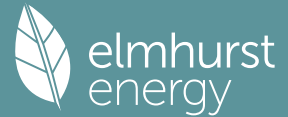


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Property Reference	OP-D320 P5WINT				Issued on Date	29/11/2024				
Assessment Reference	P5WINT		Prop Type Ref		P5WINT					
Property	P5WINT									
SAP Rating	81 B		DER		3.55		TER	8.03		
Environmental	96 A		% DER < TER					55.79		
CO ₂ Emissions (t/year)	0.66		DFEE		37.98		TFEE		39.13	
Compliance Check	See BREL		% DFEE < TFEE					2.92		
% DPER < TPER	11.91		DPER		37.23		TPER		42.27	
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	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 518.8131 (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) =	69.6000 (23c)											
Effective ac	0.3417	0.3379	0.3342	0.3156	0.3119	0.2933	0.2933	0.2896	0.3007	0.3119	0.3193	0.3268 (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)			31.6400	1.2357	39.0989		(27)
Ground Floor			102.3300	0.1100	11.2563		(28a)
External Wall	238.8000	33.7800	205.0200	0.1700	34.8534		(29a)
Roof - ceiling	102.3300		102.3300	0.1100	11.2563		(30)
Total net area of external elements Aum(A, m ²)			443.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	98.6049		(33)
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)				31.1800	0.0500	1.5590	
E3 Sill				24.8500	0.0500	1.2425	
E4 Jamb				55.5000	0.0500	2.7750	

elmhurst
energy

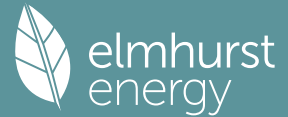
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 58.4944	Feb 57.8577	Mar 57.2210	Apr 54.0376	May 53.4009	Jun 50.2175	Jul 50.2175	Aug 49.5809	Sep 51.4909	Oct 53.4009	Nov 54.6743	Dec 55.9477 (38)
Heat transfer coeff	174.8630	174.2263	173.5896	170.4062	169.7695	166.5861	166.5861	165.9494	167.8595	169.7695	171.0429	172.3162 (39)
Average = Sum(39)m / 12 =												170.2470
HLP	Jan 0.8544	Feb 0.8513	Mar 0.8482	Apr 0.8326	May 0.8295	Jun 0.8140	Jul 0.8140	Aug 0.8109	Sep 0.8202	Oct 0.8295	Nov 0.8357	Dec 0.8420 (40)
HLP (average)												0.8319
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												3.0080 (42)
Hot water usage for mixer showers	102.6490	101.1064	98.8585	94.5576	91.3836	87.8440	85.8321	88.0630	90.5084	94.3089	98.7022	102.2557 (42a)
Hot water usage for baths	33.9230	33.4192	32.7097	31.4016	30.4221	29.3360	28.7493	29.4538	30.2209	31.3830	32.7181	33.8083 (42b)
Hot water usage for other uses	47.8261	46.0869	44.3478	42.6087	40.8695	39.1304	39.1304	40.8695	42.6087	44.3478	46.0869	47.8261 (42c)
Average daily hot water use (litres/day)												169.5691 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	184.3981	180.6125	175.9160	168.5678	162.6752	156.3104	153.7118	158.3863	163.3380	170.0397	177.5072	183.8901 (44)
Energy conte	292.0414	257.1898	270.3764	230.7609	218.9921	192.2018	185.9011	196.1153	201.4121	230.7423	252.8916	287.9274 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	43.8062	38.5785	40.5565	34.6141	32.8488	28.8303	27.8852	29.4173	30.2118	34.6113	37.9337	43.1891 (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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090 (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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090 (64)
12Total per year (kWh/year)												3850.5739 (64a)
Electric shower(s)												3851 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	140.9899	125.1546	133.7862	119.1984	116.7010	81.9167	80.4220	83.8183	84.9791	120.6079	126.5569	139.6219 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	198.9376	220.2523	198.9376	205.5688	198.9376	205.5688	198.9376	198.9376	205.5688	198.9376	205.5688	198.9376 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	375.4528	379.3489	369.5310	348.6300	322.2461	297.4490	280.8831	276.9870	286.8049	307.7060	334.0898	358.8869 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399 (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)	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193 (71)
Water heating gains (Table 5)	189.5025	186.2420	179.8202	165.5534	156.8561	113.7732	108.0941	112.6590	118.0265	162.1074	175.7734	187.6639 (72)
Total internal gains	832.0127	853.9630	816.4085	787.8719	746.1596	684.9108	656.0345	656.7033	678.5200	736.8707	783.5518	813.6081 (73)

[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					11.5000	10.6334	0.6300	0.7000		37.3716 (74)			
South					6.9000	46.7521	0.6300	0.7000		98.5875 (78)			
West					13.2400	19.6403	0.6300	0.7000		79.4707 (80)			
Solar gains	215.4298	388.3415	583.0539	800.7816		962.4330	982.6721	936.2003	658.5267	443.6340	262.0531	181.6963 (83)	
Total gains	1047.4424	1242.3044	1399.4624	1588.6535		1708.5926	1667.5829	1592.2349	1469.2101	1337.0467	1180.5046	1045.6048	995.3044 (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	32.5112	32.6300	32.7497	33.3615	33.4866	34.1265	34.1265	34.2574	33.8676	33.4866	33.2373	32.9917
alpha	3.1674	3.1753	3.1833	3.2241	3.2324	3.2751	3.2751	3.2838	3.2578	3.2324	3.2158	3.1994
util living area	0.9747	0.9566	0.9250	0.8517	0.7327	0.5768	0.4400	0.4886	0.7076	0.8897	0.9588	0.9782 (86)
Living	18.8917	19.2032	19.6397	20.2064	20.6336	20.8824	20.9635	20.9487	20.7613	20.1983	19.4626	18.8569
Non living	17.6935	18.0897	18.6411	19.3504	19.8586	20.1420	20.2178	20.2092	20.0183	19.3545	18.4307	17.6559
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	4	0	0	0	0	0	0	0	0	0	0	0
16 / 9	27	0	0	0	0	0	0	0	0	0	0	21
MIT	19.9600	19.2032	19.6397	20.2064	20.6336	20.8824	20.9635	20.9487	20.7613	20.1983	19.4626	19.4864 (87)
Th 2	20.2064	20.2091	20.2118	20.2251	20.2278	20.2412	20.2412	20.2439	20.2359	20.2278	20.2225	20.2171 (88)
util rest of house	0.9712	0.9508	0.9148	0.8315	0.6971	0.5224	0.3708	0.4179	0.6576	0.8702	0.9523	0.9752 (89)
MIT 2	19.2404	18.0897	18.6411	19.3504	19.8586	20.1420	20.2178	20.2092	20.0183	19.3545	18.4307	18.6251 (90)
Living area fraction									fLA =	Living area / (4) =		0.1158 (91)
MIT	19.3237	18.2186	18.7567	19.4496	19.9483	20.2277	20.3042	20.2948	20.1044	19.4522	18.5502	18.7249 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3237	18.2186	18.7567	19.4496	19.9483	20.2277	20.3042	20.2948	20.1044	19.4522	18.5502	18.7249 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9666	0.9310	0.8909	0.8081	0.6830	0.5214	0.3767	0.4228	0.6482	0.8464	0.9333	0.9678	(94)
Useful gains	1012.4610	1156.6126	1246.7715	1283.7967	1167.0060	869.4546	599.8175	621.1831	866.6826	999.2255	975.8867	963.2709	(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	2627.0927	2320.4519	2127.6377	1797.7117	1400.3143	937.5005	617.0655	646.3429	1007.8878	1502.8403	1958.4799	2502.8689	(97)
Space heating kWh	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609	(98a)
Space heating requirement - total per year (kWh/year)												5409.9682	
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	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5409.9682	
Space heating per m2											(98c) / (4) =	26.4339	(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 %)													257.3439 (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	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609 (98)	
Space heating efficiency (main heating system 1)	257.3439	257.3439	257.3439	257.3439	257.3439	0.0000	0.0000	0.0000	0.0000	257.3439	257.3439	257.3439 (210)	
Space heating fuel (main heating system)	466.8017	303.9124	254.6648	143.7838	67.4511	0.0000	0.0000	0.0000	0.0000	145.5987	274.9111	445.1090 (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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090 (64)	
Efficiency of water heater												280.2204 (216)	
(217)m	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204 (217)	
Fuel for water heating, kWh/month	139.3271	123.4923	131.5957	116.3259	113.2586	91.6542	90.1746	93.8196	94.9410	117.4518	124.2235	137.8590 (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	95.5810	86.3312	95.5810	92.4977	95.5810	92.4977	95.5810	95.5810	92.4977	95.5810	92.4977	95.5810 (231)	
Lighting	41.3353	33.1607	29.8575	21.8749	16.8968	13.8048	15.4138	20.0355	26.0241	34.1451	38.5668	42.4841 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													2102.2327 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													280.2204
Water heating fuel used													1374.1235 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.7780)

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mechanical ventilation fans (SFP = 1.7780) 1125.3886 (230a)
 Total electricity for the above, kWh/year 1125.3886 (231)
 Electricity for lighting (calculated in Appendix L) 333.5995 (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 4935.3444 (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	2102.2327	0.1556	327.0088 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1374.1235	0.1415	194.4887 (264)
Space and water heating			521.4975 (265)
Pumps, fans and electric keep-hot	1125.3886	0.1387	156.1053 (267)
Energy for lighting	333.5995	0.1443	48.1487 (268)
Total CO2, kg/year			725.7515 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5500 (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	2102.2327	1.5758	3312.7990 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1374.1235	1.5234	2093.3319 (278)
Space and water heating			5406.1309 (279)
Pumps, fans and electric keep-hot	1125.3886	1.5128	1702.4879 (281)
Energy for lighting	333.5995	1.5338	511.6861 (282)
Total Primary energy kWh/year			7620.3050 (286)
Dwelling Primary energy Rate (DPER)			37.2300 (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	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 518.8131 (5)

2. Ventilation rate

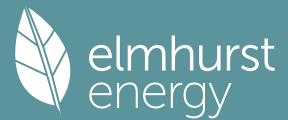
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number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

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0771 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3271 (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) = 0.2780 (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	0.3545	0.3475	0.3406	0.3058	0.2989	0.2641	0.2641	0.2572	0.2780	0.2989	0.3128	0.3267 (22b)
Effective ac	0.5628	0.5604	0.5580	0.5468	0.5447	0.5349	0.5349	0.5331	0.5387	0.5447	0.5489	0.5534 (25)

3. Heat losses and heat loss parameter

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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)			31.6400	1.1450	36.2290			(27)					
Ground Floor			102.3300	0.1300	13.3029			(28a)					
External Wall	238.8000	33.7800	205.0200	0.1800	36.9036			(29a)					
Roof - ceiling	102.3300		102.3300	0.1100	11.2563			(30)					
Total net area of external elements Aum(A, m2)			443.4600					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		99.8318			(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)				31.1800	0.0500		1.5590						
E3 Sill				24.8500	0.0500		1.2425						
E4 Jamb				55.5000	0.0500		2.7750						
E5 Ground floor (normal)				47.1000	0.1600		7.5360						
E6 Intermediate floor within a dwelling				47.1000	0.0000		0.0000						
E10 Eaves (insulation at ceiling level)				29.2100	0.0600		1.7526						
E12 Gable (insulation at ceiling level)				17.8900	0.0600		1.0734						
E16 Corner (normal)				30.4200	0.0900		2.7378						
E17 Corner (inverted - internal area greater than external area)				10.1400	-0.0900		-0.9126						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								17.7637 (36)					
Point Thermal bridges						(36a) =		0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		117.5955 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 96.3617	Feb 95.9439	Mar 95.5345	Apr 93.6113	May 93.2515	Jun 91.5764	Jul 91.5764	Aug 91.2662	Sep 92.2216	Oct 93.2515	Nov 93.9794	Dec 94.7404	(38)
Heat transfer coeff	213.9572	213.5395	213.1300	211.2068	210.8470	209.1719	209.1719	208.8617	209.8171	210.8470	211.5749	212.3359	(39)
Average = Sum(39)m / 12 =												211.2051	
HLP	Jan 1.0454	Feb 1.0434	Mar 1.0414	Apr 1.0320	May 1.0302	Jun 1.0220	Jul 1.0220	Aug 1.0205	Sep 1.0252	Oct 1.0302	Nov 1.0338	Dec 1.0375	(40)
HLP (average)												1.0320	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

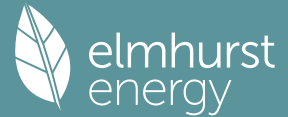
4. Water heating energy requirements (kWh/year)													

Assumed occupancy													3.0080 (42)
Hot water usage for mixer showers													
74.6538	73.5319	71.8971	68.7692	66.4608	63.8866	62.4233	64.0458	65.8243	68.5883	71.7834	74.3678	74.3678	(42a)
Hot water usage for baths													
32.2268	31.7482	31.0742	29.8315	28.9010	27.8692	27.3118	27.9811	28.7098	29.8139	31.0822	32.1179	32.1179	(42b)
Hot water usage for other uses													
45.4348	43.7826	42.1304	40.4782	38.8261	37.1739	37.1739	38.8261	40.4782	42.1304	43.7826	45.4348	45.4348	(42c)
Average daily hot water use (litres/day)													140.0120 (43)
Daily hot water use	Jan 152.3154	Feb 149.0627	Mar 145.1017	Apr 139.0789	May 134.1878	Jun 128.9296	Jul 126.9091	Aug 130.8530	Sep 135.0124	Oct 140.5326	Nov 146.6482	Dec 151.9204	(44)
Energy conte	241.2304	212.2633	223.0160	190.3920	180.6426	158.5340	153.4855	162.0233	166.4838	190.7014	208.9272	237.8707	(45)
Energy content (annual)										Total = Sum(45)m =		2325.5702	
Distribution loss (46)m = 0.15 x (45)m													
36.1846	31.8395	33.4524	28.5588	27.0964	23.7801	23.0228	24.3035	24.9726	28.6052	31.3391	35.6806	35.6806	(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	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	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													
294.5800	260.4501	276.3656	242.0207	233.9922	210.1627	206.8351	215.3729	218.1124	244.0510	260.5559	291.2203	291.2203	(62)
WWHRS	-34.1286	-30.1836	-31.6066	-26.1715	-24.3909	-20.8714	-19.5637	-20.8040	-21.5944	-25.4574	-28.8402	-33.4966	(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	260.4514	230.2665	244.7590	215.8492	209.6014	189.2912	187.2715	194.5689	196.5180	218.5936	231.7157	257.7237	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2636.6101	(64)
Electric shower(s)												2637	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	122.8888	109.1270	116.8325	104.6083	102.7434	94.0155	93.7136	96.5524	96.6588	106.0879	110.7712	121.7717	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 150.3991	Feb 150.3991	Mar 150.3991	Apr 150.3991	May 150.3991	Jun 150.3991	Jul 150.3991	Aug 150.3991	Sep 150.3991	Oct 150.3991	Nov 150.3991	Dec 150.3991	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
198.9376	220.2523	198.9376	205.5688	198.9376	205.5688	198.9376	198.9376	198.9376	205.5688	198.9376	205.5688	198.9376	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
375.4528	379.3489	369.5310	348.6300	322.2461	297.4490	280.8831	276.9870	286.8049	307.7060	334.0898	358.8869	358.8869	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	(71)
Water heating gains (Table 5)													
165.1731	162.3913	157.0329	145.2893	138.0959	130.5771	125.9592	129.7748	134.2483	142.5913	153.8489	163.6716	163.6716	(72)
Total internal gains	810.6833	833.1122	796.6213	770.6078	730.3994	701.7147	673.8996	673.8191	694.7418	720.3545	764.6273	792.6158	(73)

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6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
North	11.5000				10.6334		0.6300		0.7000	0.7700	37.3716 (74)
South	6.9000				46.7521		0.6300		0.7000	0.7700	98.5875 (78)
West	13.2400				19.6403		0.6300		0.7000	0.7700	79.4707 (80)
Solar gains	215.4298	388.3415	583.0539	800.7816	962.4330	982.6721	936.2003	812.5068	658.5267	443.6340	181.6963 (83)
Total gains	1026.1130	1221.4537	1379.6752	1571.3894	1692.8324	1684.3868	1610.0999	1486.3260	1353.2685	1163.9885	974.3121 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	26.5707	26.6227	26.6739	26.9167	26.9627	27.1786	27.1786	27.2190	27.0950	26.9627	26.8699	26.7736
util living area	2.7714	2.7748	2.7783	2.7944	2.7975	2.8119	2.8119	2.8146	2.8063	2.7975	2.7913	2.7849
util living area	0.9773	0.9628	0.9382	0.8825	0.7882	0.6482	0.5140	0.5638	0.7616	0.9123	0.9649	0.9803 (86)
MIT	18.3428	18.6597	19.1405	19.7857	20.3486	20.7426	20.9032	20.8720	20.5657	19.8244	18.9752	18.2917 (87)
Th 2	20.0456	20.0473	20.0490	20.0568	20.0582	20.0650	20.0650	20.0663	20.0624	20.0582	20.0553	20.0522 (88)
util rest of house	0.9739	0.9572	0.9285	0.8632	0.7513	0.5837	0.4226	0.4732	0.7077	0.8940	0.9587	0.9773 (89)
MIT 2	16.9021	17.3053	17.9145	18.7238	19.4040	19.8509	20.0057	19.9828	19.6704	18.7861	17.7149	16.8408 (90)
Living area fraction	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (91)
MIT	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (92)
Temperature adjustment	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (93)
adjusted MIT	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (93)

8. Space heating requirement

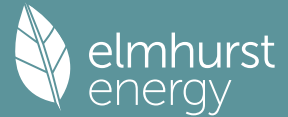
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9576	0.9353	0.9010	0.8323	0.7266	0.5753	0.4272	0.4753	0.6884	0.8643	0.9375	0.9624 (94)
Ext temp.	982.5640	1142.4197	1243.0986	1307.9313	1229.9682	968.9643	687.9134	706.4077	931.6081	1006.0188	962.5092	937.7124 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2732.0137	2682.5145	2463.0263	2100.8261	1647.4212	1119.9445	734.1098	769.8094	1190.5153	1751.3633	2276.7241	2719.7787 (97)
Space heating requirement - total per year (kWh/year)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98c)
Space heating per m2	(98c) / (4) =											33.9698 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	1410.1740	1121.2825	983.3437	618.5095	336.4952	0.0000	0.0000	0.0000	0.0000	600.7977	1025.1731	1436.4651 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	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)
Efficiency of water heater (217)m	260.4514	230.2665	244.7590	215.8492	209.6014	189.2912	187.2715	194.5689	196.5180	218.5936	231.7157	257.7237 (64)
Fuel for water heating, kWh/month	87.1609	87.0139	86.7226	86.1347	84.9400	79.8000	79.8000	79.8000	79.8000	86.0559	86.8727	79.8000 (216)
Space cooling fuel requirement (221)m	298.8166	264.6317	282.2320	250.5949	246.7640	237.2070	234.6760	243.8207	246.2632	254.0136	266.7303	295.5565 (219)
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	41.3353	33.1607	29.8575	21.8749	16.8968	13.8048	15.4138	20.0355	26.0241	34.1451	38.5668	42.4841 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-85.2492	-115.1877	-158.6742	-170.5943	-177.4338	-163.0958	-160.8174	-154.7835	-143.5058	-127.6509	-91.8131	-74.2796 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-64.5821	-133.5811	-261.5328	-387.3119	-507.0869	-507.9160	-502.1672	-427.6564	-316.6298	-189.4367	-85.6635	-51.2671 (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)

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	7532.2408	1.1300	8511.4321 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3121.3066	1.1300	3527.0764 (278)
Space and water heating			12038.5085 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	333.5995	1.5338	511.6861 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1623.0852	1.5010	-2436.3164
PV Unit electricity exported	-3434.8314	0.4636	-1592.5455
Total			-4028.8619 (283)
Total Primary energy kWh/year			8651.4335 (286)
Target Primary Energy Rate (TPER)			42.2700 (287)

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Property Reference	OP-D320 P5WINT				Issued on Date	29/11/2024
Assessment Reference	P5WINT	Prop Type Ref	P5WINT			
Property	P5WINT					
SAP Rating	81 B	DER	3.55	TER	8.03	
Environmental	96 A	% DER < TER				55.79
CO ₂ Emissions (t/year)	0.66	DFEE	37.98	TFEE	39.13	
Compliance Check	See BREL	% DFEE < TFEE				2.92
% DPER < TPER	11.91	DPER	37.23	TPER	42.27	
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	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	518.8131 (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) = 0.0771 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2521 (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) = 0.2143 (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	0.2732	0.2679	0.2625	0.2357	0.2304	0.2036	0.2036	0.1982	0.2143	0.2304	0.2411	0.2518 (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	0.5373	0.5359	0.5345	0.5278	0.5265	0.5207	0.5207	0.5196	0.5230	0.5265	0.5291	0.5317 (25)

3. Heat losses and heat loss parameter

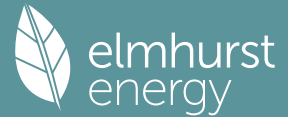
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			31.6400	1.2357	39.0989		(27)
Ground Floor			102.3300	0.1100	11.2563		(28a)
External Wall	238.8000	33.7800	205.0200	0.1700	34.8534		(29a)
Roof - ceiling	102.3300		102.3300	0.1100	11.2563		(30)
Total net area of external elements Aum(A, m ²)			443.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	98.6049		(33)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	31.1800	0.0500	1.5590
E3 Sill	24.8500	0.0500	1.2425
E4 Jamb	55.5000	0.0500	2.7750
E5 Ground floor (normal)	47.1000	0.1600	7.5360
E6 Intermediate floor within a dwelling	47.1000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	29.2100	0.0600	1.7526

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E12 Gable (insulation at ceiling level)	17.8900	0.0600	1.0734
E16 Corner (normal)	30.4200	0.0900	2.7378
E17 Corner (inverted - internal area greater than external area)	10.1400	-0.0900	-0.9126
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.7637 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	116.3686 (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	91.9941	91.7460	91.5027	90.3604	90.1466	89.1517	89.1517	88.9674	89.5349	90.1466	90.5790	91.0311 (38)
Heat transfer coeff	208.3626	208.1145	207.8713	206.7289	206.5152	205.5202	205.5202	205.3360	205.9035	206.5152	206.9476	207.3996 (39)
Average = Sum(39)m / 12 =												206.7279
HLP	1.0181	1.0169	1.0157	1.0101	1.0091	1.0042	1.0042	1.0033	1.0061	1.0091	1.0112	1.0134 (40)
HLP (average)												1.0101
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

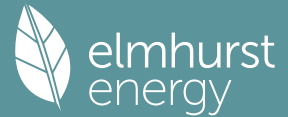
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												3.0080 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths												32.2268 (42b)
Hot water usage for other uses												45.4348 (42c)
Average daily hot water use (litres/day)												71.1837 (43)
Daily hot water use												
Energy conte	77.6616	75.5308	73.2046	70.3097	67.7270	65.0431	64.4857	66.8072	69.1881	71.9443	74.8648	77.5526 (44)
Energy content (annual)	122.9969	107.5548	112.5128	96.2505	91.1736	79.9780	77.9899	82.7212	85.3158	97.6277	106.6586	121.4287 (45)
Distribution loss (46)m = 0.15 x (45)m												1182.2086
Water storage loss:												
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss												0.0000 (57)
Combi loss												0.0000 (59)
Total heat required for water heating calculated for each month												
WWHRS	104.5474	91.4216	95.6359	81.8129	77.4976	67.9813	66.2914	70.3130	72.5184	82.9836	90.6598	103.2144 (62)
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 (63a)
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 (63b)
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 (63c)
Output from w/h	104.5474	91.4216	95.6359	81.8129	77.4976	67.9813	66.2914	70.3130	72.5184	82.9836	90.6598	103.2144 (64)
12Total per year (kWh/year)												1004.8773 (64)
Electric shower(s)												1005 (64)
Heat gains from water heating, kWh/month												
	59.7853	53.2692	58.1679	55.5089	56.5505	53.9437	55.7418	56.5505	55.5089	58.1679	57.0741	59.7853 (64a)
	41.0832	36.1727	38.4509	34.3305	33.5120	30.4813	30.5083	31.7159	32.0068	35.2879	36.9335	40.7499 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
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)												
Water heating gains (Table 5)												
Total internal gains	697.7295	721.5493	688.2697	669.9997	634.3465	613.4727	588.9462	586.6732	604.9474	622.1932	659.0749	680.7156 (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	11.5000	10.6334	0.6300	0.7000	0.7700	37.3716 (74)						
South	6.9000	46.7521	0.6300	0.7000	0.7700	98.5875 (78)						
West	13.2400	19.6403	0.6300	0.7000	0.7700	79.4707 (80)						
Solar gains	215.4298	388.3415	583.0539	800.7816	962.4330	982.6721	936.2003	812.5068	658.5267	443.6340	262.0531	181.6963 (83)
Total gains	913.1592	1109.8908	1271.3236	1470.7813	1596.7795	1596.1448	1525.1465	1399.1800	1263.4741	1065.8272	921.1279	862.4119 (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	

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tau	27.2842	27.3167	27.3487	27.4998	27.5282	27.6615	27.6615	27.6863	27.6100	27.5282	27.4707	27.4109
alpha	2.8189	2.8211	2.8232	2.8333	2.8352	2.8441	2.8441	2.8458	2.8407	2.8352	2.8314	2.8274
util living area	0.9829	0.9699	0.9475	0.8948	0.8032	0.6647	0.5299	0.5831	0.7813	0.9259	0.9726	0.9854 (86)
MIT	18.3040	18.6245	19.1090	19.7587	20.3315	20.7331	20.8991	20.8649	20.5453	19.7838	18.9267	18.2446 (87)
Th 2	20.0683	20.0693	20.0703	20.0749	20.0758	20.0798	20.0798	20.0806	20.0783	20.0758	20.0740	20.0722 (88)
util rest of house	0.9803	0.9654	0.9392	0.8771	0.7681	0.6012	0.4384	0.4927	0.7299	0.9099	0.9677	0.9832 (89)
MIT 2	17.5725	17.8909	18.3702	19.0067	19.5485	19.9050	20.0309	20.0108	19.7545	19.0418	18.1966	17.5160 (90)
Living area fraction	17.6572	17.9758	18.4558	19.0938	19.6392	20.0009	20.1315	20.1097	19.8461	19.1277	18.2812	17.6004 (91)
MIT	17.6572	17.9758	18.4558	19.0938	19.6392	20.0009	20.1315	20.1097	19.8461	19.1277	18.2812	17.6004 (92)
Temperature adjustment	17.6572	17.9758	18.4558	19.0938	19.6392	20.0009	20.1315	20.1097	19.8461	19.1277	18.2812	17.6004 (93)
adjusted MIT	17.6572	17.9758	18.4558	19.0938	19.6392	20.0009	20.1315	20.1097	19.8461	19.1277	18.2812	17.6004 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9705	0.9513	0.9202	0.8542	0.7490	0.5952	0.4439	0.4958	0.7149	0.8887	0.9543	0.9745 (94)
Useful gains	886.2616	1055.7841	1169.9255	1256.4032	1195.9117	950.0937	676.9478	693.6688	903.2203	947.2204	879.0402	840.4121 (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	2783.1408	2721.2678	2485.2604	2107.3552	1639.5679	1109.9976	725.7867	761.7409	1183.1402	1761.1015	2313.9156	2779.2369 (97)
Space heating kWh	1411.2781	1119.2051	978.6091	612.6854	330.0802	0.0000	0.0000	0.0000	0.0000	605.5276	1033.1103	1442.4857 (98a)
Space heating requirement - total per year (kWh/year)												7532.9815
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	1411.2781	1119.2051	978.6091	612.6854	330.0802	0.0000	0.0000	0.0000	0.0000	605.5276	1033.1103	1442.4857 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7532.9815
Space heating per m2											(98c) / (4) =	36.8073 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	1931.8901	1520.8496	1560.5533	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7063	0.7774	0.7366	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1364.5791	1182.3303	1149.4881	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1768.4884	1689.5180	1546.3886	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	290.8147	377.3476	295.2940	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	72.7037	94.3369	73.8235	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												240.8641 (107)
Energy for space heating												36.8073 (99)
Energy for space cooling												1.1769 (108)
Total												37.9842 (109)
Fabric Energy Efficiency (DFEE)												38.0 (109)

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

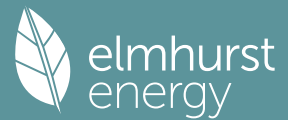
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	518.8131 (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) = 0.0771 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3271 (18)

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Number of sides sheltered

2 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.2780 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.3545	0.3475	0.3406	0.3058	0.2989	0.2641	0.2641	0.2572	0.2780	0.2989	0.3128	0.3267	(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	0.5628	0.5604	0.5580	0.5468	0.5447	0.5349	0.5349	0.5331	0.5387	0.5447	0.5489	0.5534	(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)			31.6400	1.1450	36.2290			(27)
Ground Floor			102.3300	0.1300	13.3029			(28a)
External Wall	238.8000	33.7800	205.0200	0.1800	36.9036			(29a)
Roof - ceiling	102.3300		102.3300	0.1100	11.2563			(30)
Total net area of external elements Aum(A, m2)			443.4600					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	99.8318		(33)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length m	Psi-value W/m2K	Total W/K	
E2 Other lintels (including other steel lintels)	31.1800	0.0500	1.5590	
E3 Sill	24.8500	0.0500	1.2425	
E4 Jamb	55.5000	0.0500	2.7750	
E5 Ground floor (normal)	47.1000	0.1600	7.5360	
E6 Intermediate floor within a dwelling	47.1000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	29.2100	0.0600	1.7526	
E12 Gable (insulation at ceiling level)	17.8900	0.0600	1.0734	
E16 Corner (normal)	30.4200	0.0900	2.7378	
E17 Corner (inverted - internal area greater than external area)	10.1400	-0.0900	-0.9126	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.7637	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	117.5955 (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	96.3617	95.9439	95.5345	93.6113	93.2515	91.5764	91.5764	91.2662	92.2216	93.2515	93.9794	94.7404	(38)
Heat transfer coeff	213.9572	213.5395	213.1300	211.2068	210.8470	209.1719	209.1719	208.8617	209.8171	210.8470	211.5749	212.3359	(39)
Average = Sum(39)m / 12 =												211.2051	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0454	1.0434	1.0414	1.0320	1.0302	1.0220	1.0220	1.0205	1.0252	1.0302	1.0338	1.0375	(40)
HLP (average)												1.0320	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

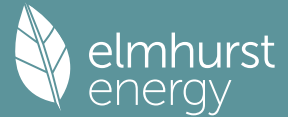
4. Water heating energy requirements (kWh/year)

Assumed occupancy													3.0080 (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	32.2268	31.7482	31.0742	29.8315	28.9010	27.8692	27.3118	27.9811	28.7098	29.8139	31.0822	32.1179	(42b)
Hot water usage for other uses	45.4348	43.7826	42.1304	40.4782	38.8261	37.1739	37.1739	38.8261	40.4782	42.1304	43.7826	45.4348	(42c)
Average daily hot water use (litres/day)												71.1837	(43)
Daily hot water use	77.6616	75.5308	73.2046	70.3097	67.7270	65.0431	64.4857	66.8072	69.1881	71.9443	74.8648	77.5526	(44)
Energy conte	122.9969	107.5548	112.5128	96.2505	91.1736	79.9780	77.9899	82.7212	85.3158	97.6277	106.6586	121.4287	(45)
Energy content (annual)										Total = Sum(45)m =		1182.2086	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	104.5474	91.4216	95.6359	81.8129	77.4976	67.9813	66.2914	70.3130	72.5184	82.9836	90.6598	103.2144	(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	104.5474	91.4216	95.6359	81.8129	77.4976	67.9813	66.2914	70.3130	72.5184	82.9836	90.6598	103.2144	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1004.8773	(64)
Electric shower(s)	59.7853	53.2692	58.1679	55.5089	56.5505	53.9437	55.7418	56.5505	55.5089	58.1679	57.0741	59.7853	(64a)
Heat gains from water heating, kWh/month	41.0832	36.1727	38.4509	34.3305	33.5120	30.4813	30.5083	31.7159	32.0068	35.2879	36.9335	40.7499	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	198.9376	220.2523	198.9376	205.5688	198.9376	205.5688	198.9376	198.9376	205.5688	198.9376	205.5688	198.9376 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	375.4528	379.3489	369.5310	348.6300	322.2461	297.4490	280.8831	276.9870	286.8049	307.7060	334.0898	358.8869 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399 (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)	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193 (71)
Water heating gains (Table 5)	55.2193	53.8284	51.6814	47.6812	45.0430	42.3351	41.0058	42.6289	44.4539	47.4299	51.2965	54.7714 (72)
Total internal gains	697.7295	721.5493	688.2697	669.9997	634.3465	613.4727	588.9462	586.6732	604.9474	622.1932	659.0749	680.7156 (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					11.5000	10.6334	0.6300	0.7000				0.7700	37.3716 (74)
South					6.9000	46.7521	0.6300	0.7000				0.7700	98.5875 (78)
West					13.2400	19.6403	0.6300	0.7000				0.7700	79.4707 (80)
Solar gains	215.4298	388.3415	583.0539	800.7816	962.4330	982.6721	936.2003	812.5068	658.5267	443.6340	262.0531	181.6963	(83)
Total gains	913.1592	1109.8908	1271.3236	1470.7813	1596.7795	1596.1448	1525.1465	1399.1800	1263.4741	1065.8272	921.1279	862.4119	(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	26.5707	26.6227	26.6739	26.9167	26.9627	27.1786	27.1786	27.2190	27.0950	26.9627	26.8699	26.7736
alpha	2.7714	2.7748	2.7783	2.7944	2.7975	2.8119	2.8119	2.8146	2.8063	2.7975	2.7913	2.7849
util living area	0.9829	0.9702	0.9483	0.8967	0.8070	0.6698	0.5358	0.5886	0.7852	0.9270	0.9728	0.9854 (86)
MIT	18.2339	18.5571	19.0486	19.7151	20.3012	20.7190	20.8923	20.8569	20.5255	19.7476	18.8771	18.1826 (87)
Th 2	20.0456	20.0473	20.0490	20.0568	20.0582	20.0650	20.0650	20.0663	20.0624	20.0582	20.0553	20.0522 (88)
util rest of house	0.9803	0.9656	0.9400	0.8791	0.7718	0.6057	0.4425	0.4968	0.7336	0.9111	0.9678	0.9831 (89)
MIT 2	17.4882	17.8097	18.2965	18.9520	19.5074	19.8812	20.0130	19.9926	19.7249	18.9946	18.1351	17.4414 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.5745	17.8962	18.3836	19.0404	19.5994	19.9782	20.1148	20.0927	19.8176	19.0818	18.2210	17.5272 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.5745	17.8962	18.3836	19.0404	19.5994	19.9782	20.1148	20.0927	19.8176	19.0818	18.2210	17.5272 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9704	0.9513	0.9207	0.8557	0.7520	0.5992	0.4479	0.4996	0.7179	0.8896	0.9543	0.9743 (94)
Ext temp.	886.0942	1055.8245	1170.5687	1258.5970	1200.7776	956.3603	683.0412	699.0756	907.0272	948.1069	879.0261	840.2519 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2840.1807	2775.2050	2532.7477	2141.7139	1665.5546	1124.9728	735.2038	771.2566	1199.6433	1788.3578	2352.9335	2829.8467 (97)
Space heating requirement - total per year (kWh/year)	1453.8403	1155.4237	1013.4612	635.8442	345.7941	0.0000	0.0000	0.0000	0.0000	625.1467	1061.2133	1480.2585 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	1453.8403	1155.4237	1013.4612	635.8442	345.7941	0.0000	0.0000	0.0000	0.0000	625.1467	1061.2133	1480.2585 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	7770.9821											
Space heating per m2	(98c) / (4) = 37.9702 (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	1966.2161	1547.8723	1587.3492	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6974	0.7691	0.7281	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1371.2978	1190.3918	1155.7959	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1768.4884	1689.5180	1546.3886	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	285.9772	371.3499	290.6010	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	71.4943	92.8375	72.6502	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement	236.9820 (107)											
Energy for space heating	37.9702 (99)											
Energy for space cooling	1.1579 (108)											
Total	39.1281 (109)											
Fabric Energy Efficiency (TFEE)	39.1 (109)											

Full SAP Calculation Printout



Property Reference	OP-D320 P5WINT				Issued on Date	29/11/2024
Assessment Reference	P5WINT	Prop Type Ref	P5WINT			
Property	P5WINT					
SAP Rating	81 B	DER	3.55	TER	8.03	
Environmental	96 A	% DER < TER				55.79
CO ₂ Emissions (t/year)	0.66	DFEE	37.98	TFEE	39.13	
Compliance Check	See BREL	% DFEE < TFEE				2.92
% DPER < TPER	11.91	DPER	37.23	TPER	42.27	
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	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 518.8131 (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)

	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	0.1897	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) =												69.6000 (23c)
Effective ac	0.3417	0.3379	0.3342	0.3156	0.3119	0.2933	0.2933	0.2896	0.3007	0.3119	0.3193	0.3268 (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)			31.6400	1.2357	39.0989		(27)
Ground Floor			102.3300	0.1100	11.2563		(28a)
External Wall	238.8000	33.7800	205.0200	0.1700	34.8534		(29a)
Roof - ceiling	102.3300		102.3300	0.1100	11.2563		(30)
Total net area of external elements Aum(A, m ²)			443.4600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	98.6049		(33)
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)				31.1800	0.0500	1.5590	
E3 Sill				24.8500	0.0500	1.2425	
E4 Jamb				55.5000	0.0500	2.7750	

elmhurst
energy

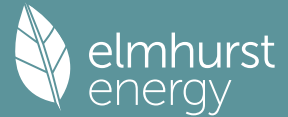
Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(39)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	58.4944	57.8577	57.2210	54.0376	53.4009	50.2175	50.2175	49.5809	51.4909	53.4009	54.6743	55.9477 (38)
Heat transfer coeff												
	174.8630	174.2263	173.5896	170.4062	169.7695	166.5861	166.5861	165.9494	167.8595	169.7695	171.0429	172.3162 (39)
Average = Sum(39)m / 12 =												170.2470
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.8544	0.8513	0.8482	0.8326	0.8295	0.8140	0.8140	0.8109	0.8202	0.8295	0.8357	0.8420 (40)
HLP (average)												0.8319
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												3.0080 (42)
Hot water usage for mixer showers	102.6490	101.1064	98.8585	94.5576	91.3836	87.8440	85.8321	88.0630	90.5084	94.3089	98.7022	102.2557 (42a)
Hot water usage for baths	33.9230	33.4192	32.7097	31.4016	30.4221	29.3360	28.7493	29.4538	30.2209	31.3830	32.7181	33.8083 (42b)
Hot water usage for other uses	47.8261	46.0869	44.3478	42.6087	40.8695	39.1304	39.1304	40.8695	42.6087	44.3478	46.0869	47.8261 (42c)
Average daily hot water use (litres/day)												169.5691 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	184.3981	180.6125	175.9160	168.5678	162.6752	156.3104	153.7118	158.3863	163.3380	170.0397	177.5072	183.8901 (44)
Energy conte	292.0414	257.1898	270.3764	230.7609	218.9921	192.2018	185.9011	196.1153	201.4121	230.7423	252.8916	287.9274 (45)
Energy content (annual)										Total = Sum(45)m =		2816.5523
Distribution loss (46)m = 0.15 x (45)m	43.8062	38.5785	40.5565	34.6141	32.8488	28.8303	27.8852	29.4173	30.2118	34.6113	37.9337	43.1891 (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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090 (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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				3850.5739 (64)
Electric shower(s)												3851 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	140.9899	125.1546	133.7862	119.1984	116.7010	81.9167	80.4220	83.8183	84.9791	120.6079	126.5569	139.6219 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991	150.3991 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	198.9376	220.2523	198.9376	205.5688	198.9376	205.5688	198.9376	198.9376	205.5688	198.9376	205.5688	198.9376 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	375.4528	379.3489	369.5310	348.6300	322.2461	297.4490	280.8831	276.9870	286.8049	307.7060	334.0898	358.8869 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399 (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)	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193 (71)
Water heating gains (Table 5)	189.5025	186.2420	179.8202	165.5534	156.8561	113.7732	108.0941	112.6590	118.0265	162.1074	175.7734	187.6639 (72)
Total internal gains	832.0127	853.9630	816.4085	787.8719	746.1596	684.9108	656.0345	656.7033	678.5200	736.8707	783.5518	813.6081 (73)

[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					11.5000	10.6334	0.6300	0.7000		37.3716 (74)			
South					6.9000	46.7521	0.6300	0.7000		98.5875 (78)			
West					13.2400	19.6403	0.6300	0.7000		79.4707 (80)			
Solar gains	215.4298	388.3415	583.0539	800.7816		962.4330	982.6721	936.2003	658.5267	443.6340	262.0531	181.6963 (83)	
Total gains	1047.4424	1242.3044	1399.4624	1588.6535		1708.5926	1667.5829	1592.2349	1469.2101	1337.0467	1180.5046	1045.6048	995.3044 (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	32.5112	32.6300	32.7497	33.3615	33.4866	34.1265	34.1265	34.2574	33.8676	33.4866	33.2373	32.9917
alpha	3.1674	3.1753	3.1833	3.2241	3.2324	3.2751	3.2751	3.2838	3.2578	3.2324	3.2158	3.1994
util living area	0.9747	0.9566	0.9250	0.8517	0.7327	0.5768	0.4400	0.4886	0.7076	0.8897	0.9588	0.9782 (86)
Living	18.8917	19.2032	19.6397	20.2064	20.6336	20.8824	20.9635	20.9487	20.7613	20.1983	19.4626	18.8569
Non living	17.6935	18.0897	18.6411	19.3504	19.8586	20.1420	20.2178	20.2092	20.0183	19.3545	18.4307	17.6559
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	4	0	0	0	0	0	0	0	0	0	0	0
16 / 9	27	0	0	0	0	0	0	0	0	0	0	21
MIT	19.9600	19.2032	19.6397	20.2064	20.6336	20.8824	20.9635	20.9487	20.7613	20.1983	19.4626	19.4864 (87)
Th 2	20.2064	20.2091	20.2118	20.2251	20.2278	20.2412	20.2412	20.2439	20.2359	20.2278	20.2225	20.2171 (88)
util rest of house	0.9712	0.9508	0.9148	0.8315	0.6971	0.5224	0.3708	0.4179	0.6576	0.8702	0.9523	0.9752 (89)
MIT 2	19.2404	18.0897	18.6411	19.3504	19.8586	20.1420	20.2178	20.2092	20.0183	19.3545	18.4307	18.6251 (90)
Living area fraction									fLA =	Living area / (4) =		0.1158 (91)
MIT	19.3237	18.2186	18.7567	19.4496	19.9483	20.2277	20.3042	20.2948	20.1044	19.4522	18.5502	18.7249 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3237	18.2186	18.7567	19.4496	19.9483	20.2277	20.3042	20.2948	20.1044	19.4522	18.5502	18.7249 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9666	0.9310	0.8909	0.8081	0.6830	0.5214	0.3767	0.4228	0.6482	0.8464	0.9333	0.9678	(94)
Useful gains	1012.4610	1156.6126	1246.7715	1283.7967	1167.0060	869.4546	599.8175	621.1831	866.6826	999.2255	975.8867	963.2709	(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	2627.0927	2320.4519	2127.6377	1797.7117	1400.3143	937.5005	617.0655	646.3429	1007.8878	1502.8403	1958.4799	2502.8689	(97)
Space heating kWh	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609	(98a)
Space heating requirement - total per year (kWh/year)												5409.9682	
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	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5409.9682	
Space heating per m2											(98c) / (4) =	26.4339	(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 %)													257.3439 (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	1201.2860	782.1000	655.3645	370.0188	173.5814	0.0000	0.0000	0.0000	0.0000	374.6895	707.4671	1145.4609	(98)
Space heating efficiency (main heating system 1)	257.3439	257.3439	257.3439	257.3439	257.3439	0.0000	0.0000	0.0000	0.0000	257.3439	257.3439	257.3439	(210)
Space heating fuel (main heating system)	466.8017	303.9124	254.6648	143.7838	67.4511	0.0000	0.0000	0.0000	0.0000	145.5987	274.9111	445.1090	(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	390.4230	346.0506	368.7580	325.9689	317.3737	256.8338	252.6875	262.9017	266.0441	329.1239	348.0996	386.3090	(64)
Efficiency of water heater													280.2204 (216)
(217)m	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	280.2204	(217)
Fuel for water heating, kWh/month	139.3271	123.4923	131.5957	116.3259	113.2586	91.6542	90.1746	93.8196	94.9410	117.4518	124.2235	137.8590	(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	95.5810	86.3312	95.5810	92.4977	95.5810	92.4977	95.5810	95.5810	92.4977	95.5810	92.4977	95.5810	(231)
Lighting	41.3353	33.1607	29.8575	21.8749	16.8968	13.8048	15.4138	20.0355	26.0241	34.1451	38.5668	42.4841	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													2102.2327 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													280.2204
Water heating fuel used													1374.1235 (219)
Space cooling fuel													0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.7780)

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mechanical ventilation fans (SFP = 1.7780) 1125.3886 (230a)
 Total electricity for the above, kWh/year 1125.3886 (231)
 Electricity for lighting (calculated in Appendix L) 333.5995 (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 4935.3444 (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	2102.2327	0.1556	327.0088 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1374.1235	0.1415	194.4887 (264)
Space and water heating			521.4975 (265)
Pumps, fans and electric keep-hot	1125.3886	0.1387	156.1053 (267)
Energy for lighting	333.5995	0.1443	48.1487 (268)
Total CO2, kg/year			725.7515 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.5500 (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	2102.2327	1.5758	3312.7990 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1374.1235	1.5234	2093.3319 (278)
Space and water heating			5406.1309 (279)
Pumps, fans and electric keep-hot	1125.3886	1.5128	1702.4879 (281)
Energy for lighting	333.5995	1.5338	511.6861 (282)
Total Primary energy kWh/year			7620.3050 (286)
Dwelling Primary energy Rate (DPER)			37.2300 (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	102.3300 (1b)	x 2.4600 (2b)	= 251.7318 (1b) - (3b)
First floor	102.3300 (1c)	x 2.6100 (2c)	= 267.0813 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	204.6600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 518.8131 (5)

2. Ventilation rate

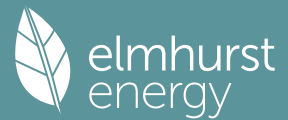
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number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

Air changes per hour
 Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 40.0000 / (5) = 0.0771 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3271 (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) = 0.2780 (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	0.3545	0.3475	0.3406	0.3058	0.2989	0.2641	0.2641	0.2572	0.2780	0.2989	0.3128	0.3267 (22b)
Effective ac	0.5628	0.5604	0.5580	0.5468	0.5447	0.5349	0.5349	0.5331	0.5387	0.5447	0.5489	0.5534 (25)

3. Heat losses and heat loss parameter

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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)			31.6400	1.1450	36.2290			(27)					
Ground Floor			102.3300	0.1300	13.3029			(28a)					
External Wall	238.8000	33.7800	205.0200	0.1800	36.9036			(29a)					
Roof - ceiling	102.3300		102.3300	0.1100	11.2563			(30)					
Total net area of external elements Aum(A, m2)			443.4600					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		99.8318			(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)				31.1800	0.0500		1.5590						
E3 Sill				24.8500	0.0500		1.2425						
E4 Jamb				55.5000	0.0500		2.7750						
E5 Ground floor (normal)				47.1000	0.1600		7.5360						
E6 Intermediate floor within a dwelling				47.1000	0.0000		0.0000						
E10 Eaves (insulation at ceiling level)				29.2100	0.0600		1.7526						
E12 Gable (insulation at ceiling level)				17.8900	0.0600		1.0734						
E16 Corner (normal)				30.4200	0.0900		2.7378						
E17 Corner (inverted - internal area greater than external area)				10.1400	-0.0900		-0.9126						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								17.7637 (36)					
Point Thermal bridges						(36a) =		0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		117.5955 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 96.3617	Feb 95.9439	Mar 95.5345	Apr 93.6113	May 93.2515	Jun 91.5764	Jul 91.5764	Aug 91.2662	Sep 92.2216	Oct 93.2515	Nov 93.9794	Dec 94.7404	(38)
Heat transfer coeff	213.9572	213.5395	213.1300	211.2068	210.8470	209.1719	209.1719	208.8617	209.8171	210.8470	211.5749	212.3359	(39)
Average = Sum(39)m / 12 =												211.2051	
HLP	Jan 1.0454	Feb 1.0434	Mar 1.0414	Apr 1.0320	May 1.0302	Jun 1.0220	Jul 1.0220	Aug 1.0205	Sep 1.0252	Oct 1.0302	Nov 1.0338	Dec 1.0375	(40)
HLP (average)												1.0320	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

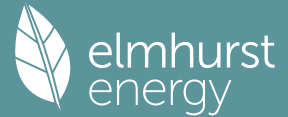
4. Water heating energy requirements (kWh/year)													

Assumed occupancy													3.0080 (42)
Hot water usage for mixer showers													
74.6538	73.5319	71.8971	68.7692	66.4608	63.8866	62.4233	64.0458	65.8243	68.5883	71.7834	74.3678	74.3678	(42a)
Hot water usage for baths													
32.2268	31.7482	31.0742	29.8315	28.9010	27.8692	27.3118	27.9811	28.7098	29.8139	31.0822	32.1179	32.1179	(42b)
Hot water usage for other uses													
45.4348	43.7826	42.1304	40.4782	38.8261	37.1739	37.1739	38.8261	40.4782	42.1304	43.7826	45.4348	45.4348	(42c)
Average daily hot water use (litres/day)													140.0120 (43)
Daily hot water use	Jan 152.3154	Feb 149.0627	Mar 145.1017	Apr 139.0789	May 134.1878	Jun 128.9296	Jul 126.9091	Aug 130.8530	Sep 135.0124	Oct 140.5326	Nov 146.6482	Dec 151.9204	(44)
Energy conte	241.2304	212.2633	223.0160	190.3920	180.6426	158.5340	153.4855	162.0233	166.4838	190.7014	208.9272	237.8707	(45)
Energy content (annual)										Total = Sum(45)m =		2325.5702	
Distribution loss (46)m = 0.15 x (45)m													
36.1846	31.8395	33.4524	28.5588	27.0964	23.7801	23.0228	24.3035	24.9726	28.6052	31.3391	35.6806	35.6806	(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	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	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													
294.5800	260.4501	276.3656	242.0207	233.9922	210.1627	206.8351	215.3729	218.1124	244.0510	260.5559	291.2203	291.2203	(62)
WWHRS	-34.1286	-30.1836	-31.6066	-26.1715	-24.3909	-20.8714	-19.5637	-20.8040	-21.5944	-25.4574	-28.8402	-33.4966	(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	260.4514	230.2665	244.7590	215.8492	209.6014	189.2912	187.2715	194.5689	196.5180	218.5936	231.7157	257.7237	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2636.6101	(64)
Electric shower(s)												2637	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	122.8888	109.1270	116.8325	104.6083	102.7434	94.0155	93.7136	96.5524	96.6588	106.0879	110.7712	121.7717	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 150.3991	Feb 150.3991	Mar 150.3991	Apr 150.3991	May 150.3991	Jun 150.3991	Jul 150.3991	Aug 150.3991	Sep 150.3991	Oct 150.3991	Nov 150.3991	Dec 150.3991	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
198.9376	220.2523	198.9376	205.5688	198.9376	205.5688	198.9376	198.9376	198.9376	205.5688	198.9376	205.5688	198.9376	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
375.4528	379.3489	369.5310	348.6300	322.2461	297.4490	280.8831	276.9870	286.8049	307.7060	334.0898	358.8869	358.8869	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	38.0399	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	-120.3193	(71)
Water heating gains (Table 5)													
165.1731	162.3913	157.0329	145.2893	138.0959	130.5771	125.9592	129.7748	134.2483	142.5913	153.8489	163.6716	163.6716	(72)
Total internal gains	810.6833	833.1122	796.6213	770.6078	730.3994	701.7147	673.8996	673.8191	694.7418	720.3545	764.6273	792.6158	(73)

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6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
North	11.5000				10.6334		0.6300		0.7000	0.7700	37.3716 (74)
South	6.9000				46.7521		0.6300		0.7000	0.7700	98.5875 (78)
West	13.2400				19.6403		0.6300		0.7000	0.7700	79.4707 (80)
Solar gains	215.4298	388.3415	583.0539	800.7816	962.4330	982.6721	936.2003	812.5068	658.5267	443.6340	181.6963 (83)
Total gains	1026.1130	1221.4537	1379.6752	1571.3894	1692.8324	1684.3868	1610.0999	1486.3260	1353.2685	1163.9885	974.3121 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	26.5707	26.6227	26.6739	26.9167	26.9627	27.1786	27.1786	27.2190	27.0950	26.9627	26.8699	26.7736
util living area	2.7714	2.7748	2.7783	2.7944	2.7975	2.8119	2.8119	2.8146	2.8063	2.7975	2.7913	2.7849
util living area	0.9773	0.9628	0.9382	0.8825	0.7882	0.6482	0.5140	0.5638	0.7616	0.9123	0.9649	0.9803 (86)
MIT	18.3428	18.6597	19.1405	19.7857	20.3486	20.7426	20.9032	20.8720	20.5657	19.8244	18.9752	18.2917 (87)
Th 2	20.0456	20.0473	20.0490	20.0568	20.0582	20.0650	20.0650	20.0663	20.0624	20.0582	20.0553	20.0522 (88)
util rest of house	0.9739	0.9572	0.9285	0.8632	0.7513	0.5837	0.4226	0.4732	0.7077	0.8940	0.9587	0.9773 (89)
MIT 2	16.9021	17.3053	17.9145	18.7238	19.4040	19.8509	20.0057	19.9828	19.6704	18.7861	17.7149	16.8408 (90)
Living area fraction	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (91)
MIT	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (92)
Temperature adjustment	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (93)
adjusted MIT	17.0690	17.4621	18.0565	18.8468	19.5134	19.9542	20.1096	20.0857	19.7741	18.9063	17.8608	17.0088 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9576	0.9353	0.9010	0.8323	0.7266	0.5753	0.4272	0.4753	0.6884	0.8643	0.9375	0.9624 (94)
Ext temp.	982.5640	1142.4197	1243.0986	1307.9313	1229.9682	968.9643	687.9134	706.4077	931.6081	1006.0188	962.5092	937.7124 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	2732.0137	2682.5145	2463.0263	2100.8261	1647.4212	1119.9445	734.1098	769.8094	1190.5153	1751.3633	2276.7241	2719.7787 (97)
Space heating requirement - total per year (kWh/year)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98c)
Space heating per m2	(98c) / (4) =											33.9698 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	1301.5906	1034.9437	907.6262	570.8843	310.5850	0.0000	0.0000	0.0000	0.0000	554.5363	946.2348	1325.8573 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	1410.1740	1121.2825	983.3437	618.5095	336.4952	0.0000	0.0000	0.0000	0.0000	600.7977	1025.1731	1436.4651 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	260.4514	230.2665	244.7590	215.8492	209.6014	189.2912	187.2715	194.5689	196.5180	218.5936	231.7157	257.7237 (64)
Efficiency of water heater (217)m	87.1609	87.0139	86.7226	86.1347	84.9400	79.8000	79.8000	79.8000	79.8000	86.0559	86.8727	79.8000 (216)
Fuel for water heating, kWh/month	298.8166	264.6317	282.2320	250.5949	246.7640	237.2070	234.6760	243.8207	246.2632	254.0136	266.7303	295.5565 (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	41.3353	33.1607	29.8575	21.8749	16.8968	13.8048	15.4138	20.0355	26.0241	34.1451	38.5668	42.4841 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-85.2492	-115.1877	-158.6742	-170.5943	-177.4338	-163.0958	-160.8174	-154.7835	-143.5058	-127.6509	-91.8131	-74.2796 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-64.5821	-133.5811	-261.5328	-387.3119	-507.0869	-507.9160	-502.1672	-427.6564	-316.6298	-189.4367	-85.6635	-51.2671 (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)

elmhurst
energy

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

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	7532.2408	1.1300	8511.4321 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3121.3066	1.1300	3527.0764 (278)
Space and water heating			12038.5085 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	333.5995	1.5338	511.6861 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1623.0852	1.5010	-2436.3164
PV Unit electricity exported	-3434.8314	0.4636	-1592.5455
Total			-4028.8619 (283)
Total Primary energy kWh/year			8651.4335 (286)
Target Primary Energy Rate (TPER)			42.2700 (287)