	22.8997	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-34.5724	-48.7602	-70.1220	-78.8905	-85.1193	-79.4772	-78.5011	-74.0864	-66.2982	-55.7821	-38.0176	-29.8880	(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)	

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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	-19.4712	-40.9697	-81.4449	-122.3440	-161.7844	-162.5539	-160.6347	-135.9972	-99.6708	-58.5900	-25.9975	-15.3961		(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													2268.2601	(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													2810.6991	(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)													179.8157	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1824.3692	(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													3520.4057	(238)

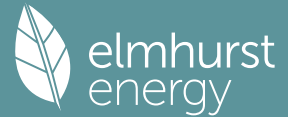
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2268.2601	0.2100	476.3346	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2810.6991	0.2100	590.2468	(264)
Space and water heating			1066.5814	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.8157	0.1443	25.9530	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-739.5149	0.1346	-99.5184	
PV Unit electricity exported	-1084.8544	0.1259	-136.5749	
Total			-236.0933	(269)
Total CO2, kg/year			868.3703	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7600	(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	2268.2601	1.1300	2563.1339	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2810.6991	1.1300	3176.0900	(278)
Space and water heating			5739.2239	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.8157	1.5338	275.8073	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-739.5149	1.4974	-1107.3174	
PV Unit electricity exported	-1084.8544	0.4621	-501.3239	
Total			-1608.6412	(283)
Total Primary energy kWh/year			4536.4908	(286)
Target Primary Energy Rate (TPER)			61.4500	(287)

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Property Reference	OP-D320 S2JAY				Issued on Date	29/11/2024	
Assessment Reference	S2AY		Prop Type Ref	S2JAY			
Property	S2JAY						
SAP Rating	82 B	DER	4.57	TER	11.76		
Environmental	96 A	% DER < TER				61.14	
CO ₂ Emissions (t/year)	0.31	DFEE	34.18	TFEE	35.44		
Compliance Check	See BREL	% DFEE < TFEE				3.54	
% DPER < TPER	21.27	DPER	48.38	TPER	61.45		
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	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.5972 (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) = 0.1652 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3402 (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) = 0.2892 (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	0.3687	0.3615	0.3542	0.3181	0.3109	0.2747	0.2747	0.2675	0.2892	0.3109	0.3253	0.3398 (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	0.5680	0.5653	0.5627	0.5506	0.5483	0.5377	0.5377	0.5358	0.5418	0.5483	0.5529	0.5577 (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			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			12.5200	1.2357	15.4715		(27)
Ground Floor			36.9100	0.1100	4.0601		(28a)
External Wall	84.7200	14.6600	70.0600	0.1700	11.9102		(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601		(30)
Total net area of external elements Aum(A, m ²)			158.5400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.6419		(33)
Party Wall			39.6600	0.0000	0.0000		(32)

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

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	9.6400	0.0500	0.4820
E2 Other lintels (including other steel lintels)	6.8100	0.0500	0.3405
E3 Sill	21.0000	0.0500	1.0500
E4 Jamb	17.2200	0.1600	2.7552
E5 Ground floor (normal)	17.2200	0.0000	0.0000
E6 Intermediate floor within a dwelling			

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E10 Eaves (insulation at ceiling level)	9.1600	0.0600	0.5496
E12 Gable (insulation at ceiling level)	8.0600	0.0600	0.4836
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	8.0600	0.0800	0.6448
P2 Party wall - Intermediate floor within a dwelling	8.0600	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	8.0600	0.1200	0.9672
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.7504 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		46.3923 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	34.0366	33.8784	33.7234	32.9952	32.8590	32.2248	32.2248	32.1073	32.4691	32.8590	33.1346	33.4228 (38)
Heat transfer coeff	80.4289	80.2707	80.1157	79.3875	79.2513	78.6171	78.6171	78.4996	78.8614	79.2513	79.5269	79.8150 (39)
Average = Sum(39)m / 12 =												79.3869
HLP	1.0895	1.0874	1.0853	1.0754	1.0736	1.0650	1.0650	1.0634	1.0683	1.0736	1.0773	1.0812 (40)
HLP (average)												1.0754
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3352 (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	27.3757	26.9691	26.3966	25.3410	24.5505	23.6740	23.2006	23.7691	24.3881	25.3260	26.4034	27.2832 (42b)
Hot water usage for other uses	38.5446	37.1430	35.7414	34.3398	32.9381	31.5365	31.5365	32.9381	34.3398	35.7414	37.1430	38.5446 (42c)
Average daily hot water use (litres/day)												60.4222 (43)
Daily hot water use	65.9203	64.1121	62.1380	59.6807	57.4886	55.2105	54.7371	56.7072	58.7279	61.0674	63.5464	65.8278 (44)
Energy conte	104.4017	91.2948	95.5038	81.6999	77.3907	67.8878	66.1998	70.2154	72.4173	82.8678	90.5335	103.0704 (45)
Energy content (annual)										Total = Sum(45)m =		1003.4829
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
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	88.7414	77.6006	81.1782	69.4449	65.7821	57.7046	56.2698	59.6831	61.5547	70.4377	76.9535	87.6098 (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	88.7414	77.6006	81.1782	69.4449	65.7821	57.7046	56.2698	59.6831	61.5547	70.4377	76.9535	87.6098 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		852.9605 (64)
Electric shower(s)	50.7512	45.2198	49.3783	47.1211	48.0053	45.7924	47.3188	48.0053	47.1211	49.3783	48.4498	50.7512 (64a)
Heat gains from water heating, kWh/month	34.8732	30.7051	32.6391	29.1415	28.4469	25.8742	25.8971	26.9221	27.1690	29.9540	31.3508	34.5903 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												577.2923 (64a)

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	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	118.7197	107.2307	110.8050	107.2307	110.8050	107.2307	107.2307	110.8050	107.2307	110.8050	107.2307 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	208.1818	202.7939	191.3236	176.8445	163.2362	154.1450	152.0069	157.3948	168.8651	183.3442	196.9525 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759 (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)	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	46.8725	45.6921	43.8698	40.4743	38.2350	35.9365	34.8080	36.1856	37.7347	40.2607	43.5428	46.4923 (72)
Total internal gains	418.1746	430.6213	411.9221	400.6307	380.3380	368.0054	354.2114	353.4509	363.9623	374.3842	395.7197	408.7032 (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						4.8900	10.6334	0.6300	0.7000	0.7700		15.8910 (74)
East						1.6600	19.6403	0.6300	0.7000	0.7700		9.9639 (76)
South						5.9700	46.7521	0.6300	0.7000	0.7700		85.2996 (78)
Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480 (83)
Total gains	529.3291	620.1801	673.5767	731.4585	758.9540	747.9673	718.7961	681.4033	649.2310	584.3405	528.8562	503.8512 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.4953	25.5455	25.5949	25.8297	25.8741	26.0828	26.0828	26.1219	26.0020	25.8741	25.7844	25.6913
alpha	2.6997	2.7030	2.7063	2.7220	2.7249	2.7389	2.7389	2.7415	2.7335	2.7249	2.7190	2.7128
util living area	0.9493	0.9235	0.8892	0.8217	0.7207	0.5765	0.4452	0.4818	0.6647	0.8422	0.9249	0.9549 (86)
MIT	18.6281	18.9680	19.4098	19.9805	20.4608	20.7953	20.9263	20.9065	20.6799	20.0576	19.2536	18.5670 (87)
Th 2	20.0094	20.0111	20.0129	20.0210	20.0225	20.0295	20.0295	20.0308	20.0268	20.0225	20.0194	20.0162 (88)
util rest of house	0.9422	0.9130	0.8736	0.7959	0.6784	0.5106	0.3587	0.3951	0.6037	0.8139	0.9129	0.9486 (89)
MIT 2	17.8516	18.1850	18.6165	19.1683	19.6118	19.9016	19.9960	19.9858	19.8124	19.2530	18.4759	17.7963 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.0073	18.3419	18.7756	19.3311	19.7820	20.0808	20.1825	20.1704	19.9863	19.4143	18.6318	17.9509 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.0073	18.3419	18.7756	19.3311	19.7820	20.0808	20.1825	20.1704	19.9863	19.4143	18.6318	17.9509 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9232	0.8908	0.8500	0.7749	0.6669	0.5143	0.3730	0.4082	0.6010	0.7931	0.8912	0.9307 (94)
Useful gains	488.6696	552.4376	572.5194	566.8350	506.1345	384.6739	268.0763	278.1690	390.1586	463.4143	471.3109	468.9340 (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	1102.4615	1078.9942	983.4658	828.1012	640.5119	430.8807	281.6456	295.9763	464.2009	698.5457	917.0919	1097.5255 (97)
Space heating kWh	456.6612	353.8460	305.7441	188.1117	99.9768	0.0000	0.0000	0.0000	0.0000	174.9377	320.9623	467.6721 (98a)
Space heating requirement - total per year (kWh/year)	2367.9120											
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	456.6612	353.8460	305.7441	188.1117	99.9768	0.0000	0.0000	0.0000	0.0000	174.9377	320.9623	467.6721 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2367.9120											
Space heating per m2	(98c) / (4) = 32.0768 (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	739.0005	581.7663	596.5971	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7740	0.8359	0.8132	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	571.9658	486.3187	485.1486	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	831.1161	799.2009	757.6101	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	186.5882	232.7844	202.7114	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	46.6470	58.1961	50.6778	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	155.5210 (107)											
Energy for space heating	32.0768 (99)											
Energy for space cooling	2.1068 (108)											
Total	34.1836 (109)											
Fabric Energy Efficiency (DFEE)	34.2 (109)											

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

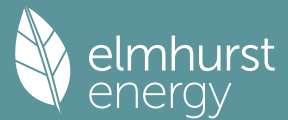
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	181.5972 (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) = 0.1652 (8)

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Pressure test		Yes
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4152	(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) =	0.3529 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.4500	0.4412	0.4323	0.3882	0.3794	0.3353	0.3353	0.3265	0.3529	0.3794	0.3970	0.4147	(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	0.6012	0.5973	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5788	0.5860	(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			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			12.5200	1.1450	14.3359			(27)
Ground Floor			36.9100	0.1300	4.7983			(28a)
External Wall	84.7200	14.6600	70.0600	0.1800	12.6108			(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601			(30)
Total net area of external elements Aum(A, m2)			158.5400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	37.9451		(33)
Party Wall			39.6600	0.0000	0.0000			(32)

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

100.0000 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	9.6400	0.0500	0.4820	
E2 Other lintels (including other steel lintels)	6.8100	0.0500	0.3405	
E3 Sill	21.0000	0.0500	1.0500	
E4 Jamb	17.2200	0.1600	2.7552	
E5 Ground floor (normal)	17.2200	0.0000	0.0000	
E6 Intermediate floor within a dwelling	9.1600	0.0600	0.5496	
E10 Eaves (insulation at ceiling level)	8.0600	0.0600	0.4836	
E12 Gable (insulation at ceiling level)	9.8500	0.0900	0.8865	
E16 Corner (normal)	9.8500	0.0600	0.5910	
E18 Party wall between dwellings	8.0600	0.0800	0.6448	
P1 Party wall - Ground floor	8.0600	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	8.0600	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	8.0600	0.1200	0.9672	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.7504	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	46.6955	(37)

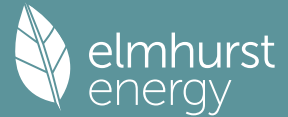
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	36.0304	35.7949	35.5639	34.4793	34.2764	33.3317	33.3317	33.1568	33.6956	34.2764	34.6869	35.1161	(38)
Average = Sum(39)m / 12 =	82.7259	82.4903	82.2594	81.1748	80.9719	80.0272	80.0272	79.8522	80.3911	80.9719	81.3824	81.8116	(39)
												81.1738	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1206	1.1175	1.1143	1.0996	1.0969	1.0841	1.0841	1.0817	1.0890	1.0969	1.1024	1.1083	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.0996	
												31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3352 (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	27.3757	26.9691	26.3966	25.3410	24.5505	23.6740	23.2006	23.7691	24.3881	25.3260	26.4034	27.2832	(42b)
Hot water usage for other uses	38.5446	37.1430	35.7414	34.3398	32.9381	31.5365	31.5365	32.9381	34.3398	35.7414	37.1430	38.5446	(42c)
Average daily hot water use (litres/day)													60.4222 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	65.9203	64.1121	62.1380	59.6807	57.4886	55.2105	54.7371	56.7072	58.7279	61.0674	63.5464	65.8278	(44)
Energy content (annual)	104.4017	91.2948	95.5038	81.6999	77.3907	67.8878	66.1998	70.2154	72.4173	82.8678	90.5335	103.0704	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1003.4829
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	0.0000 (46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	0.0000 (61)
Total heat required for water heating calculated for each month	88.7414	77.6006	81.1782	69.4449	65.7821	57.7046	56.2698	59.6831	61.5547	70.4377	76.9535	87.6098	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	88.7414	77.6006	81.1782	69.4449	65.7821	57.7046	56.2698	59.6831	61.5547	70.4377	76.9535	87.6098	(64)
12Total per year (kWh/year)													852.9605 (64)
Electric shower(s)	50.7512	45.2198	49.3783	47.1211	48.0053	45.7924	47.3188	48.0053	47.1211	49.3783	48.4498	50.7512	(64a)
													577.2923 (64a)
Heat gains from water heating, kWh/month	34.8732	30.7051	32.6391	29.1415	28.4469	25.8742	25.8971	26.9221	27.1690	29.9540	31.3508	34.5903	(65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307	107.2307 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437	206.0437 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759 (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)	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725	46.8725 (72)
Total internal gains	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746	418.1746 (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					4.8900	10.6334	0.6300	0.7000			0.7700	15.8910 (74)
East					1.6600	19.6403	0.6300	0.7000			0.7700	9.9639 (76)
South					5.9700	46.7521	0.6300	0.7000			0.7700	85.2996 (78)
Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480 (83)
Total gains	529.3291	620.1801	673.5767	731.4585	758.9540	747.9673	718.7961	681.4033	649.2310	584.3405	528.8562	503.8512 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.7873	24.8581	24.9279	25.2610	25.3243	25.6232	25.6232	25.6794	25.5073	25.3243	25.1966	25.0644
alpha	2.6525	2.6572	2.6619	2.6841	2.6883	2.7082	2.7082	2.7120	2.7005	2.6883	2.6798	2.6710
util living area	0.9501	0.9249	0.8915	0.8253	0.7260	0.5822	0.4509	0.4873	0.6701	0.8452	0.9261	0.9555 (86)
MIT	18.5479	18.8920	19.3435	19.9357	20.4315	20.7831	20.9209	20.9003	20.6624	20.0200	19.1984	18.4969 (87)
Th 2	19.9840	19.9866	19.9892	20.0011	20.0034	20.0139	20.0139	20.0158	20.0098	20.0034	19.9988	19.9941 (88)
util rest of house	0.9429	0.9145	0.8760	0.7994	0.6834	0.5152	0.3624	0.3989	0.6085	0.8168	0.9141	0.9491 (89)
MIT 2	17.7560	18.0941	18.5360	19.1117	19.5708	19.8785	19.9780	19.9680	19.7840	19.2039	18.4082	17.7126 (90)
Living area fraction	17.9148	18.2541	18.6979	19.2769	19.7434	20.0599	20.1670	20.1549	19.9601	19.3675	18.5666	17.8699 (92)
MIT	17.9148	18.2541	18.6979	19.2769	19.7434	20.0599	20.1670	20.1549	19.9601	19.3675	18.5666	17.8699 (93)
Temperature adjustment												0.0000
adjusted MIT	17.9148	18.2541	18.6979	19.2769	19.7434	20.0599	20.1670	20.1549	19.9601	19.3675	18.5666	17.8699 (93)

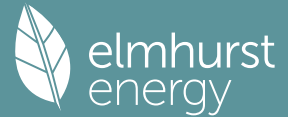
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9236	0.8918	0.8518	0.7777	0.6710	0.5186	0.3768	0.4121	0.6051	0.7954	0.8921	0.9310 (94)
Useful gains	488.9032	553.0827	573.7338	568.8747	509.2779	387.8846	270.8720	280.8108	392.8550	464.7768	471.7668	469.0767 (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	1126.2934	1101.5826	1003.3882	842.3404	651.2866	436.9386	285.4595	299.8351	471.0974	709.9202	933.1812	1118.3543 (97)
Space heating kWh	474.2183	368.5920	319.6629	196.8952	105.6545	0.0000	0.0000	0.0000	0.0000	182.3867	332.2184	483.0626 (98a)
Space heating requirement - total per year (kWh/year)												2462.6906
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	474.2183	368.5920	319.6629	196.8952	105.6545	0.0000	0.0000	0.0000	0.0000	182.3867	332.2184	483.0626 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2462.6906
Space heating per m ²												33.3608 (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	752.2556	592.2012	606.8771	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7656	0.8286	0.8057	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	575.9435	490.6913	488.9689	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	831.1161	799.2009	757.6101	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	183.7243	229.5311	199.8690	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	45.9311	57.3828	49.9673	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												153.2811 (107)
Energy for space heating												33.3608 (99)
Energy for space cooling												2.0764 (108)
Total												35.4372 (109)
Fabric Energy Efficiency (TFEE)												35.4 (109)

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Property Reference	OP-D320 S2JAY				Issued on Date	29/11/2024
Assessment Reference	S2AY	Prop Type Ref	S2JAY			
Property	S2JAY					
SAP Rating	82 B	DER	4.57	TER	11.76	
Environmental	96 A	% DER < TER				61.14
CO ₂ Emissions (t/year)	0.31	DFEE	34.18	TFEE	35.44	
Compliance Check	See BREL	% DFEE < TFEE				3.54
% DPER < TPER	21.27	DPER	48.38	TPER	61.45	
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	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	181.5972 (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			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			12.5200	1.2357	15.4715		(27)
Ground Floor			36.9100	0.1100	4.0601		(28a)
External Wall	84.7200	14.6600	70.0600	0.1700	11.9102		(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601		(30)
Total net area of external elements Aum(A, m ²)			158.5400				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.6419		(33)
Party Wall			39.6600	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)				9.6400	0.0500		0.4820
E3 Sill				6.8100	0.0500		0.3405

elmhurst
energy

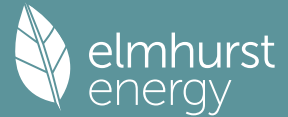
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	19.7553	19.5325	19.3096	18.1954	17.9725	16.8582	16.8582	16.6354	17.3039	17.9725	18.4182	18.8639 (38)
Heat transfer coeff	66.1476	65.9248	65.7019	64.5876	64.3648	63.2505	63.2505	63.0277	63.6962	64.3648	64.8105	65.2562 (39)
Average = Sum(39)m / 12 =												64.5319
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8961	0.8930	0.8900	0.8749	0.8719	0.8568	0.8568	0.8538	0.8629	0.8719	0.8780	0.8840 (40)
HLP (average)												0.8742
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.3352 (42)
Hot water usage for mixer showers	87.1379	85.8284	83.9202	80.2692	77.5748	74.5701	72.8622	74.7559	76.8319	80.0580	83.7875	86.8041 (42a)
Hot water usage for baths	28.8165	28.3886	27.7859	26.6747	25.8426	24.9200	24.4217	25.0201	25.6717	26.6589	27.7930	28.7191 (42b)
Hot water usage for other uses	40.5733	39.0979	37.6225	36.1471	34.6717	33.1963	33.1963	34.6717	36.1471	37.6225	39.0979	40.5733 (42c)
Average daily hot water use (litres/day)												143.9405 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	156.5277	153.3149	149.3286	143.0910	138.0891	132.6864	130.4801	134.4478	138.6507	144.3395	150.6784	156.0965 (44)
Energy content (annual)	247.9017	218.3183	229.5125	195.8844	185.8945	163.1534	157.8044	166.4744	170.9702	195.8673	214.6690	244.4093 (45)
Distribution loss (46)m = 0.15 x (45)m	37.1852	32.7477	34.4269	29.3827	27.8842	24.4730	23.6707	24.9712	25.6455	29.3801	32.2004	36.6614 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (64)
12Total per year (kWh/year)												3424.8810 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	126.3134	112.2299	120.1990	107.6020	105.6960	72.2581	71.0799	73.9627	74.8572	109.0120	113.8479	125.1522 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	118.7197	107.2307	110.8050	107.2307	110.8050	107.2307	107.2307	110.8050	107.2307	110.8050	107.2307 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	208.1818	202.7939	191.3236	176.8445	163.2362	154.1450	152.0069	157.3948	168.8651	183.3442	196.9525 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759 (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)	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	169.7761	167.0088	161.5578	149.4472	142.0645	100.3585	95.5375	99.4122	103.9683	146.5215	158.1220	168.2153 (72)
Total internal gains	541.0782	551.9379	529.6100	509.6036	484.1675	432.4275	414.9409	416.6775	430.1959	480.6449	510.2990	530.4262 (73)

[Jan]	Area m ²	Solar flux Table 6a W/m ²	G Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.8900	10.6334	0.6300	0.7000	0.7700	15.8910 (74)
East	1.6600	19.6403	0.6300	0.7000	0.7700	9.9639 (76)
South	5.9700	46.7521	0.6300	0.7000	0.7700	85.2996 (78)

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Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480 (83)
Total gains	652.2326	741.4967	791.2647	840.4314	862.7835	812.3893	779.5256	744.6299	715.4647	690.6012	643.4355	625.5743 (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	30.9997	31.1045	31.2100	31.7484	31.8583	32.4196	32.4196	32.5342	32.1927	31.8583	31.6393	31.4232	
alpha	3.0666	3.0736	3.0807	3.1166	3.1239	3.1613	3.1613	3.1689	3.1462	3.1239	3.1093	3.0949	
util living area	0.9078	0.8697	0.8200	0.7289	0.6067	0.4690	0.3480	0.3772	0.5553	0.7456	0.8660	0.9159 (86)	
Living	19.4474	19.7369	20.0775	20.4842	20.7703	20.9269	20.9785	20.9720	20.8706	20.5277	19.9520	19.4075	
Non living	18.3649	18.7239	19.1435	19.6401	19.9688	20.1452	20.1912	20.1890	20.0880	19.7027	19.0058	18.3225	
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	20.2058	19.7369	20.0775	20.4842	20.7703	20.9269	20.9785	20.9720	20.8706	20.5277	19.9520	19.6303 (87)	
Th 2	20.1708	20.1734	20.1760	20.1889	20.1914	20.2044	20.2044	20.2069	20.1992	20.1914	20.1863	20.1811 (88)	
util rest of house	0.8972	0.8555	0.8006	0.7009	0.5677	0.4179	0.2882	0.3161	0.5035	0.7135	0.8493	0.9061 (89)	
MIT 2	19.4509	18.7239	19.1435	19.6401	19.9688	20.1452	20.1912	20.1890	20.0880	19.7027	19.0058	18.6574 (90)	
Living area fraction	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	fLA = Living area / (4) =				0.2005 (91)
MIT	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	20.2449	19.8681	19.1955	18.8525 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6022	18.9270	19.3308	19.8093	20.1295	20.3019	20.3491	20.3460	20.2449	19.8681	19.1955	18.8525 (93)	

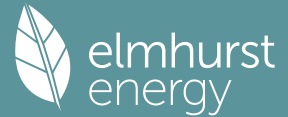
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8890	0.8306	0.7783	0.6868	0.5646	0.4243	0.2992	0.3270	0.5066	0.6995	0.8255	0.8871 (94)
Useful gains	579.8457	615.8716	615.8439	577.2005	487.0909	344.7148	233.2696	243.5265	362.4571	483.0840	531.1658	554.9647 (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	1012.2056	924.7269	843.0075	704.6078	542.5615	360.6493	237.1301	248.7081	391.4074	596.5372	783.9128	956.1653 (97)
Space heating kWh	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98a)
Space heating requirement - total per year (kWh/year)												1396.1200
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	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1396.1200
Space heating per m2										(98c) / (4) =		18.9125 (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 %)												237.0522 (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	321.6758	207.5507	169.0097	91.7332	41.2702	0.0000	0.0000	0.0000	0.0000	84.4092	181.9779	298.4933 (98)
Space heating efficiency (main heating system 1)	237.0522	237.0522	237.0522	237.0522	237.0522	0.0000	0.0000	0.0000	0.0000	237.0522	237.0522	237.0522 (210)
Space heating fuel (main heating system)	135.6983	87.5549	71.2964	38.6975	17.4097	0.0000	0.0000	0.0000	0.0000	35.6079	76.7670	125.9188 (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	346.2833	307.1791	327.8941	291.0924	284.2761	227.7854	224.5908	233.2608	235.6022	294.2489	309.8770	342.7909 (64)
Efficiency of water heater (217)m	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562	268.3562 (216)
Fuel for water heating, kWh/month	129.0387	114.4670	122.1862	108.4724	105.9324	84.8817	83.6913	86.9221	87.7946	109.6487	115.4723	127.7373 (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	22.9184	20.7005	22.9184	22.1791	22.9184	22.1791	22.9184	22.9184	22.1791	22.9184	22.1791	22.9184 (231)
Lighting	23.4370	18.8020	16.9292	12.4030	9.5805	7.8273	8.7396	11.3601	14.7556	19.3602	21.8673	24.0884 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												588.9505 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												268.3562
Water heating fuel used												1276.2446 (219)

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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)	269.8462	(230a)
Total electricity for the above, kWh/year	269.8462	(231)
Electricity for lighting (calculated in Appendix L)	189.1502	(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	2324.1915	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	588.9505	0.1559	91.8270 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1276.2446	0.1415	180.6286 (264)
Space and water heating			272.4556 (265)
Pumps, fans and electric keep-hot	269.8462	0.1387	37.4310 (267)
Energy for lighting	189.1502	0.1443	27.3002 (268)
Total CO2, kg/year			337.1869 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.5700 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	588.9505	1.5772	928.8829 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1276.2446	1.5234	1944.2007 (278)
Space and water heating			2873.0836 (279)
Pumps, fans and electric keep-hot	269.8462	1.5128	408.2233 (281)
Energy for lighting	189.1502	1.5338	290.1248 (282)
Total Primary energy kWh/year			3571.4317 (286)
Dwelling Primary energy Rate (DPER)			48.3800 (287)

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

1. Overall dwelling characteristics

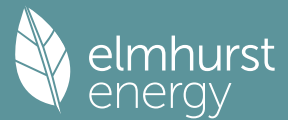
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	36.9100 (1b)	x 2.3100 (2b)	= 85.2621 (1b) - (3b)
First floor	36.9100 (1c)	x 2.6100 (2c)	= 96.3351 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.8200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	181.5972 (5)

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) = 0.1652 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4152 (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) = 0.3529 (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	0.4500	0.4412	0.4323	0.3882	0.3794	0.3353	0.3353	0.3265	0.3529	0.3794	0.3970	0.4147 (22b)
Effective ac	0.6012	0.5973	0.5935	0.5754	0.5720	0.5562	0.5562	0.5533	0.5623	0.5720	0.5788	0.5860 (25)

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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			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			12.5200	1.1450	14.3359			(27)
Ground Floor			36.9100	0.1300	4.7983			(28a)
External Wall	84.7200	14.6600	70.0600	0.1800	12.6108			(29a)
Roof - ceiling	36.9100		36.9100	0.1100	4.0601			(30)
Total net area of external elements Aum(A, m2)			158.5400					(31)
Fabric heat loss, W/K = Sum (A x U)					37.9451			(33)
Party Wall			39.6600	0.0000	0.0000			(32)

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

100.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	9.6400	0.0500	0.4820	
E2 Other lintels (including other steel lintels)	6.8100	0.0500	0.3405	
E3 Sill	21.0000	0.0500	1.0500	
E4 Jamb	17.2200	0.1600	2.7552	
E5 Ground floor (normal)	17.2200	0.0000	0.0000	
E6 Intermediate floor within a dwelling	9.1600	0.0600	0.5496	
E10 Baves (insulation at ceiling level)	8.0600	0.0600	0.4836	
E12 Gable (insulation at ceiling level)	9.8500	0.0900	0.8865	
E16 Corner (normal)	9.8500	0.0600	0.5910	
E18 Party wall between dwellings	8.0600	0.0800	0.6448	
P1 Party wall - Ground floor	8.0600	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	8.0600	0.1200	0.9672	
P4 Party wall - Roof (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.7504 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 46.6955 (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	36.0304	35.7949	35.5639	34.4793	34.2764	33.3317	33.3317	33.1568	33.6956	34.2764	34.6869	35.1161	(38)
Heat transfer coeff	82.7259	82.4903	82.2594	81.1748	80.9719	80.0272	80.0272	79.8522	80.3911	80.9719	81.3824	81.8116	(39)
Average = Sum(39)m / 12 =												81.1738	
HLP	1.1206	1.1175	1.1143	1.0996	1.0969	1.0841	1.0841	1.0817	1.0890	1.0969	1.1024	1.1083	(40)
HLP (average)												1.0996	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

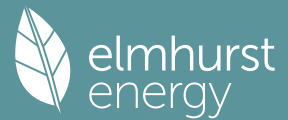
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3352 (42)
Hot water usage for mixer showers	63.3730	62.4207	61.0329	58.3776	56.4180	54.2328	52.9907	54.3680	55.8777	58.2240	60.9364	63.1302	(42a)
Hot water usage for baths	27.3757	26.9691	26.3966	25.3410	24.5505	23.6740	23.2006	23.7691	24.3881	25.3260	26.4034	27.2832	(42b)
Hot water usage for other uses	38.5446	37.1430	35.7414	34.3398	32.9381	31.5365	31.5365	32.9381	34.3398	35.7414	37.1430	38.5446	(42c)
Average daily hot water use (litres/day)												118.8500	(43)
Daily hot water use	129.2934	126.5328	123.1708	118.0583	113.9067	109.4433	107.7277	111.0752	114.6056	119.2914	124.4827	128.9580	(44)
Energy conte	204.7691	180.1810	189.3090	161.6159	153.3403	134.5733	130.2874	137.5343	141.3202	161.8773	177.3485	201.9171	(45)
Energy content (annual)										Total = Sum(45)m =		1974.0731	
Distribution loss (46)m = 0.15 x (45)m	30.7154	27.0272	28.3963	24.2424	23.0010	20.1860	19.5431	20.6301	21.1980	24.2816	26.6023	30.2876	(46)
Water storage loss:													
Store volume												230.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7973	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9706	(55)
Total storage loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(56)
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	258.1187	228.3678	242.6586	213.2445	206.6899	186.2020	183.6370	190.8839	192.9488	215.2269	228.9772	255.2667	(62)
WWHRS	-28.9715	-25.6226	-26.8305	-22.2168	-20.7052	-17.7176	-16.6074	-17.6603	-18.3313	-21.6106	-24.4822	-28.4350	(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	229.1472	202.7451	215.8281	191.0278	185.9847	168.4844	167.0296	173.2236	174.6175	193.6163	204.4950	226.8317	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2333.0308	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)
Heat gains from water heating, kWh/month	110.7654	98.4596	105.6249	95.0402	93.6653	86.0486	86.0002	88.4098	88.2919	96.5039	100.2713	109.8171	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	116.7592	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.2307	118.7197	107.2307	110.8050	107.2307	110.8050	107.2307	107.2307	110.8050	107.2307	110.8050	107.2307	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	206.0437	208.1818	202.7939	191.3236	176.8445	163.2362	154.1450	152.0069	157.3948	168.8651	183.3442	196.9525	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	34.6759	(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)													

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	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074	-93.4074 (71)
Water heating gains (Table 5)	148.8782	146.5172	141.9690	132.0003	125.8943	119.5119	115.5917	118.8304	122.6276	129.7095	139.2657	147.6037 (72)
Total internal gains	523.1803	534.4464	513.0213	495.1567	470.9972	451.5808	434.9952	436.0958	448.8552	466.8330	494.4426	512.8146 (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	4.8900				10.6334		0.6300		0.7000		0.7700		15.8910 (74)	
East	1.6600				19.6403		0.6300		0.7000		0.7700		9.9639 (76)	
South	5.9700				46.7521		0.6300		0.7000		0.7700		85.2996 (78)	
Solar gains	111.1545	189.5588	261.6547	330.8278	378.6160	379.9619	364.5847	327.9524	285.2688	209.9563	133.1365	95.1480	(83)	
Total gains	634.3348	724.0052	774.6760	825.9845	849.6132	831.5427	799.5798	764.0481	734.1240	676.7893	627.5792	607.9626	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	24.7873	24.8581	24.9279	25.2610	25.3243	25.6232	25.6232	25.6794	25.5073	25.3243	25.1966	25.0644
alpha	2.6525	2.6572	2.6619	2.6841	2.6883	2.7082	2.7082	2.7120	2.7005	2.6883	2.6798	2.6710
util living area	0.9271	0.8982	0.8601	0.7882	0.6836	0.5396	0.4123	0.4441	0.6214	0.8029	0.8963	0.9335 (86)
MIT	18.7858	19.1063	19.5274	20.0689	20.5152	20.8206	20.9365	20.9207	20.7219	20.1593	19.4027	18.7384 (87)
Th 2	19.9840	19.9866	19.9892	20.0011	20.0034	20.0139	20.0139	20.0158	20.0098	20.0034	19.9988	19.9941 (88)
util rest of house	0.9174	0.8850	0.8415	0.7595	0.6391	0.4742	0.3292	0.3606	0.5590	0.7703	0.8807	0.9246 (89)
MIT 2	17.4215	17.8220	18.3463	19.0132	19.5363	19.8725	19.9776	19.9679	19.7756	19.1363	18.2075	17.3684 (90)
Living area fraction										fLA = Living area / (4) =		0.2005 (91)
MIT	17.6950	18.0795	18.5831	19.2249	19.7325	20.0625	20.1698	20.1589	19.9653	19.3414	18.4471	17.6431 (92)
Temperature adjustment												0.0000
adjusted MIT	17.6950	18.0795	18.5831	19.2249	19.7325	20.0625	20.1698	20.1589	19.9653	19.3414	18.4471	17.6431 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8880	0.8535	0.8102	0.7339	0.6259	0.4776	0.3428	0.3733	0.5560	0.7450	0.8500	0.8964 (94)
Useful gains	563.3182	617.9068	627.6126	606.1505	531.7636	397.1225	274.1210	285.2334	408.1832	504.2010	533.4291	544.9974 (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	1108.1143	1087.1820	993.9516	838.1205	650.4102	437.1524	285.6836	300.1605	471.5180	707.8079	923.4576	1099.7972 (97)
Space heating kWh	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711 (98a)
Space heating requirement - total per year (kWh/year)												2093.6041
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	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2093.6041
Space heating per m2										(98c) / (4) =		28.3609 (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	405.3283	315.3529	272.5562	167.0184	88.2731	0.0000	0.0000	0.0000	0.0000	151.4836	280.8206	412.7711 (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)	439.1423	341.6608	295.2938	180.9517	95.6372	0.0000	0.0000	0.0000	0.0000	164.1209	304.2476	447.2059 (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	229.1472	202.7451	215.8281	191.0278	185.9847	168.4844	167.0296	173.2236	174.6175	193.6163	204.4950	226.8317 (64)
Efficiency of water heater (217)m	85.3245	85.0465	84.5842	83.7600	82.4909	79.8000	79.8000	79.8000	79.8000	83.5155	84.7715	79.8000 (216)
Fuel for water heating, kWh/month	268.5596	238.3932	255.1634	228.0658	225.4607	211.1333	209.3102	217.0721	218.8189	231.8328	241.2309	265.6581 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	22.2804	17.8742	16.0937	11.7909	9.1077	7.4410	8.3083	10.7995	14.0274	18.4048	20.7881	22.8997 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-34.5724	-48.7602	-70.1220	-78.8905	-85.1193	-79.4772	-78.5011	-74.0864	-66.2982	-55.7821	-38.0176	-29.8880 (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)

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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	-19.4712	-40.9697	-81.4449	-122.3440	-161.7844	-162.5539	-160.6347	-135.9972	-99.6708	-58.5900	-25.9975	-15.3961		(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													2268.2601	(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													2810.6991	(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)													179.8157	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1824.3692	(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													3520.4057	(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	2268.2601	0.2100	476.3346	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2810.6991	0.2100	590.2468	(264)
Space and water heating			1066.5814	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.8157	0.1443	25.9530	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-739.5149	0.1346	-99.5184	
PV Unit electricity exported	-1084.8544	0.1259	-136.5749	
Total			-236.0933	(269)
Total CO2, kg/year			868.3703	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7600	(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	2268.2601	1.1300	2563.1339	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2810.6991	1.1300	3176.0900	(278)
Space and water heating			5739.2239	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.8157	1.5338	275.8073	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-739.5149	1.4974	-1107.3174	
PV Unit electricity exported	-1084.8544	0.4621	-501.3239	
Total			-1608.6412	(283)
Total Primary energy kWh/year			4536.4908	(286)
Target Primary Energy Rate (TPER)			61.4500	(287)