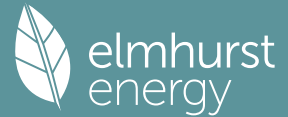


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Property Reference	OP-D320 S3KITE				Issued on Date	29/11/2024	
Assessment Reference	S3KITE			Prop Type Ref	S3KITE		
Property	S3KITE						
SAP Rating	82 B		DER	4.08		TER	9.99
Environmental	96 A		% DER < TER				59.16
CO ₂ Emissions (t/year)	0.38		DFEE	33.59		TFEE	34.67
Compliance Check	See BREL		% DFEE < TFEE				3.12
% DPER < TPER	17.03		DPER	43.14		TPER	52.00
Assessor Details	Mr. Matthew Stainrod					Assessor ID	AU83-0001
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

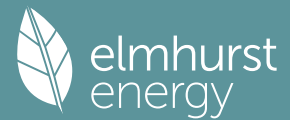
2. Ventilation rate

											m3 per hour	
Number of open chimneys											0 * 80 =	0.0000 (6a)
Number of open flues											0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)
Number of flues attached to other heater											0 * 35 =	0.0000 (6e)
Number of blocked chimneys											0 * 20 =	0.0000 (6f)
Number of intermittent extract fans											0 * 10 =	0.0000 (7a)
Number of passive vents											0 * 10 =	0.0000 (7b)
Number of flueless gas fires											0 * 40 =	0.0000 (7c)
											Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000 (8)
Pressure test											Yes	
Pressure Test Method											Blower Door	
Measured/design AP50											3.5000 (17)	
Infiltration rate											0.1750 (18)	
Number of sides sheltered											2 (19)	
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.1487 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3337	0.3299	0.3262	0.3076	0.3039	0.2853	0.2853	0.2816	0.2927	0.3039	0.3113	0.3188 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			17.2200	1.2357	21.2795		(27)
Ground Floor			50.7300	0.1100	5.5803		(28a)
External Wall	100.9200	19.3600	81.5600	0.1700	13.8652		(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790		(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013		(30)
Total net area of external elements Aum(A, m ²)			202.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.4453		(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.7900	0.0500	0.4895	

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E3 Sill	10.8500	0.0500	0.5425
E4 Jamb	27.0000	0.0500	1.3500
E5 Ground floor (normal)	21.3400	0.1600	3.4144
E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	9.9800	0.0800	0.7984
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616
E14 Flat roof	3.9000	0.0800	0.3120
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.3294 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	59.7747 (37)

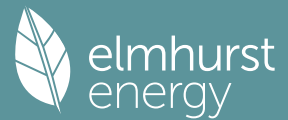
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.9558	26.6553	26.3549	24.8527	24.5523	23.0501	23.0501	22.7497	23.6510	24.5523	25.1532	25.7540 (38)
Average = Sum(39)m / 12 =	86.7304	86.4300	86.1296	84.6274	84.3270	82.8248	82.8248	82.5244	83.4257	84.3270	84.9278	85.5287 (39)
												84.5523
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8705	0.8675	0.8645	0.8494	0.8464	0.8313	0.8313	0.8283	0.8374	0.8464	0.8524	0.8585 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7361 (42)
Hot water usage for mixer showers												
Hot water usage for baths	96.3803	94.9319	92.8213	88.7830	85.8028	82.4794	80.5904	82.6850	84.9811	88.5495	92.6745	96.0110 (42a)
Hot water usage for other uses	31.8592	31.3861	30.7198	29.4912	28.5713	27.5513	27.0003	27.6619	28.3823	29.4738	30.7277	31.7515 (42b)
Average daily hot water use (litres/day)	44.8949	43.2623	41.6298	39.9973	38.3647	36.7322	36.7322	38.3647	39.9973	41.6298	43.2623	44.8949 (42c)
												159.2114 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	173.1344	169.5803	165.1708	158.2715	152.7389	146.7629	144.3228	148.7117	153.3607	159.6531	166.6645	172.6574 (44)
Energy content (annual)	274.2026	241.4801	253.8614	216.6657	205.6159	180.4620	174.5460	184.1361	189.1091	216.6477	237.4441	270.3398 (45)
Distribution loss (46)m = 0.15 x (45)m												2644.5105
Water storage loss:	41.1304	36.2220	38.0792	32.4999	30.8424	27.0693	26.1819	27.6204	28.3664	32.4972	35.6166	40.5510 (46)
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	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (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	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (64)
12Total per year (kWh/year)												3678.5321 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	135.0584	119.9312	128.2950	114.5118	112.2534	78.0132	76.6465	79.8352	80.8884	115.9215	121.4206	133.7741 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448 (68)
Pumps, fans	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430 (71)
Total internal gains	181.5301	178.4690	172.4395	159.0441	150.8782	108.3517	103.0194	107.3053	112.3450	155.8084	168.6397	179.8038 (72)
	633.9392	647.7431	620.8151	597.6049	567.0471	512.0522	491.0152	492.6474	508.7955	562.0738	597.2969	620.9295 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	5.7300											
		10.6334										
			0.6300									
				0.7000								
					0.7700							
						18.6208						
							18.6208					

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East		2.5300	19.6403	0.6300	0.7000	0.7700	15.1859 (76)
South		7.8800	46.7521	0.6300	0.7000	0.7700	112.5897 (78)
West		1.0800	19.6403	0.6300	0.7000	0.7700	6.4825 (80)

Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301 (83)
Total gains	786.8181	910.1093	985.9741	1062.0113	1099.2935	1046.0695	1003.5033	953.4600	908.0501	853.6154	780.7432	751.5596 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	31.9092	32.0201	32.1318	32.7022	32.8187	33.4139	33.4139	33.5356	33.1732	32.8187	32.5865	32.3576
alpha	3.1273	3.1347	3.1421	3.1801	3.1879	3.2276	3.2276	3.2357	3.2115	3.1879	3.1724	3.1572
util living area												
	0.9263	0.8895	0.8396	0.7467	0.6214	0.4772	0.3542	0.3857	0.5710	0.7714	0.8890	0.9339 (86)
Living	19.3693	19.6795	20.0435	20.4723	20.7685	20.9289	20.9794	20.9727	20.8689	20.5002	19.8900	19.3266
Non living	18.2836	18.6704	19.1207	19.6458	19.9874	20.1683	20.2135	20.2112	20.1074	19.6910	18.9476	18.2373
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1658	19.6795	20.0435	20.4723	20.7685	20.9289	20.9794	20.9727	20.8689	20.5002	19.8900	19.5606 (87)
Th 2	20.1926	20.1952	20.1978	20.2107	20.2133	20.2263	20.2263	20.2289	20.2211	20.2133	20.2081	20.2029 (88)
util rest of house												
	0.9175	0.8771	0.8218	0.7199	0.5831	0.4267	0.2950	0.3251	0.5198	0.7412	0.8745	0.9259 (89)
MIT 2	19.4316	18.6704	19.1207	19.6458	19.9874	20.1683	20.2135	20.2112	20.1074	19.6910	18.9476	18.5915 (90)
Living area fraction												
MIT	19.5775	18.8709	19.3041	19.8101	20.1427	20.3194	20.3657	20.3625	20.2587	19.8518	19.1349	18.7841 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5775	18.8709	19.3041	19.8101	20.1427	20.3194	20.3657	20.3625	20.2587	19.8518	19.1349	18.7841 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9099	0.8527	0.7992	0.7051	0.5795	0.4329	0.3058	0.3358	0.5224	0.7259	0.8512	0.9086 (94)
Useful gains	715.9479	776.0869	788.0156	748.8443	636.9885	452.8802	306.9140	320.1965	474.3889	619.6663	664.5320	682.8574 (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												
	1325.0239	1207.5090	1102.8100	923.2910	711.9442	473.7107	311.8964	327.0049	513.7933	780.1754	1022.0961	1247.3596 (97)
Space heating kWh												
	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98a)
Space heating requirement - total per year (kWh/year)												1955.4985
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												
	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1955.4985
Space heating per m2										(98c) / (4) =		19.6276 (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 %)												255.5332 (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												
	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98)
Space heating efficiency (main heating system 1)												
	255.5332	255.5332	255.5332	255.5332	255.5332	0.0000	0.0000	0.0000	0.0000	255.5332	255.5332	255.5332 (210)
Space heating fuel (main heating system)												
	177.3361	113.4552	91.6542	49.1528	21.8238	0.0000	0.0000	0.0000	0.0000	46.7332	100.7486	164.3581 (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												
	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (64)
Efficiency of water heater (217)m												269.4773 (216)
	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773 (217)
Fuel for water heating, kWh/month												
	138.2618	122.5858	130.7134	115.7328	112.8100	90.9516	89.5557	93.1145	94.1605	116.9038	123.4434	136.8283 (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												
	37.6445	34.0015	37.6445	36.4301	37.6445	36.4301	37.6445	37.6445	36.4301	37.6445	36.4301	37.6445 (231)
Lighting												
	27.5599	22.1096	19.9072	14.5849	11.2658	9.2042	10.2770	13.3585	17.3513	22.7659	25.7140	28.3259 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												

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Space heating fuel - main system 1	765.2620 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	269.4773
Water heating fuel used	1365.0617 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.4840)	
mechanical ventilation fans (SFP = 1.4840)	443.2332 (230a)
Total electricity for the above, kWh/year	443.2332 (231)
Electricity for lighting (calculated in Appendix L)	222.4243 (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	2795.9812 (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	765.2620	0.1560	119.3504 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1365.0617	0.1415	193.2034 (264)
Space and water heating			312.5539 (265)
Pumps, fans and electric keep-hot	443.2332	0.1387	61.4819 (267)
Energy for lighting	222.4243	0.1443	32.1027 (268)
Total CO2, kg/year			406.1385 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0800 (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	765.2620	1.5773	1207.0795 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1365.0617	1.5234	2079.5179 (278)
Space and water heating			3286.5974 (279)
Pumps, fans and electric keep-hot	443.2332	1.5128	670.5232 (281)
Energy for lighting	222.4243	1.5338	341.1618 (282)
Total Primary energy kWh/year			4298.2825 (286)
Dwelling Primary energy Rate (DPER)			43.1400 (287)

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

1. Overall dwelling characteristics

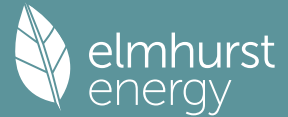
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3725 (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) = 0.3167 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)

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Adj infilt rate	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3167	0.3404	0.3562	0.3721 (22b)
Effective ac	0.5815	0.5783	0.5752	0.5607	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5635	0.5692 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			2.1400	1.0000	2.1400		(26)
TER Opening Type (Uw = 1.20)			17.2200	1.1450	19.7176		(27)
Ground Floor			50.7300	0.1300	6.5949		(28a)
External Wall	100.9200	19.3600	81.5600	0.1800	14.6808		(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790		(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013		(30)
Total net area of external elements Aum(A, m2)			202.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.7136		(33)
Party Wall			44.1300	0.0000	0.0000		(32)

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)	9.7900	0.0500	0.4895
E3 Sill	10.8500	0.0500	0.5425
E4 Jamb	27.0000	0.0500	1.3500
E5 Ground floor (normal)	21.3400	0.1600	3.4144
E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	9.9800	0.0800	0.7984
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616
E14 Flat roof	3.9000	0.0800	0.3120
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158

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

Point Thermal bridges

Total fabric heat loss

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.9791	46.7234	46.4728	45.2956	45.0754	44.0501	44.0501	43.8602	44.4450	45.0754	45.5209	45.9868 (38)
Average = Sum(39)m / 12 =	107.0221	106.7664	106.5158	105.3386	105.1183	104.0931	104.0931	103.9032	104.4880	105.1183	105.5639	106.0297 (39)

HLP

HLP (average)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in mont	1.0742	1.0716	1.0691	1.0573	1.0551	1.0448	1.0448	1.0429	1.0488	1.0551	1.0596	1.0642 (40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7361 (42)
Hot water usage for mixer showers	70.0948	69.0414	67.5064	64.5694	62.4021	59.9850	58.6112	60.1345	61.8044	64.3996	67.3996	69.8262 (42a)
Hot water usage for baths	30.2663	29.8168	29.1838	28.0167	27.1427	26.1737	25.6503	26.2788	26.9632	28.0001	29.1913	30.1639 (42b)
Hot water usage for other uses	42.6501	41.0992	39.5483	37.9974	36.4465	34.8956	34.8956	36.4465	37.9974	39.5483	41.0992	42.6501 (42c)
Average daily hot water use (litres/day)												131.4595 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	143.0112	139.9574	136.2385	130.5835	125.9913	121.0543	119.1570	122.8599	126.7651	131.9481	137.6901	142.6403 (44)
Energy content (annual)	226.4947	199.2974	209.3934	178.7623	169.6085	148.8504	144.1101	152.1262	156.3140	179.0523	196.1648	223.3402 (45)
Distribution loss (46)m = 0.15 x (45)m	33.9742	29.8946	31.4090	26.8143	25.4413	22.3276	21.6165	22.8189	23.4471	26.8578	29.4247	33.5010 (46)

Water storage loss:

Store volume

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

Temperature factor from Table 2b

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

Total storage loss

If cylinder contains dedicated solar storage

Primary loss

Combi loss

Total heat required for water heating calculated for each month

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

12Total per year (kWh/year)

Electric shower(s)

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

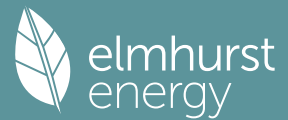
Heat gains from water heating, kWh/month

117.9892 104.8158 112.3030 100.7414 99.0745 90.7957 90.5963 93.2617 93.2773 102.2146 106.5277 116.9403 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	(71)
Water heating gains (Table 5)	158.5876	155.9759	150.9449	139.9186	133.1647	126.1051	121.7692	125.3517	129.5519	137.3852	147.9552	157.1778	(72)
Total internal gains	613.9967	628.2500	602.3205	581.4794	552.3336	529.8056	509.7650	510.6938	526.0024	546.6505	579.6124	601.3035	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

North					5.7300	10.6334	0.6300	0.7000			0.7700	18.6208 (74)	
East					2.5300	19.6403	0.6300	0.7000			0.7700	15.1859 (76)	
South					7.8800	46.7521	0.6300	0.7000			0.7700	112.5897 (78)	
West					1.0800	19.6403	0.6300	0.7000			0.7700	6.4825 (80)	

Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301	(83)
Total gains	766.8756	890.6162	967.4795	1045.8858	1084.5800	1063.8229	1022.2531	971.5063	925.2570	838.1922	763.0587	731.9336	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8591	25.9211	25.9821	26.2724	26.3275	26.5868	26.5868	26.6354	26.4863	26.3275	26.2163	26.1012	
alpha	2.7239	2.7281	2.7321	2.7515	2.7552	2.7725	2.7725	2.7757	2.7658	2.7552	2.7478	2.7401	
util living area	0.9405	0.9123	0.8739	0.8012	0.6945	0.5491	0.4200	0.4545	0.6375	0.8222	0.9129	0.9466	(86)
MIT	18.7592	19.0929	19.5281	20.0766	20.5253	20.8257	20.9391	20.9226	20.7220	20.1449	19.3714	18.7039	(87)
Th 2	20.0220	20.0241	20.0261	20.0359	20.0377	20.0462	20.0462	20.0477	20.0429	20.0377	20.0340	20.0301	(88)
util rest of house	0.9324	0.9007	0.8570	0.7740	0.6515	0.4850	0.3382	0.3722	0.5769	0.7921	0.8995	0.9393	(89)
MIT 2	17.4121	17.8305	18.3734	19.0494	19.5766	19.9072	20.0107	20.0001	19.8056	19.1466	18.1929	17.3477	(90)
Living area fraction									fLA = Living area / (4) =			0.1987	(91)
MIT	17.6798	18.0814	18.6029	19.2535	19.7651	20.0897	20.1952	20.1835	19.9877	19.3450	18.4271	17.6172	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6798	18.0814	18.6029	19.2535	19.7651	20.0897	20.1952	20.1835	19.9877	19.3450	18.4271	17.6172	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	694.8313	775.9278	799.8670	782.9572	692.1872	519.2131	359.2665	373.4743	530.2509	642.5492	664.3633	669.1867	(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	1431.9382	1407.3269	1289.1475	1090.6261	847.7915	571.4420	374.2340	393.1151	615.1919	919.2573	1195.7359	1422.6220	(97)
Space heating kWh	548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98a)
Space heating requirement - total per year (kWh/year)												2823.0386	
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	548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2823.0386	
Space heating per m2										(98c) / (4) =		28.3352	(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	
548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	594.1576	459.6969	394.3930	240.0018	125.4275	0.0000	0.0000	0.0000	0.0000	223.0453	414.5051	607.3195	(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	247.7999	219.1438	233.0667	205.8178	200.0568	180.8822	179.0908	185.9423	187.6670	208.4991	220.7146	245.2388	(64)
Efficiency of water heater	85.7888	85.5153	85.0556	84.2250	82.8791	79.8000	79.8000	79.8000	79.8000	84.0313	85.2812	85.8531	(216)
Fuel for water heating, kWh/month	288.8489	256.2629	274.0169	244.3666	241.3839	226.6694	224.4246	233.0104	235.1717	248.1207	258.8079	285.6493	(219)

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Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	(231)
Lighting	27.5599	22.1096	19.9072	14.5849	11.2658	9.2042	10.2770	13.3585	17.3513	22.7659	25.7140	28.3259	28.3259	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-46.2279	-64.5478	-91.8920	-102.2785	-109.3887	-101.7411	-100.4344	-95.2225	-85.9349	-73.2702	-50.5802	-40.0364	-40.0364	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-28.0508	-58.7791	-116.4251	-174.3030	-229.9618	-230.9123	-228.2396	-193.5216	-142.1768	-83.9257	-37.4037	-22.2033	-22.2033	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													3058.5467	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3016.7332	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													222.4243	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2507.4574	(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													3876.2469	(238)

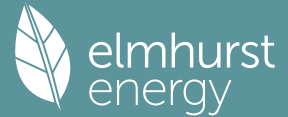
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3058.5467	0.2100	642.2948	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3016.7332	0.2100	633.5140	(264)
Space and water heating			1275.8088	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	222.4243	0.1443	32.1027	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-961.5546	0.1348	-129.6218	
PV Unit electricity exported	-1545.9027	0.1260	-194.7625	
Total			-324.3844	(269)
Total CO2, kg/year			995.4564	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9900	(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	3058.5467	1.1300	3456.1578	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3016.7332	1.1300	3408.9085	(278)
Space and water heating			6865.0663	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	222.4243	1.5338	341.1618	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-961.5546	1.4982	-1440.6267	
PV Unit electricity exported	-1545.9027	0.4625	-714.9182	
Total			-2155.5450	(283)
Total Primary energy kWh/year			5180.7840	(286)
Target Primary Energy Rate (TPER)			52.0000	(287)

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Property Reference	OP-D320 S3KITE				Issued on Date	29/11/2024	
Assessment Reference	S3KITE			Prop Type Ref	S3KITE		
Property	S3KITE						
SAP Rating	82 B	DER	4.08	TER	9.99		
Environmental	96 A	% DER < TER				59.16	
CO ₂ Emissions (t/year)	0.38	DFEE	33.59	TFEE	34.67		
Compliance Check	See BREL	% DFEE < TFEE				3.12	
% DPER < TPER	17.03	DPER	43.14	TPER	52.00		
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

2. Ventilation rate

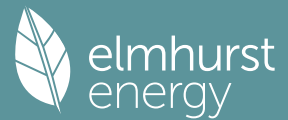
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2975 (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) = 0.2529 (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	0.3225	0.3161	0.3098	0.2782	0.2719	0.2403	0.2403	0.2339	0.2529	0.2719	0.2845	0.2972 (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	0.5520	0.5500	0.5480	0.5387	0.5370	0.5289	0.5289	0.5274	0.5320	0.5370	0.5405	0.5442 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			17.2200	1.2357	21.2795		(27)
Ground Floor			50.7300	0.1100	5.5803		(28a)
External Wall	100.9200	19.3600	81.5600	0.1700	13.8652		(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790		(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013		(30)
Total net area of external elements Aum(A, m ²)			202.3800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	48.4453	(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.7900	0.0500	0.4895	
E3 Sill				10.8500	0.0500	0.5425	
E4 Jamb				27.0000	0.0500	1.3500	
E5 Ground floor (normal)				21.3400	0.1600	3.4144	

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E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000										
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880										
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988										
E16 Corner (normal)	14.4600	0.0900	1.3014										
E18 Party wall between dwellings	9.8500	0.0600	0.5910										
P1 Party wall - Ground floor	9.9800	0.0800	0.7984										
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000										
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976										
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616										
E14 Flat roof	3.9000	0.0800	0.3120										
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.3294	(36)
Point Thermal Bridges												0.0000	
Total fabric heat loss												59.7747	(37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	44.5948	44.4317	44.2718	43.5209	43.3804	42.7264	42.7264	42.6053	42.9783	43.3804	43.6646	43.9618	(38)
Average = Sum(39)m / 12 =	104.3694	104.2063	104.0465	103.2956	103.1551	102.5011	102.5011	102.3799	102.7530	103.1551	103.4393	103.7364	(39)
												103.2949	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0476	1.0459	1.0443	1.0368	1.0354	1.0288	1.0288	1.0276	1.0313	1.0354	1.0382	1.0412	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												1.0368	
												31	
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.7361 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	30.2663	29.8168	29.1838	28.0167	27.1427	26.1737	25.6503	26.2788	26.9632	28.0001	29.1913	30.1639	(42b)
Hot water usage for other uses	42.6501	41.0992	39.5483	37.9974	36.4465	34.8956	34.8956	36.4465	37.9974	39.5483	41.0992	42.6501	(42c)
Average daily hot water use (litres/day)												66.8344	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	72.9164	70.9160	68.7321	66.0141	63.5892	61.0693	60.5459	62.7253	64.9606	67.5484	70.2905	72.8141	(44)
Energy content (annual)	115.4817	100.9834	105.6387	90.3700	85.6033	75.0918	73.2250	77.6671	80.1029	91.6626	100.1417	114.0092	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	98.1595	85.8359	89.7929	76.8145	72.7628	63.8280	62.2412	66.0170	68.0875	77.9132	85.1204	96.9079	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	98.1595	85.8359	89.7929	76.8145	72.7628	63.8280	62.2412	66.0170	68.0875	77.9132	85.1204	96.9079	(64)
12Total per year (kWh/year)												943.4808	(64)
Electric shower(s)	56.1342	50.0161	54.6156	52.1190	53.0970	50.6494	52.3377	53.0970	52.1190	54.6156	53.5886	56.1342	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												638.5234	(64a)
Heat gains from water heating, kWh/month	38.5734	33.9630	36.1021	32.2334	31.4650	28.6194	28.6447	29.7785	30.0516	33.1322	34.6773	38.2605	(65)
5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	(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)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	(71)
Water heating gains (Table 5)	51.8460	50.5402	48.5244	44.7686	42.2916	39.7491	38.5010	40.0249	41.7384	44.5325	48.1629	51.4254	(72)
Total internal gains	504.2551	519.8143	496.8999	483.3294	458.4605	443.4496	426.4967	425.3670	438.1889	450.7979	476.8201	492.5511	(73)
6. Solar gains													
[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
North	5.7300	10.6334	0.6300	0.7000	0.7700	18.6208	(74)						
East	2.5300	19.6403	0.6300	0.7000	0.7700	15.1859	(76)						
South	7.8800	46.7521	0.6300	0.7000	0.7700	112.5897	(78)						
West	1.0800	19.6403	0.6300	0.7000	0.7700	6.4825	(80)						
Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301	(83)
Total gains	657.1340	782.1805	862.0589	947.7357	990.7069	977.4669	938.9848	886.1795	837.4435	742.3395	660.2664	623.1812	(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	26.5164	26.5579	26.5987	26.7921	26.8285	26.9997	26.9997	27.0317	26.9335	26.8285	26.7548	26.6782
alpha	2.7678	2.7705	2.7732	2.7861	2.7886	2.8000	2.8000	2.8021	2.7956	2.7886	2.7837	2.7785
util living area	0.9570	0.9317	0.8967	0.8278	0.7241	0.5785	0.4462	0.4849	0.6726	0.8533	0.9346	0.9623 (86)
MIT	18.6358	18.9850	19.4371	20.0086	20.4842	20.8066	20.9315	20.9118	20.6889	20.0635	19.2525	18.5688 (87)
Th 2	20.0439	20.0452	20.0466	20.0528	20.0540	20.0594	20.0594	20.0604	20.0573	20.0540	20.0516	20.0491 (88)
util rest of house	0.9510	0.9224	0.8822	0.8030	0.6828	0.5141	0.3619	0.4001	0.6132	0.8268	0.9240	0.9570 (89)
MIT 2	17.8830	18.2260	18.6679	19.2197	19.6591	19.9375	20.0278	20.0173	19.8469	19.2836	18.4981	17.8206 (90)
Living area fraction	18.0326	18.3768	18.8207	19.3765	19.8231	20.1102	20.2074	20.1951	20.0142	19.4386	18.6480	17.9693 (91)
Temperature adjustment												0.0000
adjusted MIT	18.0326	18.3768	18.8207	19.3765	19.8231	20.1102	20.2074	20.1951	20.0142	19.4386	18.6480	17.9693 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9339	0.9016	0.8596	0.7826	0.6718	0.5178	0.3757	0.4129	0.6103	0.8064	0.9039	0.9412 (94)
Useful gains	613.7299	705.2340	741.0316	741.6737	665.5232	506.1757	352.7745	365.9065	511.0693	598.6240	596.8389	586.5295 (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	1433.2653	1404.3723	1281.9276	1082.1774	837.9363	564.8062	369.7588	388.5398	607.7033	911.7445	1194.5176	1428.3749 (97)
Space heating kWh	609.7343	469.8209	402.4266	245.1626	128.2753	0.0000	0.0000	0.0000	0.0000	232.9617	430.3286	626.3330 (98a)
Space heating requirement - total per year (kWh/year)												3145.0431
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	609.7343	469.8209	402.4266	245.1626	128.2753	0.0000	0.0000	0.0000	0.0000	232.9617	430.3286	626.3330 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3145.0431
Space heating per m2										(98c) / (4) =		31.5672 (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	963.5099	758.5078	778.0875	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7795	0.8411	0.8169	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	751.0138	637.9769	635.5950	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1086.7901	1044.4718	985.3950	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	241.7589	302.4322	260.2512	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	60.4397	75.6080	65.0628	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												201.1106 (107)
Energy for space heating												31.5672 (99)
Energy for space cooling												2.0186 (108)
Total												33.5858 (109)
Fabric Energy Efficiency (DFEE)												33.6 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

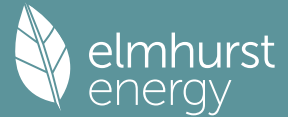
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1225 (8)
Yes
Blower Door
5.0000 (17)
0.3725 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3167 (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 infiltr rate	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3167	0.3404	0.3562	0.3721	(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	0.5815	0.5783	0.5752	0.5607	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5635	0.5692	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Opaque door			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			17.2200	1.1450	19.7176			(27)
Ground Floor			50.7300	0.1300	6.5949			(28a)
External Wall	100.9200	19.3600	81.5600	0.1800	14.6808			(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790			(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013			(30)
Total net area of external elements Aum(A, m2)			202.3800					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.7136			(33)
Party Wall			44.1300	0.0000	0.0000			(32)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.7900	0.0500	0.4895	
E3 Sill	10.8500	0.0500	0.5425	
E4 Jamb	27.0000	0.0500	1.3500	
E5 Ground floor (normal)	21.3400	0.1600	3.4144	
E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880	
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988	
E16 Corner (normal)	14.4600	0.0900	1.3014	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	9.9800	0.0800	0.7984	
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976	
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616	
E14 Flat roof	3.9000	0.0800	0.3120	
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158	

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

11.3294 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 60.0430 (37)

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

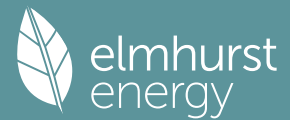
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.9791	46.7234	46.4728	45.2956	45.0754	44.0501	44.0501	43.8602	44.4450	45.0754	45.5209	45.9868	(38)
Heat transfer coeff	107.0221	106.7664	106.5158	105.3386	105.1183	104.0931	104.0931	103.9032	104.4880	105.1183	105.5639	106.0297	(39)
Average = Sum(39)m / 12 =												105.3375	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0742	1.0716	1.0691	1.0573	1.0551	1.0448	1.0448	1.0429	1.0488	1.0551	1.0596	1.0642	(40)
HLP (average)												1.0573	
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7361 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	30.2663	29.8168	29.1838	28.0167	27.1427	26.1737	25.6503	26.2788	26.9632	28.0001	29.1913	30.1639	(42b)
Hot water usage for other uses	42.6501	41.0992	39.5483	37.9974	36.4465	34.8956	34.8956	36.4465	37.9974	39.5483	41.0992	42.6501	(42c)
Average daily hot water use (litres/day)												66.8344	(43)
Daily hot water use	72.9164	70.9160	68.7321	66.0141	63.5892	61.0693	60.5459	62.7253	64.9606	67.5484	70.2905	72.8141	(44)
Energy conte	115.4817	100.9834	105.6387	90.3700	85.6033	75.0918	73.2250	77.6671	80.1029	91.6626	100.1417	114.0092	(45)
Energy content (annual)										Total = Sum(45)m =	1109.9774		
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	98.1595	85.8359	89.7929	76.8145	72.7628	63.8280	62.2412	66.0170	68.0875	77.9132	85.1204	96.9079	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h													

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12Total per year (kWh/year)	98.1595	85.8359	89.7929	76.8145	72.7628	63.8280	62.2412	66.0170	68.0875	77.9132	85.1204	96.9079 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m =											943.4808 (64)
	56.1342	50.0161	54.6156	52.1190	53.0970	50.6494	52.3377	53.0970	52.1190	54.6156	53.5886	56.1342 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											638.5234 (64a)
Heat gains from water heating, kWh/month	38.5734	33.9630	36.1021	32.2334	31.4650	28.6194	28.6447	29.7785	30.0516	33.1322	34.6773	38.2605 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804 (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)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430 (71)
Water heating gains (Table 5)	51.8460	50.5402	48.5244	44.7686	42.2916	39.7491	38.5010	40.0249	41.7384	44.5325	48.1629	51.4254 (72)
Total internal gains	504.2551	519.8143	496.8999	483.3294	458.4605	443.4496	426.4967	425.3670	438.1889	450.7979	476.8201	492.5511 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	5.7300	10.6334	0.6300	0.7000	0.7700	18.6208 (74)
East	2.5300	19.6403	0.6300	0.7000	0.7700	15.1859 (76)
South	7.8800	46.7521	0.6300	0.7000	0.7700	112.5897 (78)
West	1.0800	19.6403	0.6300	0.7000	0.7700	6.4825 (80)

Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301 (83)
Total gains	657.1340	782.1805	862.0589	947.7357	990.7069	977.4669	938.9848	886.1795	837.4435	742.3395	660.2664	623.1812 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	25.8591	25.9211	25.9821	26.2724	26.3275	26.5868	26.5868	26.6354	26.4863	26.3275	26.2163	26.1012
alpha	2.7239	2.7281	2.7321	2.7515	2.7552	2.7725	2.7725	2.7757	2.7658	2.7552	2.7478	2.7401
util living area	0.9575	0.9328	0.8987	0.8309	0.7288	0.5835	0.4512	0.4898	0.6773	0.8558	0.9355	0.9627 (86)
MIT	18.5658	18.9186	19.3790	19.9698	20.4591	20.7964	20.9270	20.9066	20.6739	20.0309	19.2046	18.5079 (87)
Th 2	20.0220	20.0241	20.0261	20.0359	20.0377	20.0462	20.0462	20.0477	20.0429	20.0377	20.0340	20.0301 (88)
util rest of house	0.9515	0.9235	0.8842	0.8061	0.6873	0.5183	0.3652	0.4035	0.6175	0.8293	0.9249	0.9573 (89)
MIT 2	17.7994	18.1465	18.5974	19.1707	19.6239	19.9181	20.0126	20.0023	19.8226	19.2410	18.4394	17.7479 (90)
Living area fraction	17.9517	18.3000	18.7527	19.3295	19.7898	20.0926	20.1943	20.1820	19.9918	19.3980	18.5915	17.8990 (91)
MIT	17.9517	18.3000	18.7527	19.3295	19.7898	20.0926	20.1943	20.1820	19.9918	19.3980	18.5915	17.8990 (92)
Temperature adjustment	17.9517	18.3000	18.7527	19.3295	19.7898	20.0926	20.1943	20.1820	19.9918	19.3980	18.5915	17.8990 (93)
adjusted MIT	17.9517	18.3000	18.7527	19.3295	19.7898	20.0926	20.1943	20.1820	19.9918	19.3980	18.5915	17.8990 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9342	0.9024	0.8611	0.7850	0.6755	0.5217	0.3792	0.4163	0.6140	0.8084	0.9046	0.9413 (94)
Useful gains	613.9111	705.8672	742.3496	744.0043	669.2128	509.9092	356.0275	368.9606	514.1509	600.0785	597.2565	586.6242 (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	1461.0354	1430.6658	1305.1094	1098.6318	850.3911	571.7431	374.1448	392.9600	615.6177	924.8295	1213.0831	1452.4985 (97)
Space heating kWh	630.2604	487.0647	418.6932	255.3318	134.7966	0.0000	0.0000	0.0000	0.0000	241.6147	443.3951	644.2105 (98a)
Space heating requirement - total per year (kWh/year)												3255.3672
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	630.2604	487.0647	418.6932	255.3318	134.7966	0.0000	0.0000	0.0000	0.0000	241.6147	443.3951	644.2105 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3255.3672
Space heating per m2												32.6746 (99)

8c. Space cooling requirement

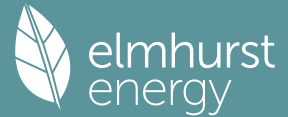
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	978.4748	770.2887	789.6643	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7722	0.8348	0.8104	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	755.5882	643.0068	639.9405	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1086.7901	1044.4718	985.3950	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	238.4654	298.6899	257.0181	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											1.0000 (105)

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Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	59.6163	74.6725	64.2545	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												198.5434 (107)
Energy for space heating												32.6746 (99)
Energy for space cooling												1.9928 (108)
Total												34.6674 (109)
Fabric Energy Efficiency (TFEE)												34.7 (109)

Full SAP Calculation Printout



Property Reference	OP-D320 S3KITE				Issued on Date	29/11/2024
Assessment Reference	S3KITE		Prop Type Ref	S3KITE		
Property	S3KITE					
SAP Rating	82 B	DER	4.08	TER	9.99	
Environmental	96 A	% DER < TER				59.16
CO ₂ Emissions (t/year)	0.38	DFEE	33.59	TFEE	34.67	
Compliance Check	See BREL	% DFEE < TFEE				3.12
% DPER < TPER	17.03	DPER	43.14	TPER	52.00	
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

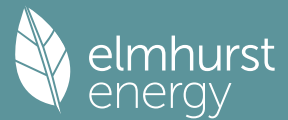
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.1750 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1487 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.1897 0.1859 0.1822 0.1636 0.1599 0.1413 0.1413 0.1376 0.1487 0.1599 0.1673 0.1748 (22b)
Balanced mechanical ventilation with heat recovery	
If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	71.2000 (23c)
Effective ac	0.3337 0.3299 0.3262 0.3076 0.3039 0.2853 0.2853 0.2816 0.2927 0.3039 0.3113 0.3188 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			17.2200	1.2357	21.2795		(27)
Ground Floor			50.7300	0.1100	5.5803		(28a)
External Wall	100.9200	19.3600	81.5600	0.1700	13.8652		(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790		(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013		(30)
Total net area of external elements Aum(A, m ²)			202.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.4453		(33)
Party Wall			44.1300	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.7900	0.0500	0.4895	

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E3 Sill	10.8500	0.0500	0.5425
E4 Jamb	27.0000	0.0500	1.3500
E5 Ground floor (normal)	21.3400	0.1600	3.4144
E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	9.9800	0.0800	0.7984
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616
E14 Flat roof	3.9000	0.0800	0.3120
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.3294 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	59.7747 (37)

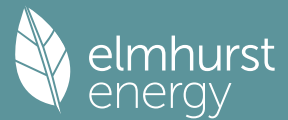
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.9558	26.6553	26.3549	24.8527	24.5523	23.0501	23.0501	22.7497	23.6510	24.5523	25.1532	25.7540 (38)
Average = Sum(39)m / 12 =	86.7304	86.4300	86.1296	84.6274	84.3270	82.8248	82.8248	82.5244	83.4257	84.3270	84.9278	85.5287 (39)
												84.5523
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8705	0.8675	0.8645	0.8494	0.8464	0.8313	0.8313	0.8283	0.8374	0.8464	0.8524	0.8585 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.7361 (42)
Hot water usage for mixer showers												
Hot water usage for baths	96.3803	94.9319	92.8213	88.7830	85.8028	82.4794	80.5904	82.6850	84.9811	88.5495	92.6745	96.0110 (42a)
Hot water usage for other uses	31.8592	31.3861	30.7198	29.4912	28.5713	27.5513	27.0003	27.6619	28.3823	29.4738	30.7277	31.7515 (42b)
Average daily hot water use (litres/day)	44.8949	43.2623	41.6298	39.9973	38.3647	36.7322	36.7322	38.3647	39.9973	41.6298	43.2623	44.8949 (42c)
												159.2114 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	173.1344	169.5803	165.1708	158.2715	152.7389	146.7629	144.3228	148.7117	153.3607	159.6531	166.6645	172.6574 (44)
Energy content (annual)	274.2026	241.4801	253.8614	216.6657	205.6159	180.4620	174.5460	184.1361	189.1091	216.6477	237.4441	270.3398 (45)
Distribution loss (46)m = 0.15 x (45)m												2644.5105
Water storage loss:	41.1304	36.2220	38.0792	32.4999	30.8424	27.0693	26.1819	27.6204	28.3664	32.4972	35.6166	40.5510 (46)
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	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (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	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (64)
12Total per year (kWh/year)												3678.5321 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	135.0584	119.9312	128.2950	114.5118	112.2534	78.0132	76.6465	79.8352	80.8884	115.9215	121.4206	133.7741 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448 (68)
Pumps, fans	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430 (71)
Total internal gains	181.5301	178.4690	172.4395	159.0441	150.8782	108.3517	103.0194	107.3053	112.3450	155.8084	168.6397	179.8038 (72)
	633.9392	647.7431	620.8151	597.6049	567.0471	512.0522	491.0152	492.6474	508.7955	562.0738	597.2969	620.9295 (73)

6. Solar gains												
[Jan]												
	Area											
	m2											
	Solar flux											
	Table 6a											
	W/m2											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
North	5.7300											
		10.6334										
			0.6300									
				0.7000								
					0.7700							
						18.6208						
							18.6208					

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East	2.5300	19.6403	0.6300	0.7000	0.7700	15.1859 (76)
South	7.8800	46.7521	0.6300	0.7000	0.7700	112.5897 (78)
West	1.0800	19.6403	0.6300	0.7000	0.7700	6.4825 (80)

Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301 (83)
Total gains	786.8181	910.1093	985.9741	1062.0113	1099.2935	1046.0695	1003.5033	953.4600	908.0501	853.6154	780.7432	751.5596 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	31.9092	32.0201	32.1318	32.7022	32.8187	33.4139	33.4139	33.5356	33.1732	32.8187	32.5865	32.3576
alpha	3.1273	3.1347	3.1421	3.1801	3.1879	3.2276	3.2276	3.2357	3.2115	3.1879	3.1724	3.1572
util living area	0.9263	0.8895	0.8396	0.7467	0.6214	0.4772	0.3542	0.3857	0.5710	0.7714	0.8890	0.9339 (86)
Living	19.3693	19.6795	20.0435	20.4723	20.7685	20.9289	20.9794	20.9727	20.8689	20.5002	19.8900	19.3266
Non living	18.2836	18.6704	19.1207	19.6458	19.9874	20.1683	20.2135	20.2112	20.1074	19.6910	18.9476	18.2373
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1658	19.6795	20.0435	20.4723	20.7685	20.9289	20.9794	20.9727	20.8689	20.5002	19.8900	19.5606 (87)
Th 2	20.1926	20.1952	20.1978	20.2107	20.2133	20.2263	20.2263	20.2289	20.2211	20.2133	20.2081	20.2029 (88)
util rest of house	0.9175	0.8771	0.8218	0.7199	0.5831	0.4267	0.2950	0.3251	0.5198	0.7412	0.8745	0.9259 (89)
MIT 2	19.4316	18.6704	19.1207	19.6458	19.9874	20.1683	20.2135	20.2112	20.1074	19.6910	18.9476	18.5915 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.5775	18.8709	19.3041	19.8101	20.1427	20.3194	20.3657	20.3625	20.2587	19.8518	19.1349	18.7841 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5775	18.8709	19.3041	19.8101	20.1427	20.3194	20.3657	20.3625	20.2587	19.8518	19.1349	18.7841 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9099	0.8527	0.7992	0.7051	0.5795	0.4329	0.3058	0.3358	0.5224	0.7259	0.8512	0.9086 (94)
Useful gains	715.9479	776.0869	788.0156	748.8443	636.9885	452.8802	306.9140	320.1965	474.3889	619.6663	664.5320	682.8574 (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	1325.0239	1207.5090	1102.8100	923.2910	711.9442	473.7107	311.8964	327.0049	513.7933	780.1754	1022.0961	1247.3596 (97)
Space heating kWh	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98a)
Space heating requirement - total per year (kWh/year)	1955.4985											
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	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1955.4985											
Space heating per m2	(98c) / (4) = 19.6276 (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 %)												255.5332 (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	453.1526	289.9156	234.2070	125.6016	55.7671	0.0000	0.0000	0.0000	0.0000	119.4188	257.4462	419.9896 (98)
Space heating efficiency (main heating system 1)	255.5332	255.5332	255.5332	255.5332	255.5332	0.0000	0.0000	0.0000	0.0000	255.5332	255.5332	255.5332 (210)
Space heating fuel (main heating system)	177.3361	113.4552	91.6542	49.1528	21.8238	0.0000	0.0000	0.0000	0.0000	46.7332	100.7486	164.3581 (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	372.5842	330.3409	352.2430	311.8737	303.9975	245.0940	241.3324	250.9225	253.7411	315.0293	332.6521	368.7214 (64)
Efficiency of water heater (217)m	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773	269.4773 (216)
Fuel for water heating, kWh/month	138.2618	122.5858	130.7134	115.7328	112.8100	90.9516	89.5557	93.1145	94.1605	116.9038	123.4434	136.8283 (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	37.6445	34.0015	37.6445	36.4301	37.6445	36.4301	37.6445	37.6445	36.4301	37.6445	36.4301	37.6445 (231)
Lighting	27.5599	22.1096	19.9072	14.5849	11.2658	9.2042	10.2770	13.3585	17.3513	22.7659	25.7140	28.3259 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												

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Space heating fuel - main system 1	765.2620 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	269.4773
Water heating fuel used	1365.0617 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.4840)	
mechanical ventilation fans (SFP = 1.4840)	443.2332 (230a)
Total electricity for the above, kWh/year	443.2332 (231)
Electricity for lighting (calculated in Appendix L)	222.4243 (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	2795.9812 (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	765.2620	0.1560	119.3504 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1365.0617	0.1415	193.2034 (264)
Space and water heating			312.5539 (265)
Pumps, fans and electric keep-hot	443.2332	0.1387	61.4819 (267)
Energy for lighting	222.4243	0.1443	32.1027 (268)
Total CO2, kg/year			406.1385 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.0800 (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	765.2620	1.5773	1207.0795 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1365.0617	1.5234	2079.5179 (278)
Space and water heating			3286.5974 (279)
Pumps, fans and electric keep-hot	443.2332	1.5128	670.5232 (281)
Energy for lighting	222.4243	1.5338	341.1618 (282)
Total Primary energy kWh/year			4298.2825 (286)
Dwelling Primary energy Rate (DPER)			43.1400 (287)

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

1. Overall dwelling characteristics

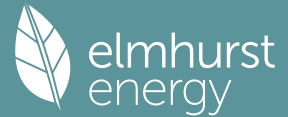
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	50.7300 (1b)	x 2.3100 (2b)	= 117.1863 (1b) - (3b)
First floor	48.9000 (1c)	x 2.6100 (2c)	= 127.6290 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	99.6300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 244.8153 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1225 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3725 (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) = 0.3167 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)

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Adj infilt rate	0.4037	0.3958	0.3879	0.3483	0.3404	0.3008	0.3008	0.2929	0.3167	0.3404	0.3562	0.3721 (22b)
Effective ac	0.5815	0.5783	0.5752	0.5607	0.5579	0.5452	0.5452	0.5429	0.5501	0.5579	0.5635	0.5692 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			2.1400	1.0000	2.1400		(26)
TER Opening Type (Uw = 1.20)			17.2200	1.1450	19.7176		(27)
Ground Floor			50.7300	0.1300	6.5949		(28a)
External Wall	100.9200	19.3600	81.5600	0.1800	14.6808		(29a)
Roof - ceiling	48.9000		48.9000	0.1100	5.3790		(30)
Bay Roof	1.8300		1.8300	0.1100	0.2013		(30)
Total net area of external elements Aum(A, m2)			202.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.7136		(33)
Party Wall			44.1300	0.0000	0.0000		(32)

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)	9.7900	0.0500	0.4895
E3 Sill	10.8500	0.0500	0.5425
E4 Jamb	27.0000	0.0500	1.3500
E5 Ground floor (normal)	21.3400	0.1600	3.4144
E6 Intermediate floor within a dwelling	17.4400	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.8000	0.0600	0.5880
E12 Gable (insulation at ceiling level)	9.9800	0.0600	0.5988
E16 Corner (normal)	14.4600	0.0900	1.3014
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	9.9800	0.0800	0.7984
P2 Party wall - Intermediate floor within a dwelling	9.9800	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	9.9800	0.1200	1.1976
E24 Eaves (insulation at ceiling level - inverted)	2.3400	0.2400	0.5616
E14 Flat roof	3.9000	0.0800	0.3120
E17 Corner (inverted - internal area greater than external area)	4.6200	-0.0900	-0.4158

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

Point Thermal bridges

Total fabric heat loss

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.9791	46.7234	46.4728	45.2956	45.0754	44.0501	44.0501	43.8602	44.4450	45.0754	45.5209	45.9868 (38)
Average = Sum(39)m / 12 =	107.0221	106.7664	106.5158	105.3386	105.1183	104.0931	104.0931	103.9032	104.4880	105.1183	105.5639	106.0297 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0742	1.0716	1.0691	1.0573	1.0551	1.0448	1.0448	1.0429	1.0488	1.0551	1.0596	1.0642 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7361 (42)
Hot water usage for mixer showers	70.0948	69.0414	67.5064	64.5694	62.4021	59.9850	58.6112	60.1345	61.8044	64.3996	67.3996	69.8262 (42a)
Hot water usage for baths	30.2663	29.8168	29.1838	28.0167	27.1427	26.1737	25.6503	26.2788	26.9632	28.0001	29.1913	30.1639 (42b)
Hot water usage for other uses	42.6501	41.0992	39.5483	37.9974	36.4465	34.8956	34.8956	36.4465	37.9974	39.5483	41.0992	42.6501 (42c)
Average daily hot water use (litres/day)												131.4595 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	143.0112	139.9574	136.2385	130.5835	125.9913	121.0543	119.1570	122.8599	126.7651	131.9481	137.6901	142.6403 (44)
Energy content (annual)	226.4947	199.2974	209.3934	178.7623	169.6085	148.8504	144.1101	152.1262	156.3140	179.0523	196.1648	223.3402 (45)
Distribution loss (46)m = 0.15 x (45)m	33.9742	29.8946	31.4090	26.8143	25.4413	22.3276	21.6165	22.8189	23.4471	26.8578	29.4247	33.5010 (46)

Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.7973 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.9706 (55)
Total storage loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (56)

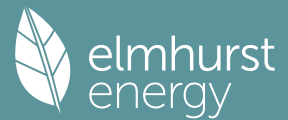
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	279.8443	247.4842	262.7431	230.3910	222.9581	200.4790	197.4597	205.4758	207.9427	232.4019	247.7935	276.6898 (62)
WWHRS	-32.0444	-28.3403	-29.6764	-24.5732	-22.9013	-19.5968	-18.3689	-19.5335	-20.2756	-23.9027	-27.0789	-31.4510 (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	247.7999	219.1438	233.0667	205.8178	200.0568	180.8822	179.0908	185.9423	187.6670	208.4991	220.7146	245.2388 (64)
Total per year (kWh/year)												2513.9200 (64)

Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	117.9892	104.8158	112.3030	100.7414	99.0745	90.7957	90.5963	93.2617	93.2773	102.2146	106.5277	116.9403 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	136.8037	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	132.6397	146.8511	132.6397	137.0611	132.6397	137.0611	132.6397	132.6397	137.0611	132.6397	137.0611	132.6397	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	255.7282	258.3819	251.6947	237.4586	219.4881	202.5983	191.3149	188.6612	195.3484	209.5845	227.5550	244.4448	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	36.6804	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	-109.4430	(71)
Water heating gains (Table 5)	158.5876	155.9759	150.9449	139.9186	133.1647	126.1051	121.7692	125.3517	129.5519	137.3852	147.9552	157.1778	(72)
Total internal gains	613.9967	628.2500	602.3205	581.4794	552.3336	529.8056	509.7650	510.6938	526.0024	546.6505	579.6124	601.3035	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

North					5.7300	10.6334	0.6300	0.7000			0.7700	18.6208 (74)	
East					2.5300	19.6403	0.6300	0.7000			0.7700	15.1859 (76)	
South					7.8800	46.7521	0.6300	0.7000			0.7700	112.5897 (78)	
West					1.0800	19.6403	0.6300	0.7000			0.7700	6.4825 (80)	

Solar gains	152.8789	262.3662	365.1590	464.4064	532.2464	534.0173	512.4881	460.8125	399.2546	291.5417	183.4463	130.6301	(83)
Total gains	766.8756	890.6162	967.4795	1045.8858	1084.5800	1063.8229	1022.2531	971.5063	925.2570	838.1922	763.0587	731.9336	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	25.8591	25.9211	25.9821	26.2724	26.3275	26.5868	26.5868	26.6354	26.4863	26.3275	26.2163	26.1012	
alpha	2.7239	2.7281	2.7321	2.7515	2.7552	2.7725	2.7725	2.7757	2.7658	2.7552	2.7478	2.7401	
util living area	0.9405	0.9123	0.8739	0.8012	0.6945	0.5491	0.4200	0.4545	0.6375	0.8222	0.9129	0.9466	(86)
MIT	18.7592	19.0929	19.5281	20.0766	20.5253	20.8257	20.9391	20.9226	20.7220	20.1449	19.3714	18.7039	(87)
Th 2	20.0220	20.0241	20.0261	20.0359	20.0377	20.0462	20.0462	20.0477	20.0429	20.0377	20.0340	20.0301	(88)
util rest of house	0.9324	0.9007	0.8570	0.7740	0.6515	0.4850	0.3382	0.3722	0.5769	0.7921	0.8995	0.9393	(89)
MIT 2	17.4121	17.8305	18.3734	19.0494	19.5766	19.9072	20.0107	20.0001	19.8056	19.1466	18.1929	17.3477	(90)
Living area fraction									fLA = Living area / (4) =				(91)
MIT	17.6798	18.0814	18.6029	19.2535	19.7651	20.0897	20.1952	20.1835	19.9877	19.3450	18.4271	17.6172	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.6798	18.0814	18.6029	19.2535	19.7651	20.0897	20.1952	20.1835	19.9877	19.3450	18.4271	17.6172	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	694.8313	775.9278	799.8670	782.9572	692.1872	519.2131	359.2665	373.4743	530.2509	642.5492	664.3633	669.1867	(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	1431.9382	1407.3269	1289.1475	1090.6261	847.7915	571.4420	374.2340	393.1151	615.1919	919.2573	1195.7359	1422.6220	(97)
Space heating kWh	548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98a)
Space heating requirement - total per year (kWh/year)												2823.0386	
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	548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2823.0386	
Space heating per m2										(98c) / (4) =		28.3352	(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	
548.4075	424.3002	364.0247	221.5216	115.7696	0.0000	0.0000	0.0000	0.0000	0.0000	205.8708	382.5882	560.5559	(98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)
Space heating fuel (main heating system)	594.1576	459.6969	394.3930	240.0018	125.4275	0.0000	0.0000	0.0000	0.0000	223.0453	414.5051	607.3195	(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	247.7999	219.1438	233.0667	205.8178	200.0568	180.8822	179.0908	185.9423	187.6670	208.4991	220.7146	245.2388	(64)
Efficiency of water heater	85.7888	85.5153	85.0556	84.2250	82.8791	79.8000	79.8000	79.8000	79.8000	84.0313	85.2812	85.8531	(216)
Fuel for water heating, kWh/month	288.8489	256.2629	274.0169	244.3666	241.3839	226.6694	224.4246	233.0104	235.1717	248.1207	258.8079	285.6493	(219)

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Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	(231)
Lighting	27.5599	22.1096	19.9072	14.5849	11.2658	9.2042	10.2770	13.3585	17.3513	22.7659	25.7140	28.3259	28.3259	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-46.2279	-64.5478	-91.8920	-102.2785	-109.3887	-101.7411	-100.4344	-95.2225	-85.9349	-73.2702	-50.5802	-40.0364	-40.0364	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-28.0508	-58.7791	-116.4251	-174.3030	-229.9618	-230.9123	-228.2396	-193.5216	-142.1768	-83.9257	-37.4037	-22.2033	-22.2033	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													3058.5467	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													3016.7332	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													222.4243	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2507.4574	(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													3876.2469	(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	3058.5467	0.2100	642.2948	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3016.7332	0.2100	633.5140	(264)
Space and water heating			1275.8088	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	222.4243	0.1443	32.1027	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-961.5546	0.1348	-129.6218	
PV Unit electricity exported	-1545.9027	0.1260	-194.7625	
Total			-324.3844	(269)
Total CO2, kg/year			995.4564	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9900	(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	3058.5467	1.1300	3456.1578	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3016.7332	1.1300	3408.9085	(278)
Space and water heating			6865.0663	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	222.4243	1.5338	341.1618	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-961.5546	1.4982	-1440.6267	
PV Unit electricity exported	-1545.9027	0.4625	-714.9182	
Total			-2155.5450	(283)
Total Primary energy kWh/year			5180.7840	(286)
Target Primary Energy Rate (TPER)			52.0000	(287)