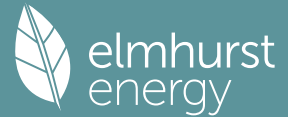


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Property Reference	OP-D320 S2SISK				Issued on Date	29/11/2024		
Assessment Reference	S2SISK			Prop Type Ref	S2SISK			
Property	S2SISK							
SAP Rating	81 B		DER	4.14		TER	10.40	
Environmental	96 A		% DER < TER				60.19	
CO ₂ Emissions (t/year)	0.39		DFEE	35.66		TFEE	36.89	
Compliance Check	See BREL		% DFEE < TFEE				3.34	
% DPER < TPER	19.19		DPER	43.78		TPER	54.18	
Assessor Details	Mr. Matthew Stainrod					Assessor ID	AU83-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	250.4280 (5)

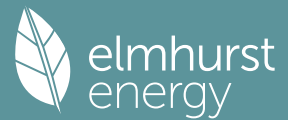
2. Ventilation rate

	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) =	71.2000 (23c)
Effective ac	0.3337 0.3299 0.3262 0.3076 0.3039 0.2853 0.2853 0.2816 0.2927 0.3039 0.3113 0.3188 (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)			17.8400	1.2357	22.0456		(27)
Ground Floor			50.9100	0.1100	5.6001		(28a)
External Wall	118.3800	19.9800	98.4000	0.1700	16.7280		(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001		(30)
Total net area of external elements Aum(A, m ²)			220.2000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.1138		(33)
Party Wall			25.8300	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)				13.9500	0.0500	0.6975	
E3 Sill				11.1200	0.0500	0.5560	

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E4 Jamb	27.9000	0.0500	1.3950
E5 Ground floor (normal)	24.0600	0.1600	3.8496
E6 Intermediate floor within a dwelling	24.0600	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	18.5800	0.0600	1.1148
E12 Gable (insulation at ceiling level)	5.4800	0.0600	0.3288
E16 Corner (normal)	14.7600	0.0900	1.3284
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.4800	0.0800	0.4384
P2 Party wall - Intermediate floor within a dwelling	5.4800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.4800	0.1200	0.6576
E17 Corner (inverted - internal area greater than external area)	4.9200	-0.0900	-0.4428
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5143 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	62.6281 (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	27.5738	27.2664	26.9591	25.4225	25.1152	23.5786	23.5786	23.2713	24.1932	25.1152	25.7298	26.3445 (38)
Heat transfer coeff	90.2019	89.8946	89.5872	88.0506	87.7433	86.2067	86.2067	85.8994	86.8214	87.7433	88.3580	88.9726 (39)
Average = Sum(39)m / 12 =												87.9738
HLP	0.8861	0.8831	0.8800	0.8649	0.8619	0.8468	0.8468	0.8438	0.8529	0.8619	0.8680	0.8740 (40)
HLP (average)												0.8642
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7556 (42)
Hot water usage for mixer showers	96.8299	95.3747	93.2543	89.1971	86.2031	82.8642	80.9663	83.0707	85.3775	88.9625	93.1068	96.4589 (42a)
Hot water usage for baths	32.0072	31.5319	30.8625	29.6282	28.7041	27.6793	27.1257	27.7905	28.5142	29.6108	30.8704	31.8990 (42b)
Hot water usage for other uses	45.1051	43.4649	41.8247	40.1845	38.5444	36.9042	36.9042	38.5444	40.1845	41.8247	43.4649	45.1051 (42c)
Average daily hot water use (litres/day)												159.9543 (43)
Daily hot water use	173.9422	170.3715	165.9415	159.0099	153.4515	147.4476	144.9962	149.4055	154.0763	160.3980	167.4421	173.4630 (44)
Energy conte	275.4820	242.6068	255.0459	217.6766	206.5752	181.3040	175.3604	184.9953	189.9915	217.6586	238.5520	271.6012 (45)
Energy content (annual)										Total = Sum(45)m =		2656.8494
Distribution loss (46)m = 0.15 x (45)m	41.3223	36.3910	38.2569	32.6515	30.9863	27.1956	26.3041	27.7493	28.4987	32.6488	35.7828	40.7402 (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	52.5120	53.2624	54.8576	52.5120	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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3690.8710 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	135.4838	120.3058	128.6888	114.8479	112.5723	78.2932	76.9172	80.1208	81.1818	116.2576	121.7889	134.1935 (65)

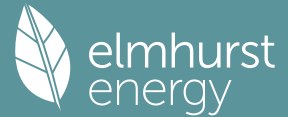
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.1226	148.4929	134.1226	138.5933	134.1226	138.5933	134.1226	134.1226	138.5933	134.1226	138.5933	134.1226 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.2053	261.8950	255.1170	240.6873	222.4724	205.3530	193.9162	191.2264	198.0045	212.4342	230.6490	247.7685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
Water heating gains (Table 5)	182.1019	179.0265	172.9689	159.5110	151.3069	108.7405	103.3834	107.6893	112.7525	156.2602	169.1513	180.3676 (72)
Total internal gains	639.7634	653.7480	626.5420	603.1252	572.2355	517.0205	495.7558	497.3719	513.6839	567.1506	602.7273	626.5923 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308 (74)
Northeast	4.8900	11.2829	0.6300	0.7000	0.7700	16.8618 (75)
South	4.5300	46.7521	0.6300	0.7000	0.7700	64.7248 (78)
Southwest	2.8100	36.7938	0.6300	0.7000	0.7700	31.5975 (79)

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Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	771.1784	882.7355	956.2527	1043.6324	1098.0804	1054.2000	1007.2907	942.3528	881.0066	824.3868	761.0014	738.5296 (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	31.3494	31.4566	31.5645	32.1154	32.2278	32.8023	32.8023	32.9197	32.5701	32.2278	32.0037	31.7826
alpha	3.0900	3.0971	3.1043	3.1410	3.1485	3.1868	3.1868	3.1946	3.1713	3.1485	3.1336	3.1188
util living area												
	0.9341	0.9028	0.8575	0.7663	0.6373	0.4894	0.3659	0.4037	0.5999	0.7960	0.9015	0.9406 (86)
Living	19.2670	19.5645	19.9415	20.4095	20.7414	20.9199	20.9760	20.9671	20.8425	20.4296	19.7964	19.2279
Non living	18.1473	18.5197	18.9882	19.5630	19.9471	20.1476	20.1982	20.1942	20.0703	19.6004	18.8240	18.1052
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	20.1134	19.5645	19.9415	20.4095	20.7414	20.9199	20.9760	20.9671	20.8425	20.4296	19.7964	19.4758 (87)
Th 2	20.1794	20.1819	20.1845	20.1974	20.2000	20.2129	20.2129	20.2155	20.2078	20.2000	20.1948	20.1897 (88)
util rest of house												
	0.9260	0.8914	0.8409	0.7400	0.5985	0.4374	0.3041	0.3399	0.5475	0.7671	0.8881	0.9333 (89)
MIT 2	19.3692	18.5197	18.9882	19.5630	19.9471	20.1476	20.1982	20.1942	20.0703	19.6004	18.8240	18.4808 (90)
Living area fraction									FLA = Living area / (4) =			0.1886 (91)
MIT	19.5096	18.7167	19.1680	19.7226	20.0969	20.2932	20.3449	20.3400	20.2159	19.7568	19.0074	18.6685 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5096	18.7167	19.1680	19.7226	20.0969	20.2932	20.3449	20.3400	20.2159	19.7568	19.0074	18.6685 (93)

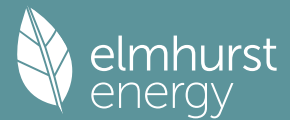
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9184	0.8666	0.8168	0.7230	0.5933	0.4429	0.3146	0.3503	0.5480	0.7491	0.8641	0.9161 (94)
Useful gains	708.2670	764.9923	781.0636	754.5411	651.4619	466.8751	316.9440	330.0976	482.8146	617.5473	657.5890	676.5990 (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	1371.9356	1242.0485	1134.8921	952.9397	736.7693	490.7950	322.8329	338.4432	530.9936	803.4474	1052.1159	1287.2984 (97)
Space heating kWh	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98a)
Space heating requirement - total per year (kWh/year)												2160.6447
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	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2160.6447
Space heating per m2										(98c) / (4) =		21.2244 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												254.3418 (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	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98)
Space heating efficiency (main heating system 1)	254.3418	254.3418	254.3418	254.3418	254.3418	0.0000	0.0000	0.0000	0.0000	254.3418	254.3418	254.3418 (210)
Space heating fuel (main heating system)	194.1361	126.0437	103.5018	56.1634	24.9541	0.0000	0.0000	0.0000	0.0000	54.3794	111.6841	178.6416 (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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (64)
Efficiency of water heater (217)m	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603 (216)
Fuel for water heating, kWh/month	138.7453	123.0116	131.1612	116.1153	113.1732	91.2698	89.8636	93.4392	94.4939	117.2864	123.8624	137.3051 (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	38.5075	34.7810	38.5075	37.2653	38.5075	37.2653	38.5075	38.5075	37.2653	38.5075	37.2653	38.5075 (223)
Lighting	27.8680	22.3568	20.1298	14.7479	11.3917	9.3071	10.3919	13.5078	17.5453	23.0204	26.0015	28.6426 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												849.5043 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	269.4603	
Water heating fuel used	1369.7270	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.4840)		
mechanical ventilation fans (SFP = 1.4840)	453.3949	(230a)
Total electricity for the above, kWh/year	453.3949	(231)
Electricity for lighting (calculated in Appendix L)	224.9109	(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	2897.5371	(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	849.5043	0.1558	132.3507	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1369.7270	0.1415	193.8639	(264)
Space and water heating			326.2147	(265)
Pumps, fans and electric keep-hot	453.3949	0.1387	62.8915	(267)
Energy for lighting	224.9109	0.1443	32.4616	(268)
Total CO2, kg/year			421.5677	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1400	(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	849.5043	1.5767	1339.4529	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1369.7270	1.5234	2086.6256	(278)
Space and water heating			3426.0785	(279)
Pumps, fans and electric keep-hot	453.3949	1.5128	685.8958	(281)
Energy for lighting	224.9109	1.5338	344.9759	(282)
Total Primary energy kWh/year			4456.9502	(286)
Dwelling Primary energy Rate (DPER)			43.7800	(287)

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

1. Overall dwelling characteristics

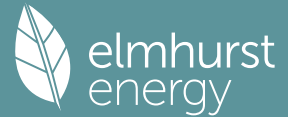
	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)	
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	101.8000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 250.4280 (5)	

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)	
Number of open flues	0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)	
Number of blocked chimneys	0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)	
Number of passive vents	0 * 10 =	0.0000 (7b)	
Number of flueless gas fires	0 * 40 =	0.0000 (7c)	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1597 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.4097		(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) =		0.3483 (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	0.4440	0.4353	0.4266	0.3831	0.3744	0.3309	0.3309	0.3221	0.3483	0.3744	0.3918	0.4092	(22b)
Effective ac	0.5986	0.5948	0.5910	0.5734	0.5701	0.5547	0.5547	0.5519	0.5606	0.5701	0.5768	0.5837	(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)			17.8400	1.1450	20.4275			(27)
Ground Floor			50.9100	0.1300	6.6183			(28a)
External Wall	118.3800	19.9800	98.4000	0.1800	17.7120			(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001			(30)
Total net area of external elements Aum(A, m2)			220.2000					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
Party Wall			25.8300	0.0000	0.0000			(33)

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

List of Thermal Bridges 100.0000 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	13.9500	0.0500	0.6975
E3 Sill	11.1200	0.0500	0.5560
E4 Jamb	27.9000	0.0500	1.3950
E5 Ground floor (normal)	24.0600	0.1600	3.8496
E6 Intermediate floor within a dwelling	24.0600	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	18.5800	0.0600	1.1148
E12 Gable (insulation at ceiling level)	5.4800	0.0600	0.3288
E16 Corner (normal)	14.7600	0.0900	1.3284
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.4800	0.0800	0.4384
P2 Party wall - Intermediate floor within a dwelling	5.4800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.4800	0.1200	0.6576
E17 Corner (inverted - internal area greater than external area)	4.9200	-0.0900	-0.4428

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

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 63.0122 (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	49.4679	49.1515	48.8414	47.3849	47.1124	45.8438	45.8438	45.6088	46.3324	47.1124	47.6637	48.2400	(38)
Heat transfer coeff	112.4801	112.1637	111.8536	110.3971	110.1246	108.8559	108.8559	108.6210	109.3446	110.1246	110.6758	111.2522	(39)
Average = Sum(39)m / 12 =												110.3958	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1049	1.1018	1.0988	1.0845	1.0818	1.0693	1.0693	1.0670	1.0741	1.0818	1.0872	1.0929	(40)
HLP (average)												1.0844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7556 (42)
Hot water usage for mixer showers													
70.4217	69.3634	67.8213	64.8706	62.6932	60.2648	58.8846	60.4151	62.0928	64.7000	67.7140	70.1519	70.1519	(42a)
Hot water usage for baths													
30.4069	29.9553	29.3194	28.1468	27.2688	26.2953	25.7695	26.4009	27.0885	28.1302	29.3269	30.3041	30.3041	(42b)
Hot water usage for other uses													
42.8498	41.2917	39.7335	38.1753	36.6171	35.0590	35.0590	36.6171	38.1753	39.7335	41.2917	42.8498	42.8498	(42c)
Average daily hot water use (litres/day)													132.0729 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.6785	140.6104	136.8741	131.1928	126.5792	121.6191	119.7130	123.4331	127.3566	132.5637	138.3326	143.3058	(44)
Energy conte	227.5516	200.2273	210.3705	179.5964	170.3999	149.5449	144.7825	152.8360	157.0434	179.8877	197.0802	224.3823	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
34.1327	30.0341	31.5556	26.9395	25.5600	22.4317	21.7174	22.9254	23.5565	26.9832	29.5620	33.6573	33.6573	(46)

Water storage loss:

Store volume 230.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.7973 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.9706 (55)

Total storage loss

30.0872 27.1756 30.0872 29.1167 30.0872 29.1167 30.0872 30.0872 29.1167 30.0872 29.1167 30.0872 30.0872 (56)

If cylinder contains dedicated solar storage

30.0872 27.1756 30.0872 29.1167 30.0872 29.1167 30.0872 30.0872 29.1167 30.0872 29.1167 30.0872 30.0872 (57)

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

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

Total heat required for water heating calculated for each month

280.9012 248.4141 263.7201 231.2251 223.7495 201.1736 198.1321 206.1856 208.6721 233.2374 248.7088 277.7319 (62)

WWHRS -32.1939 -28.4725 -29.8148 -24.6878 -23.0082 -19.6883 -18.4546 -19.6246 -20.3702 -24.0142 -27.2052 -31.5977 (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

248.7073 219.9416 233.9053 206.5372 200.7413 181.4853 179.6775 186.5610 188.3018 209.2231 221.5036 246.1343 (64)

Total per year (kWh/year) = Sum(64)m = 2522.7194 (64)

Electric shower(s) 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (64a)

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

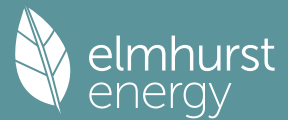
Heat gains from water heating, kWh/month

118.3406 105.1250 112.6279 101.0187 99.3377 91.0266 90.8199 93.4977 93.5199 102.4924 106.8321 117.2868 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
134.1226 148.4929 134.1226 138.5933 134.1226 138.5933 134.1226 134.1226 138.5933 134.1226 138.5933 134.1226 134.1226 (67)													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
259.2053 261.8950 255.1170 240.6873 222.4724 205.3530 193.9162 191.2264 198.0045 212.4342 230.6490 247.7685 (68)													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

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Pumps, fans	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Losses e.g. evaporation	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)
(negative values) (Table 5)												
Water heating gains (Table 5)	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
159.0599	156.4360	151.3816	140.3038	133.5184	126.4258	122.0697	125.6689	129.8887	137.7586	148.3779	157.6436	(72)
Total internal gains	619.7214	634.1575	607.9547	586.9181	557.4470	534.7058	514.4421	515.3516	530.8201	551.6489	584.9539	606.8683 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.6100	10.6334	0.6300	0.7000	0.7700	18.2308 (74)			
Northeast				4.8900	11.2829	0.6300	0.7000	0.7700	16.8618 (75)			
South				4.5300	46.7521	0.6300	0.7000	0.7700	64.7248 (78)			
Southwest				2.8100	36.7938	0.6300	0.7000	0.7700	31.5975 (79)			
Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	751.1364	863.1450	937.6654	1027.4252	1083.2918	1071.8853	1025.9770	960.3324	898.1428	808.8852	743.2280	718.8056 (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	25.1403	25.2112	25.2811	25.6146	25.6780	25.9772	25.9772	26.0334	25.8612	25.6780	25.5501	25.4177
alpha	2.6760	2.6807	2.6854	2.7076	2.7119	2.7318	2.7318	2.7356	2.7241	2.7119	2.7033	2.6945
util living area	0.9465	0.9227	0.8883	0.8177	0.7098	0.5623	0.4339	0.4745	0.6650	0.8422	0.9224	0.9517 (86)
MIT	18.6243	18.9437	19.3911	19.9840	20.4763	20.8063	20.9303	20.9093	20.6766	20.0479	19.2537	18.5784 (87)
Th 2	19.9968	19.9994	20.0018	20.0136	20.0157	20.0260	20.0260	20.0279	20.0220	20.0157	20.0113	20.0067 (88)
util rest of house	0.9390	0.9122	0.8726	0.7914	0.6667	0.4966	0.3486	0.3884	0.6038	0.8138	0.9100	0.9449 (89)
MIT 2	17.2283	17.6303	18.1909	18.9252	19.5062	19.8716	19.9855	19.9721	19.7442	19.0189	18.0338	17.1763 (90)
Living area fraction	17.4916	17.8780	18.4172	19.1249	19.6892	20.0479	20.1637	20.1489	19.9201	19.2130	18.2638	17.4408 (92)
MIT	17.4916	17.8780	18.4172	19.1249	19.6892	20.0479	20.1637	20.1489	19.9201	19.2130	18.2638	17.4408 (93)
Temperature adjustment												0.0000
adjusted MIT	17.4916	17.8780	18.4172	19.1249	19.6892	20.0479	20.1637	20.1489	19.9201	19.2130	18.2638	17.4408 (93)

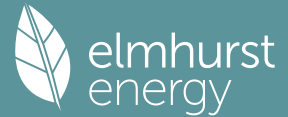
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9130	0.8826	0.8413	0.7637	0.6509	0.4982	0.3612	0.3997	0.5968	0.7858	0.8810	0.9203 (94)
Useful gains	685.7974	761.7923	788.8441	784.6023	705.0958	533.9630	370.5398	383.8221	536.0076	635.6298	654.8189	661.5174 (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	1483.7872	1455.6599	1332.9849	1128.7937	879.8057	593.0365	387.9284	407.2055	636.3951	948.5007	1235.5668	1473.0631 (97)
Space heating kWh	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (98a)
Space heating requirement - total per year (kWh/year)												3097.3307
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	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3097.3307
Space heating per m ²										(98c) / (4) =		30.4256 (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	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (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)	643.2334	505.1777	438.6140	268.4917	140.8280	0.0000	0.0000	0.0000	0.0000	252.1950	453.0211	654.1603 (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	248.7073	219.9416	233.9053	206.5372	200.7413	181.4853	179.6775	186.5610	188.3018	209.2231	221.5036	246.1343 (64)
Efficiency of water heater (217)m	85.9385	85.7021	85.2780	84.4695	83.1106	79.8000	79.8000	79.8000	79.8000	84.2996	85.4622	79.8000 (216)
Fuel for water heating, kWh/month	289.4014	256.6351	274.2856	244.5111	241.5351	227.4252	225.1598	233.7857	235.9672	248.1900	259.1831	286.2312 (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	27.8680	22.3568	20.1298	14.7479	11.3917	9.3071	10.3919	13.5078	17.5453	23.0204	26.0015	28.6426 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-46.4848	-64.9590	-92.5507	-103.0941	-110.3273	-102.6342	-101.3124	-96.0202	-86.6038	-73.7711	-50.8785	-40.2523 (233a)

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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	-28.0428	-58.7812	-116.4646	-174.4142	-230.1604	-231.1340	-228.4630	-193.6914	-142.2724	-83.9516	-37.4003	-22.1959	(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												3355.7212	(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												3022.3106	(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)												224.9109	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2515.8600	(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												4173.0827	(238)

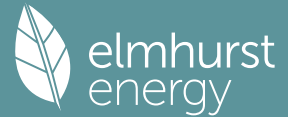
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3355.7212	0.2100	704.7015 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3022.3106	0.2100	634.6852 (264)
Space and water heating			1339.3867 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	224.9109	0.1443	32.4616 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.8883	0.1348	-130.5947
PV Unit electricity exported	-1546.9717	0.1260	-194.8828
Total			-325.4775 (269)
Total CO2, kg/year			1058.3000 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.4000 (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	3355.7212	1.1300	3791.9650 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3022.3106	1.1300	3415.2110 (278)
Space and water heating			7207.1759 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	224.9109	1.5338	344.9759 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.8883	1.4982	-1451.5553
PV Unit electricity exported	-1546.9717	0.4624	-715.3590
Total			-2166.9143 (283)
Total Primary energy kWh/year			5515.3383 (286)
Target Primary Energy Rate (TPER)			54.1800 (287)

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Property Reference	OP-D320 S2SISK				Issued on Date	29/11/2024	
Assessment Reference	S2SISK			Prop Type Ref	S2SISK		
Property	S2SISK						
SAP Rating	81 B	DER	4.14	TER	10.40		
Environmental	96 A	% DER < TER				60.19	
CO ₂ Emissions (t/year)	0.39	DFEE	35.66	TFEE	36.89		
Compliance Check	See BREL	% DFEE < TFEE				3.34	
% DPER < TPER	19.19	DPER	43.78	TPER	54.18		
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 250.4280 (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	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1597 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3347 (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) = 0.2845 (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	0.3628	0.3556	0.3485	0.3130	0.3059	0.2703	0.2703	0.2632	0.2845	0.3059	0.3201	0.3343 (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	0.5658	0.5632	0.5607	0.5490	0.5468	0.5365	0.5365	0.5346	0.5405	0.5468	0.5512	0.5559 (25)

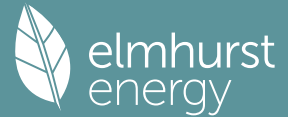
3. Heat losses and heat loss parameter

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)			17.8400	1.2357	22.0456		(27)
Ground Floor			50.9100	0.1100	5.6001		(28a)
External Wall	118.3800	19.9800	98.4000	0.1700	16.7280		(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001		(30)
Total net area of external elements Aum(A, m ²)			220.2000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.1138		(33)
Party Wall			25.8300	0.0000	0.0000		(32)

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

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	13.9500	0.0500	0.6975
E2 Other lintels (including other steel lintels)	11.1200	0.0500	0.5560
E3 Sill	27.9000	0.0500	1.3950
E4 Jamb	24.0600	0.1600	3.8496
E5 Ground floor (normal)	24.0600	0.0000	0.0000
E6 Intermediate floor within a dwelling			

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E10 Eaves (insulation at ceiling level)						18.5800	0.0600	1.1148				
E12 Gable (insulation at ceiling level)						5.4800	0.0600	0.3288				
E16 Corner (normal)						14.7600	0.0900	1.3284				
E18 Party wall between dwellings						9.8500	0.0600	0.5910				
P1 Party wall - Ground floor						5.4800	0.0800	0.4384				
P2 Party wall - Intermediate floor within a dwelling						5.4800	0.0000	0.0000				
P4 Party wall - Roof (insulation at ceiling level)						5.4800	0.1200	0.6576				
E17 Corner (inverted - internal area greater than external area)						4.9200	-0.0900	-0.4428				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											10.5143	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	62.6281 (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	46.7582	46.5470	46.3401	45.3680	45.1861	44.3394	44.3394	44.1826	44.6655	45.1861	45.5540	45.9387 (38)
Average = Sum(39)m / 12 =	109.3863	109.1752	108.9682	107.9961	107.8142	106.9675	106.9675	106.8107	107.2937	107.8142	108.1822	108.5668 (39)
												107.9952
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0745	1.0724	1.0704	1.0609	1.0591	1.0508	1.0508	1.0492	1.0540	1.0591	1.0627	1.0665 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.7556 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	30.4069	29.9553	29.3194	28.1468	27.2688	26.2953	25.7695	26.4009	27.0885	28.1302	29.3269	30.3041 (42b)
Hot water usage for other uses												
	42.8498	41.2917	39.7335	38.1753	36.6171	35.0590	35.0590	36.6171	38.1753	39.7335	41.2917	42.8498 (42c)
Average daily hot water use (litres/day)												67.1464 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	73.2567	71.2470	69.0529	66.3222	63.8860	61.3543	60.8284	63.0181	65.2638	67.8637	70.6186	73.1539 (44)
Energy conte	116.0207	101.4547	106.1317	90.7917	86.0028	75.4422	73.5667	78.0295	80.4768	92.0904	100.6091	114.5414 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1115.1579
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	98.6176	86.2365	90.2119	77.1730	73.1024	64.1259	62.5317	66.3251	68.4053	78.2769	85.5177	97.3602 (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	98.6176	86.2365	90.2119	77.1730	73.1024	64.1259	62.5317	66.3251	68.4053	78.2769	85.5177	97.3602 (64)
												Total per year (kWh/year) = Sum(64)m = 947.8842 (64)
												948 (64)
12Total per year (kWh/year)												
Electric shower(s)	56.3961	50.2494	54.8704	52.3621	53.3447	50.8857	52.5818	53.3447	52.3621	54.8704	53.8386	56.3961 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 641.5020 (64a)
Heat gains from water heating, kWh/month	38.7534	34.1215	36.2706	32.3838	31.6118	28.7529	28.7784	29.9175	30.1919	33.2868	34.8391	38.4391 (65)

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

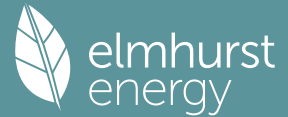
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	134.1226	148.4929	134.1226	138.5933	134.1226	138.5933	134.1226	134.1226	138.5933	134.1226	138.5933	134.1226 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	259.2053	261.8950	255.1170	240.6873	222.4724	205.3530	193.9162	191.2264	198.0045	212.4342	230.6490	247.7685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
Water heating gains (Table 5)												
	52.0879	50.7760	48.7508	44.9775	42.4889	39.9346	38.6806	40.2116	41.9331	44.7403	48.3876	51.6654 (72)
Total internal gains	509.7494	525.4975	502.3240	488.5917	463.4176	448.2145	431.0530	429.8943	442.8646	455.6307	481.9636	497.8901 (73)

6. Solar gains												

[Jan]												
			Area		Solar flux		g		FF		Access	Gains
			m2		Table 6a		W/m2		factor		factor	W
North			5.6100		10.6334		0.6300		0.7000		0.7700	18.2308 (74)
Northeast			4.8900		11.2829		0.6300		0.7000		0.7700	16.8618 (75)
South			4.5300		46.7521		0.6300		0.7000		0.7700	64.7248 (78)
Southwest			2.8100		36.7938		0.6300		0.7000		0.7700	31.5975 (79)

Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	641.1644	754.4850	832.0346	929.0989	989.2624	985.3940	942.5879	874.8751	810.1873	712.8670	640.2377	609.8275 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.8513	25.9013	25.9505	26.1841	26.2282	26.4359	26.4359	26.4747	26.3555	26.2282	26.1390	26.0464
alpha	2.7234	2.7268	2.7300	2.7456	2.7485	2.7624	2.7624	2.7650	2.7570	2.7485	2.7426	2.7364
util living area	0.9617	0.9406	0.9095	0.8429	0.7381	0.5908	0.4597	0.5052	0.6999	0.8716	0.9424	0.9662 (86)
MIT	18.5108	18.8426	19.3041	19.9178	20.4365	20.7875	20.9225	20.8976	20.6410	19.9660	19.1402	18.4530 (87)
Th 2	20.0217	20.0234	20.0251	20.0329	20.0344	20.0412	20.0412	20.0425	20.0386	20.0344	20.0314	20.0283 (88)
util rest of house	0.9562	0.9322	0.8963	0.8192	0.6971	0.5252	0.3723	0.4171	0.6408	0.8470	0.9328	0.9613 (89)
MIT 2	17.7453	18.0724	18.5253	19.1209	19.6021	19.9074	20.0056	19.9924	19.7940	19.1795	18.3753	17.6927 (90)
Living area fraction									fLA = Living area /	(4) =		0.1886 (91)
MIT	17.8897	18.2176	18.6722	19.2712	19.7595	20.0734	20.1785	20.1632	19.9538	19.3278	18.5196	17.8361 (92)
Temperature adjustment												0.0000
adjusted MIT	17.8897	18.2176	18.6722	19.2712	19.7595	20.0734	20.1785	20.1632	19.9538	19.3278	18.5196	17.8361 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9398	0.9119	0.8734	0.7973	0.6841	0.5275	0.3854	0.4289	0.6350	0.8253	0.9132	0.9461 (94)
Useful gains	602.5606	688.0459	726.7239	740.7774	676.7318	519.8107	363.2652	375.2198	514.4479	588.2970	584.6429	576.9643 (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	1486.5285	1453.9552	1326.3782	1120.0511	868.9293	585.4713	382.7833	401.9464	628.0729	940.9825	1235.3966	1480.4311 (97)
Space heating kWh	657.6721	514.6911	446.1428	273.0770	142.9949	0.0000	0.0000	0.0000	0.0000	262.3981	468.5426	672.1793 (98a)
Space heating requirement - total per year (kWh/year)												3437.6980
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	657.6721	514.6911	446.1428	273.0770	142.9949	0.0000	0.0000	0.0000	0.0000	262.3981	468.5426	672.1793 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3437.6980
Space heating per m2										(98c) / (4) =		33.7691 (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	1005.4948	791.5597	811.7616	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7648	0.8272	0.7965	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	769.0238	654.7687	646.5390	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1095.4394	1048.0865	971.6145	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	235.0193	292.6285	241.8562	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	58.7548	73.1571	60.4640	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												192.3760 (107)
Energy for space heating												33.7691 (99)
Energy for space cooling												1.8897 (108)
Total												35.6589 (109)
Fabric Energy Efficiency (DFEE)												35.7 (109)

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

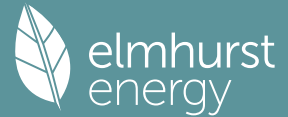
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	250.4280 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										Air changes per hour		
Pressure test											40.0000 / (5) =	0.1597 (8)	
Pressure Test Method											Yes		
Measured/design AP50											Blower Door		
Infiltration rate											5.0000	(17)	
Number of sides sheltered											0.4097	(18)	
											2	(19)	
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.3483 (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	0.4440	0.4353	0.4266	0.3831	0.3744	0.3309	0.3309	0.3221	0.3483	0.3744	0.3918	0.4092	(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	0.5986	0.5948	0.5910	0.5734	0.5701	0.5547	0.5547	0.5519	0.5606	0.5701	0.5768	0.5837	(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)			17.8400	1.1450	20.4275			(27)
Ground Floor			50.9100	0.1300	6.6183			(28a)
External Wall	118.3800	19.9800	98.4000	0.1800	17.7120			(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001			(30)
Total net area of external elements Aum(A, m2)			220.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	52.4979			(33)
Party Wall			25.8300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								100.0000 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E2 Other lintels (including other steel lintels)				13.9500	0.0500	0.6975		
E3 Sill				11.1200	0.0500	0.5560		
E4 Jamb				27.9000	0.0500	1.3950		
E5 Ground floor (normal)				24.0600	0.1600	3.8496		
E6 Intermediate floor within a dwelling				24.0600	0.0000	0.0000		
E10 Eaves (insulation at ceiling level)				18.5800	0.0600	1.1148		
E12 Gable (insulation at ceiling level)				5.4800	0.0600	0.3288		
E16 Corner (normal)				14.7600	0.0900	1.3284		
E18 Party wall between dwellings				9.8500	0.0600	0.5910		
P1 Party wall - Ground floor				5.4800	0.0800	0.4384		
P2 Party wall - Intermediate floor within a dwelling				5.4800	0.0000	0.0000		
P4 Party wall - Roof (insulation at ceiling level)				5.4800	0.1200	0.6576		
E17 Corner (inverted - internal area greater than external area)				4.9200	-0.0900	-0.4428		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								10.5143 (36)
Point Thermal bridges								(36a) = 0.0000
Total fabric heat loss								(33) + (36) + (36a) = 63.0122 (37)

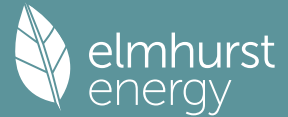
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	49.4679	49.1515	48.8414	47.3849	47.1124	45.8438	45.8438	45.6088	46.3324	47.1124	47.6637	48.2400	(38)
Average = Sum(39)m / 12 =	112.4801	112.1637	111.8536	110.3971	110.1246	108.8559	108.8559	108.6210	109.3446	110.1246	110.6758	111.2522	(39)
													110.3958
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1049	1.1018	1.0988	1.0845	1.0818	1.0693	1.0693	1.0670	1.0741	1.0818	1.0872	1.0929	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7556	(42)
Hot water usage for mixer showers												0.0000	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	30.4069	29.9553	29.3194	28.1468	27.2688	26.2953	25.7695	26.4009	27.0885	28.1302	29.3269	30.3041	(42c)
Average daily hot water use (litres/day)	42.8498	41.2917	39.7335	38.1753	36.6171	35.0590	35.0590	36.6171	38.1753	39.7335	41.2917	42.8498	(43)
													67.1464
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	73.2567	71.2470	69.0529	66.3222	63.8860	61.3543	60.8284	63.0181	65.2638	67.8637	70.6186	73.1539	(44)
Energy content (annual)	116.0207	101.4547	106.1317	90.7917	86.0028	75.4422	73.5667	78.0295	80.4768	92.0904	100.6091	114.5414	(45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m =	1115.1579
Water storage loss:												0.0000	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	98.6176	86.2365	90.2119	77.1730	73.1024	64.1259	62.5317	66.3251	68.4053	78.2769	85.5177	97.3602	(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	98.6176	86.2365	90.2119	77.1730	73.1024	64.1259	62.5317	66.3251	68.4053	78.2769	85.5177	97.3602	(64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m =	947.8842 (64)
Electric shower(s)												948	(64)
	56.3961	50.2494	54.8704	52.3621	53.3447	50.8857	52.5818	53.3447	52.3621	54.8704	53.8386	56.3961	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												641.5020	(64a)

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Heat gains from water heating, kWh/month
38.7534 34.1215 36.2706 32.3838 31.6118 28.7529 28.7784 29.9175 30.1919 33.2868 34.8391 38.4391 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.1226	148.4929	134.1226	138.5933	134.1226	138.5933	134.1226	134.1226	138.5933	134.1226	138.5933	134.1226 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.2053	261.8950	255.1170	240.6873	222.4724	205.3530	193.9162	191.2264	198.0045	212.4342	230.6490	247.7685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
Water heating gains (Table 5)	52.0879	50.7760	48.7508	44.9775	42.4889	39.9346	38.6806	40.2116	41.9331	44.7403	48.3876	51.6654 (72)
Total internal gains	509.7494	525.4975	502.3240	488.5917	463.4176	448.2145	431.0530	429.8943	442.8646	455.6307	481.9636	497.8901 (73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
North	5.6100		10.6334		0.6300		0.7000		0.7700		18.2308 (74)	
Northeast	4.8900		11.2829		0.6300		0.7000		0.7700		16.8618 (75)	
South	4.5300		46.7521		0.6300		0.7000		0.7700		64.7248 (78)	
Southwest	2.8100		36.7938		0.6300		0.7000		0.7700		31.5975 (79)	
Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	641.1644	754.4850	832.0346	929.0989	989.2624	985.3940	942.5879	874.8751	810.1873	712.8670	640.2377	609.8275 (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	25.1403	25.2112	25.2811	25.6146	25.6780	25.9772	25.9772	26.0334	25.8612	25.6780	25.5501	25.4177
alpha	2.6760	2.6807	2.6854	2.7076	2.7119	2.7318	2.7318	2.7356	2.7241	2.7119	2.7033	2.6945
util living area	0.9622	0.9415	0.9113	0.8460	0.7431	0.5963	0.4654	0.5108	0.7049	0.8739	0.9432	0.9665 (86)
MIT	18.4329	18.7684	19.2387	19.8731	20.4071	20.7752	20.9170	20.8911	20.6228	19.9284	19.0864	18.3849 (87)
Th 2	19.9968	19.9994	20.0018	20.0136	20.0157	20.0260	20.0260	20.0279	20.0220	20.0157	20.0113	20.0067 (88)
util rest of house	0.9566	0.9331	0.8981	0.8223	0.7018	0.5298	0.3760	0.4210	0.6453	0.8494	0.9336	0.9616 (89)
MIT 2	17.6521	17.9834	18.4458	19.0647	19.5613	19.8846	19.9879	19.9748	19.7654	19.1307	18.3092	17.6113 (90)
Living area fraction	17.7993	18.1315	18.5954	19.2171	19.7208	20.0526	20.1631	20.1476	19.9271	19.2811	18.4557	17.7572 (92)
MIT	17.7993	18.1315	18.5954	19.2171	19.7208	20.0526	20.1631	20.1476	19.9271	19.2811	18.4557	17.7572 (93)
Temperature adjustment												0.0000
adjusted MIT	17.7993	18.1315	18.5954	19.2171	19.7208	20.0526	20.1631	20.1476	19.9271	19.2811	18.4557	17.7572 (93)

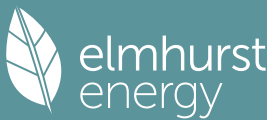
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9400	0.9126	0.8748	0.7997	0.6880	0.5317	0.3893	0.4327	0.6388	0.8271	0.9137	0.9462 (94)
Useful gains	602.6697	688.5322	727.8421	743.0222	680.6039	523.9567	366.9241	378.5913	517.5482	589.5867	584.9723	577.0086 (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	1518.4067	1484.0903	1352.9113	1138.9821	883.2902	593.5432	387.8669	407.0673	637.1595	956.0048	1256.8068	1508.2676 (97)
Space heating kWh	681.3083	534.6150	465.0515	285.0911	150.7986	0.0000	0.0000	0.0000	0.0000	272.6151	483.7208	692.8567 (98a)
Space heating requirement - total per year (kWh/year)												3566.0571
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	681.3083	534.6150	465.0515	285.0911	150.7986	0.0000	0.0000	0.0000	0.0000	272.6151	483.7208	692.8567 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3566.0571
Space heating per m2										(98c) / (4) =		35.0300 (99)

8c. Space cooling requirement

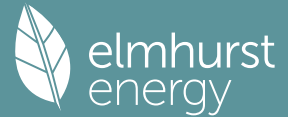
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	1023.2459	805.5340	825.5197	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7565	0.8198	0.7888	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	774.0557	660.3383	651.1887	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1095.4394	1048.0865	971.6145	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	231.3963	288.4847	238.3968	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	57.8491	72.1212	59.5992	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												189.5694 (107)
Energy for space heating												35.0300 (99)

Full SAP Calculation Printout



Energy for space cooling	1.8622	(108)
Total	36.8922	(109)
Fabric Energy Efficiency (TFEE)	36.9	(109)

Full SAP Calculation Printout



Property Reference	OP-D320 S2SISK				Issued on Date	29/11/2024
Assessment Reference	S2SISK	Prop Type Ref	S2SISK			
Property	S2SISK					
SAP Rating	81 B	DER	4.14	TER	10.40	
Environmental	96 A	% DER < TER				60.19
CO ₂ Emissions (t/year)	0.39	DFEE	35.66	TFEE	36.89	
Compliance Check	See BREL	% DFEE < TFEE				3.34
% DPER < TPER	19.19	DPER	43.78	TPER	54.18	
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	101.8000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	250.4280 (5)

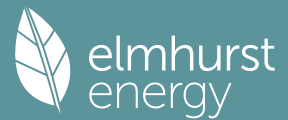
2. Ventilation rate

	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) =	71.2000 (23c)
Effective ac	0.3337 0.3299 0.3262 0.3076 0.3039 0.2853 0.2853 0.2816 0.2927 0.3039 0.3113 0.3188 (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)			17.8400	1.2357	22.0456		(27)
Ground Floor			50.9100	0.1100	5.6001		(28a)
External Wall	118.3800	19.9800	98.4000	0.1700	16.7280		(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001		(30)
Total net area of external elements Aum(A, m ²)			220.2000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.1138		(33)
Party Wall			25.8300	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)				13.9500	0.0500	0.6975	
E3 Sill				11.1200	0.0500	0.5560	

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E4 Jamb	27.9000	0.0500	1.3950
E5 Ground floor (normal)	24.0600	0.1600	3.8496
E6 Intermediate floor within a dwelling	24.0600	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	18.5800	0.0600	1.1148
E12 Gable (insulation at ceiling level)	5.4800	0.0600	0.3288
E16 Corner (normal)	14.7600	0.0900	1.3284
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.4800	0.0800	0.4384
P2 Party wall - Intermediate floor within a dwelling	5.4800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.4800	0.1200	0.6576
E17 Corner (inverted - internal area greater than external area)	4.9200	-0.0900	-0.4428
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5143 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	62.6281 (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	27.5738	27.2664	26.9591	25.4225	25.1152	23.5786	23.5786	23.2713	24.1932	25.1152	25.7298	26.3445 (38)
Heat transfer coeff	90.2019	89.8946	89.5872	88.0506	87.7433	86.2067	86.2067	85.8994	86.8214	87.7433	88.3580	88.9726 (39)
Average = Sum(39)m / 12 =												87.9738
HLP	0.8861	0.8831	0.8800	0.8649	0.8619	0.8468	0.8468	0.8438	0.8529	0.8619	0.8680	0.8740 (40)
HLP (average)												0.8642
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7556 (42)
Hot water usage for mixer showers	96.8299	95.3747	93.2543	89.1971	86.2031	82.8642	80.9663	83.0707	85.3775	88.9625	93.1068	96.4589 (42a)
Hot water usage for baths	32.0072	31.5319	30.8625	29.6282	28.7041	27.6793	27.1257	27.7905	28.5142	29.6108	30.8704	31.8990 (42b)
Hot water usage for other uses	45.1051	43.4649	41.8247	40.1845	38.5444	36.9042	36.9042	38.5444	40.1845	41.8247	43.4649	45.1051 (42c)
Average daily hot water use (litres/day)												159.9543 (43)
Daily hot water use	173.9422	170.3715	165.9415	159.0099	153.4515	147.4476	144.9962	149.4055	154.0763	160.3980	167.4421	173.4630 (44)
Energy conte	275.4820	242.6068	255.0459	217.6766	206.5752	181.3040	175.3604	184.9953	189.9915	217.6586	238.5520	271.6012 (45)
Energy content (annual)										Total = Sum(45)m =		2656.8494
Distribution loss (46)m = 0.15 x (45)m	41.3223	36.3910	38.2569	32.6515	30.9863	27.1956	26.3041	27.7493	28.4987	32.6488	35.7828	40.7402 (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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3690.8710 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	135.4838	120.3058	128.6888	114.8479	112.5723	78.2932	76.9172	80.1208	81.1818	116.2576	121.7889	134.1935 (65)

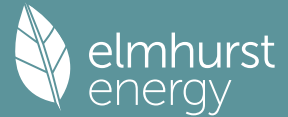
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	134.1226	148.4929	134.1226	138.5933	134.1226	138.5933	134.1226	134.1226	138.5933	134.1226	138.5933	134.1226 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	259.2053	261.8950	255.1170	240.6873	222.4724	205.3530	193.9162	191.2264	198.0045	212.4342	230.6490	247.7685 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
Water heating gains (Table 5)	182.1019	179.0265	172.9689	159.5110	151.3069	108.7405	103.3834	107.6893	112.7525	156.2602	169.1513	180.3676 (72)
Total internal gains	639.7634	653.7480	626.5420	603.1252	572.2355	517.0205	495.7558	497.3719	513.6839	567.1506	602.7273	626.5923 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.6100	10.6334	0.6300	0.7000	0.7700	18.2308 (74)
Northeast	4.8900	11.2829	0.6300	0.7000	0.7700	16.8618 (75)
South	4.5300	46.7521	0.6300	0.7000	0.7700	64.7248 (78)
Southwest	2.8100	36.7938	0.6300	0.7000	0.7700	31.5975 (79)

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Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	771.1784	882.7355	956.2527	1043.6324	1098.0804	1054.2000	1007.2907	942.3528	881.0066	824.3868	761.0014	738.5296 (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	31.3494	31.4566	31.5645	32.1154	32.2278	32.8023	32.8023	32.9197	32.5701	32.2278	32.0037	31.7826
alpha	3.0900	3.0971	3.1043	3.1410	3.1485	3.1868	3.1868	3.1946	3.1713	3.1485	3.1336	3.1188
util living area												
	0.9341	0.9028	0.8575	0.7663	0.6373	0.4894	0.3659	0.4037	0.5999	0.7960	0.9015	0.9406 (86)
Living	19.2670	19.5645	19.9415	20.4095	20.7414	20.9199	20.9760	20.9671	20.8425	20.4296	19.7964	19.2279
Non living	18.1473	18.5197	18.9882	19.5630	19.9471	20.1476	20.1982	20.1942	20.0703	19.6004	18.8240	18.1052
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	20.1134	19.5645	19.9415	20.4095	20.7414	20.9199	20.9760	20.9671	20.8425	20.4296	19.7964	19.4758 (87)
Th 2	20.1794	20.1819	20.1845	20.1974	20.2000	20.2129	20.2129	20.2155	20.2078	20.2000	20.1948	20.1897 (88)
util rest of house												
	0.9260	0.8914	0.8409	0.7400	0.5985	0.4374	0.3041	0.3399	0.5475	0.7671	0.8881	0.9333 (89)
MIT 2	19.3692	18.5197	18.9882	19.5630	19.9471	20.1476	20.1982	20.1942	20.0703	19.6004	18.8240	18.4808 (90)
Living area fraction									FLA = Living area / (4) =			0.1886 (91)
MIT	19.5096	18.7167	19.1680	19.7226	20.0969	20.2932	20.3449	20.3400	20.2159	19.7568	19.0074	18.6685 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5096	18.7167	19.1680	19.7226	20.0969	20.2932	20.3449	20.3400	20.2159	19.7568	19.0074	18.6685 (93)

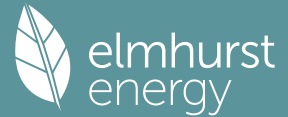
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9184	0.8666	0.8168	0.7230	0.5933	0.4429	0.3146	0.3503	0.5480	0.7491	0.8641	0.9161 (94)
Useful gains	708.2670	764.9923	781.0636	754.5411	651.4619	466.8751	316.9440	330.0976	482.8146	617.5473	657.5890	676.5990 (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	1371.9356	1242.0485	1134.8921	952.9397	736.7693	490.7950	322.8329	338.4432	530.9936	803.4474	1052.1159	1287.2984 (97)
Space heating kWh	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98a)
Space heating requirement - total per year (kWh/year)												2160.6447
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	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2160.6447
Space heating per m2										(98c) / (4) =		21.2244 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												254.3418 (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	493.7694	320.5818	263.2484	142.8470	63.4687	0.0000	0.0000	0.0000	0.0000	138.3097	284.0594	454.3603 (98)
Space heating efficiency (main heating system 1)	254.3418	254.3418	254.3418	254.3418	254.3418	0.0000	0.0000	0.0000	0.0000	254.3418	254.3418	254.3418 (210)
Space heating fuel (main heating system)	194.1361	126.0437	103.5018	56.1634	24.9541	0.0000	0.0000	0.0000	0.0000	54.3794	111.6841	178.6416 (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	373.8636	331.4676	353.4275	312.8846	304.9568	245.9360	242.1468	251.7817	254.6235	316.0402	333.7600	369.9828 (64)
Efficiency of water heater (217)m	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603	269.4603 (216)
Fuel for water heating, kWh/month	138.7453	123.0116	131.1612	116.1153	113.1732	91.2698	89.8636	93.4392	94.4939	117.2864	123.8624	137.3051 (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	38.5075	34.7810	38.5075	37.2653	38.5075	37.2653	38.5075	38.5075	37.2653	38.5075	37.2653	38.5075 (223)
Lighting	27.8680	22.3568	20.1298	14.7479	11.3917	9.3071	10.3919	13.5078	17.5453	23.0204	26.0015	28.6426 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												849.5043 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)

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Efficiency of water heater	269.4603	
Water heating fuel used	1369.7270	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.4840)		
mechanical ventilation fans (SFP = 1.4840)	453.3949	(230a)
Total electricity for the above, kWh/year	453.3949	(231)
Electricity for lighting (calculated in Appendix L)	224.9109	(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	2897.5371	(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	849.5043	0.1558	132.3507	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1369.7270	0.1415	193.8639	(264)
Space and water heating			326.2147	(265)
Pumps, fans and electric keep-hot	453.3949	0.1387	62.8915	(267)
Energy for lighting	224.9109	0.1443	32.4616	(268)
Total CO2, kg/year			421.5677	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1400	(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	849.5043	1.5767	1339.4529	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1369.7270	1.5234	2086.6256	(278)
Space and water heating			3426.0785	(279)
Pumps, fans and electric keep-hot	453.3949	1.5128	685.8958	(281)
Energy for lighting	224.9109	1.5338	344.9759	(282)
Total Primary energy kWh/year			4456.9502	(286)
Dwelling Primary energy Rate (DPER)			43.7800	(287)

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

1. Overall dwelling characteristics

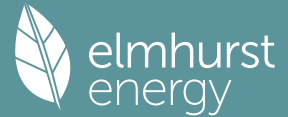
	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	50.9000 (1b)	x 2.3100 (2b)	= 117.5790 (1b) - (3b)	
First floor	50.9000 (1c)	x 2.6100 (2c)	= 132.8490 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	101.8000		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	250.4280 (5)	

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1597 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4097	(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) =	0.3483 (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	0.4440	0.4353	0.4266	0.3831	0.3744	0.3309	0.3309	0.3221	0.3483	0.3744	0.3918	0.4092	(22b)
Effective ac	0.5986	0.5948	0.5910	0.5734	0.5701	0.5547	0.5547	0.5519	0.5606	0.5701	0.5768	0.5837	(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)			17.8400	1.1450	20.4275			(27)
Ground Floor			50.9100	0.1300	6.6183			(28a)
External Wall	118.3800	19.9800	98.4000	0.1800	17.7120			(29a)
Roof - ceiling	50.9100		50.9100	0.1100	5.6001			(30)
Total net area of external elements Aum(A, m2)			220.2000					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
Party Wall			25.8300	0.0000	0.0000			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	13.9500	0.0500	0.6975
E3 Sill	11.1200	0.0500	0.5560
E4 Jamb	27.9000	0.0500	1.3950
E5 Ground floor (normal)	24.0600	0.1600	3.8496
E6 Intermediate floor within a dwelling	24.0600	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	18.5800	0.0600	1.1148
E12 Gable (insulation at ceiling level)	5.4800	0.0600	0.3288
E16 Corner (normal)	14.7600	0.0900	1.3284
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.4800	0.0800	0.4384
P2 Party wall - Intermediate floor within a dwelling	5.4800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.4800	0.1200	0.6576
E17 Corner (inverted - internal area greater than external area)	4.9200	-0.0900	-0.4428

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5143 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 63.0122 (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	49.4679	49.1515	48.8414	47.3849	47.1124	45.8438	45.8438	45.6088	46.3324	47.1124	47.6637	48.2400	(38)
Heat transfer coeff	112.4801	112.1637	111.8536	110.3971	110.1246	108.8559	108.8559	108.6210	109.3446	110.1246	110.6758	111.2522	(39)
Average = Sum(39)m / 12 =												110.3958	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1049	1.1018	1.0988	1.0845	1.0818	1.0693	1.0693	1.0670	1.0741	1.0818	1.0872	1.0929	(40)
HLP (average)												1.0844	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7556 (42)
Hot water usage for mixer showers													
70.4217	69.3634	67.8213	64.8706	62.6932	60.2648	58.8846	60.4151	62.0928	64.7000	67.7140	70.1519	70.1519	(42a)
Hot water usage for baths													
30.4069	29.9553	29.3194	28.1468	27.2688	26.2953	25.7695	26.4009	27.0885	28.1302	29.3269	30.3041	30.3041	(42b)
Hot water usage for other uses													
42.8498	41.2917	39.7335	38.1753	36.6171	35.0590	35.0590	36.6171	38.1753	39.7335	41.2917	42.8498	42.8498	(42c)
Average daily hot water use (litres/day)													132.0729 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	143.6785	140.6104	136.8741	131.1928	126.5792	121.6191	119.7130	123.4331	127.3566	132.5637	138.3326	143.3058	(44)
Energy conte	227.5516	200.2273	210.3705	179.5964	170.3999	149.5449	144.7825	152.8360	157.0434	179.8877	197.0802	224.3823	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
34.1327	30.0341	31.5556	26.9395	25.5600	22.4317	21.7174	22.9254	23.5565	26.9832	29.5620	33.6573	33.6573	(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													
280.9012	248.4141	263.7201	231.2251	223.7495	201.1736	198.1321	206.1856	208.6721	233.2374	248.7088	277.7319	277.7319	(62)
WWHRS	-32.1939	-28.4725	-29.8148	-24.6878	-23.0082	-19.6883	-18.4546	-19.6246	-20.3702	-24.0142	-27.2052	-31.5977	(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	248.7073	219.9416	233.9053	206.5372	200.7413	181.4853	179.6775	186.5610	188.3018	209.2231	221.5036	246.1343	(64)
Total per year (kWh/year) = Sum(64)m =												2522.7194	(64)

12Total per year (kWh/year) 2523 (64)

Electric shower(s) 0.0000 (64a)

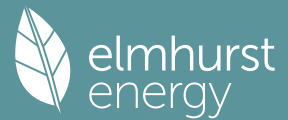
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month	118.3406	105.1250	112.6279	101.0187	99.3377	91.0266	90.8199	93.4977	93.5199	102.4924	106.8321	117.2868	(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	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	137.7788	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
134.1226	148.4929	134.1226	138.5933	134.1226	138.5933	134.1226	134.1226	134.1226	138.5933	134.1226	138.5933	134.1226	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
259.2053	261.8950	255.1170	240.6873	222.4724	205.3530	193.9162	191.2264	198.0045	212.4342	230.6490	247.7685	247.7685	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

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Pumps, fans	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779	36.7779 (69)
Losses e.g. evaporation	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)
(negative values) (Table 5)												
Water heating gains (Table 5)	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230	-110.2230 (71)
159.0599	156.4360	151.3816	140.3038	133.5184	126.4258	122.0697	125.6689	129.8887	137.7586	148.3779	157.6436	(72)
Total internal gains	619.7214	634.1575	607.9547	586.9181	557.4470	534.7058	514.4421	515.3516	530.8201	551.6489	584.9539	606.8683 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				5.6100	10.6334	0.6300	0.7000	0.7700	18.2308 (74)			
Northeast				4.8900	11.2829	0.6300	0.7000	0.7700	16.8618 (75)			
South				4.5300	46.7521	0.6300	0.7000	0.7700	64.7248 (78)			
Southwest				2.8100	36.7938	0.6300	0.7000	0.7700	31.5975 (79)			
Solar gains	131.4149	228.9875	329.7107	440.5072	525.8448	537.1795	511.5349	444.9808	367.3227	257.2363	158.2741	111.9374 (83)
Total gains	751.1364	863.1450	937.6654	1027.4252	1083.2918	1071.8853	1025.9770	960.3324	898.1428	808.8852	743.2280	718.8056 (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	25.1403	25.2112	25.2811	25.6146	25.6780	25.9772	25.9772	26.0334	25.8612	25.6780	25.5501	25.4177
alpha	2.6760	2.6807	2.6854	2.7076	2.7119	2.7318	2.7318	2.7356	2.7241	2.7119	2.7033	2.6945
util living area	0.9465	0.9227	0.8883	0.8177	0.7098	0.5623	0.4339	0.4745	0.6650	0.8422	0.9224	0.9517 (86)
MIT	18.6243	18.9437	19.3911	19.9840	20.4763	20.8063	20.9303	20.9093	20.6766	20.0479	19.2537	18.5784 (87)
Th 2	19.9968	19.9994	20.0018	20.0136	20.0157	20.0260	20.0260	20.0279	20.0220	20.0157	20.0113	20.0067 (88)
util rest of house	0.9390	0.9122	0.8726	0.7914	0.6667	0.4966	0.3486	0.3884	0.6038	0.8138	0.9100	0.9449 (89)
MIT 2	17.2283	17.6303	18.1909	18.9252	19.5062	19.8716	19.9855	19.9721	19.7442	19.0189	18.0338	17.1763 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	17.4916	17.8780	18.4172	19.1249	19.6892	20.0479	20.1637	20.1489	19.9201	19.2130	18.2638	17.4408 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.4916	17.8780	18.4172	19.1249	19.6892	20.0479	20.1637	20.1489	19.9201	19.2130	18.2638	17.4408 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9130	0.8826	0.8413	0.7637	0.6509	0.4982	0.3612	0.3997	0.5968	0.7858	0.8810	0.9203 (94)
Useful gains	685.7974	761.7923	788.8441	784.6023	705.0958	533.9630	370.5398	383.8221	536.0076	635.6298	654.8189	661.5174 (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	1483.7872	1455.6599	1332.9849	1128.7937	879.8057	593.0365	387.9284	407.2055	636.3951	948.5007	1235.5668	1473.0631 (97)
Space heating kWh	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (98a)
Space heating requirement - total per year (kWh/year)	3097.3307											
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	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3097.3307											
Space heating per m ²	(98c) / (4) = 30.4256 (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	593.7045	466.2790	404.8408	247.8178	129.9842	0.0000	0.0000	0.0000	0.0000	232.7759	418.1385	603.7900 (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)	643.2334	505.1777	438.6140	268.4917	140.8280	0.0000	0.0000	0.0000	0.0000	252.1950	453.0211	654.1603 (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	248.7073	219.9416	233.9053	206.5372	200.7413	181.4853	179.6775	186.5610	188.3018	209.2231	221.5036	246.1343 (64)
Efficiency of water heater (217)m	85.9385	85.7021	85.2780	84.4695	83.1106	79.8000	79.8000	79.8000	79.8000	84.2996	85.4622	79.8000 (216)
Fuel for water heating, kWh/month	289.4014	256.6351	274.2856	244.5111	241.5351	227.4252	225.1598	233.7857	235.9672	248.1900	259.1831	286.2312 (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	27.8680	22.3568	20.1298	14.7479	11.3917	9.3071	10.3919	13.5078	17.5453	23.0204	26.0015	28.6426 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-46.4848	-64.9590	-92.5507	-103.0941	-110.3273	-102.6342	-101.3124	-96.0202	-86.6038	-73.7711	-50.8785	-40.2523 (233a)

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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	-28.0428	-58.7812	-116.4646	-174.4142	-230.1604	-231.1340	-228.4630	-193.6914	-142.2724	-83.9516	-37.4003	-22.1959	(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												3355.7212	(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												3022.3106	(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)												224.9109	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2515.8600	(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												4173.0827	(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	3355.7212	0.2100	704.7015 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3022.3106	0.2100	634.6852 (264)
Space and water heating			1339.3867 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	224.9109	0.1443	32.4616 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.8883	0.1348	-130.5947
PV Unit electricity exported	-1546.9717	0.1260	-194.8828
Total			-325.4775 (269)
Total CO2, kg/year			1058.3000 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.4000 (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	3355.7212	1.1300	3791.9650 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3022.3106	1.1300	3415.2110 (278)
Space and water heating			7207.1759 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	224.9109	1.5338	344.9759 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-968.8883	1.4982	-1451.5553
PV Unit electricity exported	-1546.9717	0.4624	-715.3590
Total			-2166.9143 (283)
Total Primary energy kWh/year			5515.3383 (286)
Target Primary Energy Rate (TPER)			54.1800 (287)