

Full SAP Calculation Printout



Property Reference	OP-D320 APT Top				Issued on Date	29/11/2024
Assessment Reference	APT Top		Prop Type Ref	APT Top		
Property	APT Top					
SAP Rating	82 B	DER	5.19	TER	15.16	
Environmental	96 A	% DER < TER				65.77
CO ₂ Emissions (t/year)	0.25	DFEE	36.36	TFEE	37.07	
Compliance Check	See BREL	% DFEE < TFEE				1.91
% DPER < TPER	31.51	DPER	54.97	TPER	80.26	
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	51.5000 (1b)	2.3700 (2b)	122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	122.0550 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.8000 (23c)
Effective ac	0.3257	0.3219	0.3182	0.2996	0.2959	0.2773	0.2773	0.2736	0.2848	0.2959	0.3033	0.3108 (25)

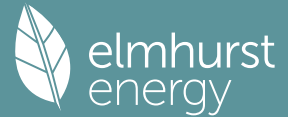
3. Heat losses and heat loss parameter

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)			10.2100	1.2357	12.6169		(27)
External Wall	52.3800	10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall		2.1400	13.7400	0.1700	2.3358		(29a)
Roof - ceiling	51.5900		51.5900	0.1100	5.6749		(30)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9365		(33)
Party Floor			52.3800				(32d)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K	100.0000 (35)
--	---------------

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	7.8300	0.0500	0.3915
E2 Other lintels (including other steel lintels)	6.8100	0.0500	0.3405
E3 Sill			
E4 Jamb	19.2000	0.0500	0.9600

Full SAP Calculation Printout



E16 Corner (normal)						9.4800	0.0900	0.8532				
E7 Party floor between dwellings (in blocks of flats)						28.8000	0.0700	2.0160				
E10 Eaves (insulation at ceiling level)						15.4000	0.0600	0.9240				
E12 Gable (insulation at ceiling level)						13.4000	0.0600	0.8040				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											6.2892	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	36.2257 (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	13.1168	12.9670	12.8173	12.0683	11.9186	11.1696	11.1696	11.0199	11.4692	11.9186	12.2181	12.5177 (38)
Average = Sum(39)m / 12 =	49.3426	49.1928	49.0430	48.2941	48.1443	47.3954	47.3954	47.2456	47.6949	48.1443	48.4438	48.7434 (39)
												48.2566
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9581	0.9552	0.9523	0.9377	0.9348	0.9203	0.9203	0.9174	0.9261	0.9348	0.9407	0.9465 (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												1.7343 (42)
Hot water usage for mixer showers												
	73.2852	72.1839	70.5790	67.5084	65.2424	62.7153	61.2789	62.8717	64.6176	67.3309	70.4674	73.0044 (42a)
Hot water usage for baths												
	24.2561	23.8958	23.3885	22.4532	21.7528	20.9762	20.5567	21.0605	21.6089	22.4399	23.3945	24.1741 (42b)
Hot water usage for other uses												
	34.0960	32.8561	31.6163	30.3764	29.1366	27.8967	27.8967	29.1366	30.3764	31.6163	32.8561	34.0960 (42c)
Average daily hot water use (litres/day)												121.0520 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	131.6372	128.9358	125.5838	120.3380	116.1317	111.5882	109.7324	113.0687	116.6029	121.3871	126.7181	131.2745 (44)
Energy content (annual)	208.4812	183.6029	193.0176	164.7367	156.3356	137.2107	132.7118	140.0026	143.7830	164.7211	180.5331	205.5441 (45)
Distribution loss (46)m = 0.15 x (45)m												
	31.2722	27.5404	28.9526	24.7105	23.4503	20.5816	19.9068	21.0004	21.5675	24.7082	27.0800	30.8316 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.4040 (55)
Total storage loss												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)
If cylinder contains dedicated solar storage												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (64)
12Total per year (kWh/year)												3044.7022 (64)
Electric shower(s)												3045 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.2061	100.6870	108.0644	97.2454	95.8677	63.6322	62.7366	65.1608	65.8175	98.6558	102.4977	112.2295 (65)

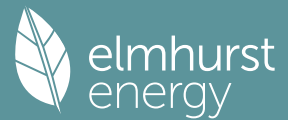
5. Internal gains (see Table 5 and 5a)

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	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605 (68)
Pumps, fans	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716 (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)	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728 (71)
Total internal gains	152.1587	149.8318	145.2479	135.0630	128.8544	88.3780	84.3234	87.5817	91.4131	132.6019	142.3579	150.8461 (72)
	429.1384	436.6122	419.8439	403.8070	384.4171	336.5205	323.2365	324.9266	335.2711	382.3119	405.2491	421.1576 (73)

6. Solar gains

[Jan]												Gains	
				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		
East				3.7500	19.6403		0.6300		0.7000		0.7700		22.5087 (76)
South				2.7100	46.7521		0.6300		0.7000		0.7700		38.7206 (78)
West				3.7500	19.6403		0.6300		0.7000		0.7700		22.5087 (80)
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783	(83)
Total gains	512.8764	588.0901	645.6507	706.6194	738.7741	693.4347	665.3241	628.8077	588.3277	555.2051	507.2776	491.6358	(84)

Full SAP Calculation Printout



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	28.9923	29.0806	29.1694	29.6218	29.7139	30.1835	30.1835	30.2791	29.9939	29.7139	29.5302	29.3487
alpha	2.9328	2.9387	2.9446	2.9748	2.9809	3.0122	3.0122	3.0186	2.9996	2.9809	2.9687	2.9566
util living area	0.8888	0.8445	0.7813	0.6736	0.5439	0.4163	0.3068	0.3363	0.5115	0.7089	0.8424	0.8980 (86)
Living	19.4383	19.7459	20.1215	20.5367	20.8036	20.9369	20.9811	20.9749	20.8792	20.5417	19.9496	19.3923
Non living	18.3160	18.6945	19.1523	19.6511	19.9519	20.1006	20.1392	20.1372	20.0442	19.6712	18.9618	18.2662
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	20.2011	19.7459	20.1215	20.5367	20.8036	20.9369	20.9811	20.9749	20.8792	20.5417	19.9496	19.6172 (87)
Th 2	20.1184	20.1208	20.1233	20.1355	20.1380	20.1503	20.1503	20.1527	20.1454	20.1380	20.1331	20.1282 (88)
util rest of house	0.8762	0.8281	0.7591	0.6429	0.5040	0.3664	0.2499	0.2775	0.4589	0.6740	0.8232	0.8864 (89)
MIT 2	19.3998	18.6945	19.1523	19.6511	19.9519	20.1006	20.1392	20.1372	20.0442	19.6712	18.9618	18.6017 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7561	19.1620	19.5833	20.0449	20.3307	20.4725	20.5136	20.5097	20.4155	20.0583	19.4010	19.0533 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7561	19.1620	19.5833	20.0449	20.3307	20.4725	20.5136	20.5097	20.4155	20.0583	19.4010	19.0533 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8705	0.8077	0.7442	0.6395	0.5132	0.3856	0.2745	0.3026	0.4760	0.6705	0.8047	0.8696 (94)
Useful gains	446.4594	475.0226	480.4693	451.8986	379.1298	267.3937	182.6141	190.2644	280.0259	372.2729	408.2177	427.5295 (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	762.6445	701.5880	641.6446	538.2333	415.5169	278.3285	185.4849	194.1650	301.2158	455.3630	595.9083	723.9988 (97)
Space heating kWh	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98a)
Space heating requirement - total per year (kWh/year)	1014.1706											
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	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1014.1706											
Space heating per m2	(98c) / (4) = 19.6926 (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 %)	238.8193 (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	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98)
Space heating efficiency (main heating system 1)	238.8193	238.8193	238.8193	238.8193	238.8193	0.0000	0.0000	0.0000	0.0000	238.8193	238.8193	238.8193 (210)
Space heating fuel (main heating system)	98.5020	63.7520	50.2114	26.0285	11.3358	0.0000	0.0000	0.0000	0.0000	25.8853	56.5856	92.3599 (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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (64)
Efficiency of water heater	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439 (216)
Fuel for water heating, kWh/month	112.3448	99.7510	106.6834	95.1677	93.2539	73.8961	73.0378	75.7070	76.3023	96.3238	100.9509	111.2694 (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	12.3940	11.1946	12.3940	11.9942	12.3940	11.9942	12.3940	12.3940	11.9942	12.3940	11.9942	12.3940 (231)
Lighting	19.5572	15.6895	14.1267	10.3498	7.9945	6.5316	7.2928	9.4795	12.3130	16.1553	18.2473	20.1008 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	424.6603 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	273.1439											
Water heating fuel used	1114.6880 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.9800)												
mechanical ventilation fans (SFP = 0.9800)	145.9290 (230a)											
Total electricity for the above, kWh/year	145.9290 (231)											

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	157.8380	(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	1843.1153	(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	424.6603	0.1561	66.2764	(261)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	1114.6880	0.1415	157.7567	(264)
Space and water heating			224.0331	(265)
Pumps, fans and electric keep-hot	145.9290	0.1387	20.2421	(267)
Energy for lighting	157.8380	0.1443	22.7809	(268)
Total CO2, kg/year			267.0561	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1900	(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	424.6603	1.5777	670.0054	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1114.6880	1.5234	1698.0665	(278)
Space and water heating			2368.0719	(279)
Pumps, fans and electric keep-hot	145.9290	1.5128	220.7613	(281)
Energy for lighting	157.8380	1.5338	242.0972	(282)
Total Primary energy kWh/year			2830.9305	(286)
Dwelling Primary energy Rate (DPER)			54.9700	(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	51.5000	(1b) x 2.3700	(2b) = 122.0550	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 122.0550	(5)

2. Ventilation rate

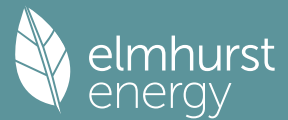
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (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	Air changes per hour	
Pressure test	20.0000 / (5) =	0.1639 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate	5.0000	(17)
Number of sides sheltered	0.4139	(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) =	0.3518 (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	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133	(22b)
Effective ac	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854	(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
---------	-------------	----------------	---------------	------------------	--------------	-------------------	---------------

Full SAP Calculation Printout



TER Opaque door			2.1400	1.0000	2.1400	(26)
TER Opening Type (Uw = 1.20)			10.2100	1.1450	11.6908	(27)
External Wall	52.3800	10.2100	42.1700	0.1800	7.5906	(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1800	2.4732	(29a)
Roof - ceiling	51.5900		51.5900	0.1100	5.6749	(30)
Total net area of external elements Aum(A, m2)			119.8500			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	29.5695		(33)

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

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)			7.8300	0.0500	0.3915	
E3 Sill			6.8100	0.0500	0.3405	
E4 Jamb			19.2000	0.0500	0.9600	
E16 Corner (normal)			9.4800	0.0900	0.8532	
E7 Party floor between dwellings (in blocks of flats)			28.8000	0.0700	2.0160	
E10 Eaves (insulation at ceiling level)			15.4000	0.0600	0.9240	
E12 Gable (insulation at ceiling level)			13.4000	0.0600	0.8040	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.2892 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 35.8587 (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	24.1905	24.0332	23.8790	23.1547	23.0191	22.3883	22.3883	22.2715	22.6313	23.0191	23.2933	23.5799	(38)
Average = Sum(39)m / 12 =	60.0492	59.8919	59.7377	59.0134	58.8779	58.2470	58.2470	58.1302	58.4900	58.8779	59.1520	59.4386	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1660	1.1629	1.1600	1.1459	1.1433	1.1310	1.1310	1.1287	1.1357	1.1433	1.1486	1.1541	(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													1.7343 (42)
Hot water usage for mixer showers													
Hot water usage for baths	53.2983	52.4974	51.3302	49.0970	47.4490	45.6111	44.5665	45.7248	46.9946	48.9679	51.2490	53.0941	(42a)
Hot water usage for other uses	23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654	(42b)
Average daily hot water use (litres/day)	32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	(42c)
Daily hot water use	108.7328	106.4117	103.5848	99.2851	95.7939	92.0404	90.5972	93.4120	96.3807	100.3213	104.6872	108.4507	(44)
Energy content (annual)	172.2061	151.5289	159.2059	135.9164	128.9570	113.1744	109.5695	115.6636	118.8470	136.1350	149.1461	169.8075	(45)
Distribution loss (46)m = 0.15 x (45)m	25.8309	22.7293	23.8809	20.3875	19.3435	16.9762	16.4354	17.3495	17.8271	20.4203	22.3719	25.4711	(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	225.5557	199.7156	212.5555	187.5451	182.3066	164.8031	162.9191	169.0132	170.4757	189.4847	200.7747	223.1571	(62)
WWHRS	-24.3658	-21.5493	-22.5652	-18.6849	-17.4136	-14.9010	-13.9673	-14.8528	-15.4171	-18.1751	-20.5901	-23.9146	(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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426	(64)
12Total per year (kWh/year)													2061.9095 (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)
Heat gains from water heating, kWh/month	99.9382	88.9327	95.6157	86.4951	85.5579	78.9334	79.1116	81.1378	80.8196	87.9446	90.8940	99.1407	(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	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)
Pumps, fans	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Total internal gains	134.3256	132.3404	128.5157	120.1321	114.9972	109.6298	106.3327	109.0562	112.2494	118.2051	126.2417	133.2536	(72)
	414.3053	422.1208	406.1117	391.8762	373.5599	357.7723	345.2458	346.4011	356.1074	370.9150	392.1329	406.5651	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
-------	------	------------	---	----	--------	-------

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	292.1174	224.7291	188.5073	110.3160	55.8459	0.0000	0.0000	0.0000	0.0000	106.3547	201.8833	298.1221 (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)	316.4869	243.4768	204.2332	119.5189	60.5047	0.0000	0.0000	0.0000	0.0000	115.2272	218.7251	322.9925 (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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426 (64)
Efficiency of water heater	84.8951	84.5816	84.0422	83.1292	81.9000	79.8000	79.8000	79.8000	79.8000	83.0230	84.3154	79.8000 (216)
Fuel for water heating, kWh/month	236.9866	210.6443	226.0654	203.1298	201.3345	187.8473	186.6565	193.1835	194.3090	206.3398	213.7030	234.5094 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.9650	12.8078	11.5320	8.4488	6.5261	5.3319	5.9533	7.7384	10.0514	13.1879	14.8957	16.4088 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.7164	-25.8887	-38.5678	-45.0158	-50.0051	-47.2409	-46.6923	-43.3696	-37.7320	-30.3608	-19.8088	-15.2144 (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	-7.4190	-15.8442	-31.9252	-48.5774	-64.8287	-65.3266	-64.5286	-54.3394	-39.4593	-22.8331	-9.9643	-5.8471 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1601.1656 (211)
Space heating fuel - main system 2												0.0000 (211)

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2494.7090 (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)	128.8471 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-848.5055 (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	3462.2162 (238)

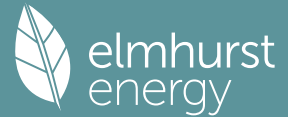
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1601.1656	0.2100	336.2448 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2494.7090	0.2100	523.8889 (264)
Space and water heating			860.1337 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.8471	0.1443	18.5966 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	0.1338	-55.8814
PV Unit electricity exported	-430.8929	0.1255	-54.0888
Total			-109.9702 (269)
Total CO2, kg/year			780.6893 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.1600 (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	1601.1656	1.1300	1809.3171 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2494.7090	1.1300	2819.0212 (278)
Space and water heating			4628.3383 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.8471	1.5338	197.6299 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	1.4945	-624.1223
PV Unit electricity exported	-430.8929	0.4608	-198.5361
Total			-822.6585 (283)
Total Primary energy kWh/year			4133.4106 (286)
Target Primary Energy Rate (TPER)			80.2600 (287)

Full SAP Calculation Printout



Property Reference	OP-D320 APT Top				Issued on Date	29/11/2024	
Assessment Reference	APT Top		Prop Type Ref	APT Top			
Property	APT Top						
SAP Rating	82 B	DER	5.19	TER	15.16		
Environmental	96 A	% DER < TER				65.77	
CO ₂ Emissions (t/year)	0.25	DFEE	36.36	TFEE	37.07		
Compliance Check	See BREL	% DFEE < TFEE				1.91	
% DPER < TPER	31.51	DPER	54.97	TPER	80.26		
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	51.5000 (1b)	2.3700 (2b)	122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	122.0550 (5)

2. Ventilation rate

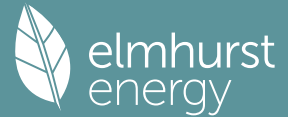
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1639 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3389 (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) = 0.2880 (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	0.3672	0.3600	0.3528	0.3168	0.3096	0.2736	0.2736	0.2664	0.2880	0.3096	0.3240	0.3384 (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	0.5674	0.5648	0.5622	0.5502	0.5479	0.5374	0.5374	0.5355	0.5415	0.5479	0.5525	0.5573 (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)			10.2100	1.2357	12.6169		(27)
External Wall	52.3800	10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1700	2.3358		(29a)
Roof - ceiling	51.5900		51.5900	0.1100	5.6749		(30)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)							(32)
Party Floor			52.3800		29.9365		(32d)
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)				7.8300	0.0500		0.3915
E3 Sill				6.8100	0.0500		0.3405
E4 Jamb				19.2000	0.0500		0.9600
E16 Corner (normal)				9.4800	0.0900		0.8532
E7 Party floor between dwellings (in blocks of flats)				28.8000	0.0700		2.0160
E10 Eaves (insulation at ceiling level)				15.4000	0.0600		0.9240

Full SAP Calculation Printout



E12 Gable (insulation at ceiling level) 13.4000 0.0600 0.8040
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.2892 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 36.2257 (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 22.8551 22.7497 22.6463 22.1607 22.0699 21.6470 21.6470 21.5686 21.8099 22.0699 22.2537 22.4458 (38)
 Average = Sum(39)m / 12 = 59.0809 58.9754 58.8720 58.3864 58.2956 57.8727 57.8727 57.7944 58.0356 58.2956 58.4794 58.6715 (39)
 58.3860

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 1.1472 1.1452 1.1431 1.1337 1.1320 1.1237 1.1237 1.1222 1.1269 1.1320 1.1355 1.1393 (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 1.7343 (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 23.0433 22.7010 22.2191 21.3305 20.6652 19.9274 19.5289 20.0074 20.5285 21.3179 22.2248 22.9654 (42b)
 Hot water usage for other uses 32.3912 31.2133 30.0354 28.8576 27.6797 26.5019 26.5019 27.6797 28.8576 30.0354 31.2133 32.3912 (42c)
 Average daily hot water use (litres/day) 50.8112 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 55.4344 53.9143 52.2546 50.1881 48.3449 46.4293 46.0307 47.6872 49.3861 51.3534 53.4381 55.3565 (44)
 Energy content (annual) 87.7946 76.7733 80.3133 68.7050 65.0815 57.0902 55.6702 59.0467 60.8980 69.6861 76.1324 86.6749 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 843.8662
 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
 WWHRS 74.6254 65.2573 68.2663 58.3993 55.3193 48.5267 47.3197 50.1897 51.7633 59.2331 64.7125 73.6737 (62)
 PV diverter 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63a)
 Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)
 FGHRs 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)
 Output from w/h 74.6254 65.2573 68.2663 58.3993 55.3193 48.5267 47.3197 50.1897 51.7633 59.2331 64.7125 73.6737 (64)
 Total per year (kWh/year) = Sum(64)m = 717.2862 (64)
 12Total per year (kWh/year) 717 (64)
 Electric shower(s) 42.6831 38.0310 41.5284 39.6300 40.3737 38.5126 39.7963 40.3737 39.6300 41.5284 40.7475 42.6831 (64a)
 Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 485.5176 (64a)
 Heat gains from water heating, kWh/month 29.3271 25.8221 27.4487 24.5073 23.9232 21.7598 21.7790 22.6408 22.8483 25.1904 26.3650 29.0892 (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 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 86.7160 (66)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 76.8362 85.0687 76.8362 79.3974 76.8362 79.3974 76.8362 79.3974 76.8362 79.3974 76.8362 (67)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 151.1287 152.6969 148.7450 140.3318 129.7117 119.7303 113.0621 111.4939 115.4458 123.8589 134.4791 144.4605 (68)
 Pumps, fans 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 31.6716 (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) -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 -69.3728 (71)
 Total internal gains 39.4182 38.4257 36.8934 34.0379 32.1549 30.2219 29.2728 30.4312 31.7338 33.8580 36.6181 39.0984 (72)
 316.3978 325.2061 311.4894 302.7820 287.7176 278.3644 268.1859 267.7761 275.5918 283.5680 299.5093 309.4099 (73)

6. Solar gains

[Jan] Area Solar flux g Specific data FF Access Gains
 m2 Table 6a W/m2 or Table 6b or Table 6c factor Table 6d W
 East 3.7500 19.6403 0.6300 0.7000 0.7700 22.5087 (76)
 South 2.7100 46.7521 0.6300 0.7000 0.7700 38.7206 (78)
 West 3.7500 19.6403 0.6300 0.7000 0.7700 22.5087 (80)
 Solar gains 83.7380 151.4779 225.8068 302.8123 354.3570 356.9142 342.0876 303.8811 253.0566 172.8932 102.0285 70.4783 (83)
 Total gains 400.1358 476.6840 537.2962 605.5943 642.0746 635.2787 610.2736 571.6572 528.6483 456.4612 401.5378 379.8881 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
 Utilisation factor for gains for living area, nil,m (see Table 9a)
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 tau 24.2135 24.2568 24.2994 24.5015 24.5397 24.7190 24.7190 24.7525 24.6496 24.5397 24.4626 24.3825
 alpha 2.6142 2.6171 2.6200 2.6334 2.6360 2.6479 2.6479 2.6502 2.6433 2.6360 2.6308 2.6255

Full SAP Calculation Printout



util living area	0.9416	0.9106	0.8645	0.7780	0.6612	0.5153	0.3922	0.4302	0.6190	0.8183	0.9142	0.9481 (86)
MIT	18.5827	18.9556	19.4553	20.0629	20.5315	20.8281	20.9389	20.9204	20.7077	20.0726	19.2260	18.5139 (87)
Th 2	19.9625	19.9641	19.9658	19.9734	19.9748	19.9815	19.9815	19.9827	19.9789	19.9748	19.9719	19.9689 (88)
util rest of house	0.9334	0.8985	0.8460	0.7480	0.6153	0.4494	0.3098	0.3462	0.5552	0.7866	0.9005	0.9407 (89)
MIT 2	17.7751	18.1391	18.6235	19.2027	19.6268	19.8777	19.9549	19.9460	19.7885	19.2279	18.4153	17.7121 (90)
Living area fraction	18.1342	18.5022	18.9934	19.5852	20.0291	20.3003	20.3925	20.3793	20.1973	19.6035	18.7758	18.0686 (92)
MIT	18.1342	18.5022	18.9934	19.5852	20.0291	20.3003	20.3925	20.3793	20.1973	19.6035	18.7758	18.0686 (93)
Temperature adjustment												0.0000
adjusted MIT	18.1342	18.5022	18.9934	19.5852	20.0291	20.3003	20.3925	20.3793	20.1973	19.6035	18.7758	18.0686 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9147	0.8774	0.8257	0.7355	0.6179	0.4708	0.3439	0.3800	0.5697	0.7735	0.8807	0.9230	(94)
Useful gains	365.9850	418.2567	443.6457	445.3934	396.7186	299.1034	209.8782	217.2126	301.1603	353.0537	353.6471	350.6257	(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	817.3378	802.1923	735.5090	623.8727	485.5492	329.8921	219.4795	229.9802	353.8580	524.8658	682.7946	813.6943	(97)
Space heating kWh	335.8065	258.0047	217.1463	128.5051	66.0899	0.0000	0.0000	0.0000	0.0000	127.8282	236.9862	344.5231	(98a)
Space heating requirement - total per year (kWh/year)												1714.8900	
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	335.8065	258.0047	217.1463	128.5051	66.0899	0.0000	0.0000	0.0000	0.0000	127.8282	236.9862	344.5231	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1714.8900	
Space heating per m2										(98c) / (4) =		33.2988	(99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	544.0031	428.2578	439.2371	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8161	0.8688	0.8465	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	443.9467	372.0906	371.8021	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.6458	686.9559	643.2947	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	194.9034	234.2598	201.9905	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	48.7258	58.5649	50.4976	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												157.7884	(107)
Energy for space heating												33.2988	(99)
Energy for space cooling												3.0639	(108)
Total												36.3627	(109)
Fabric Energy Efficiency (DFEE)												36.4	(109)

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

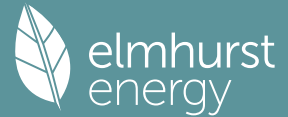
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	51.5000 (1b)	x 2.3700 (2b)	= 122.0550 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 122.0550 (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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1639 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4139	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)

Full SAP Calculation Printout



Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3518 (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	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133	(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	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854	(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)			10.2100	1.1450	11.6908			(27)
External Wall	52.3800	10.2100	42.1700	0.1800	7.5906			(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1800	2.4732			(29a)
Roof - ceiling	51.5900		51.5900	0.1100	5.6749			(30)
Total net area of external elements Aum(A, m2)			119.8500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.5695		(33)

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

100.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element	7.8300	0.0500	0.3915	
E2 Other lintels (including other steel lintels)				
E3 Sill	6.8100	0.0500	0.3405	
E4 Jamb	19.2000	0.0500	0.9600	
E16 Corner (normal)	9.4800	0.0900	0.8532	
E7 Party floor between dwellings (in blocks of flats)	28.8000	0.0700	2.0160	
E10 Eaves (insulation at ceiling level)	15.4000	0.0600	0.9240	
E12 Gable (insulation at ceiling level)	13.4000	0.0600	0.8040	

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

6.2892 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 35.8587 (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	24.1905	24.0332	23.8790	23.1547	23.0191	22.3883	22.3883	22.2715	22.6313	23.0191	23.2933	23.5799	(38)
Heat transfer coeff	60.0492	59.8919	59.7377	59.0134	58.8779	58.2470	58.2470	58.1302	58.4900	58.8779	59.1520	59.4386	(39)
Average = Sum(39)m / 12 =													59.0127

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1660	1.1629	1.1600	1.1459	1.1433	1.1310	1.1310	1.1287	1.1357	1.1433	1.1486	1.1541	(40)
HLP (average)													1.1459
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

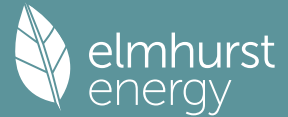
Assumed occupancy													1.7343 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654	22.9654	(42b)
Hot water usage for other uses													
32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	32.3912	(42c)
Average daily hot water use (litres/day)													50.8112 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	55.4344	53.9143	52.2546	50.1881	48.3449	46.4293	46.0307	47.6872	49.3861	51.3534	53.4381	55.3565	(44)
Energy conte	87.7946	76.7733	80.3133	68.7050	65.0815	57.0902	55.6702	59.0467	60.8980	69.6861	76.1324	86.6749	(45)
Energy content (annual)										Total = Sum(45)m =			843.8662
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	74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	(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	74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			717.2862 (64)
Electric shower(s)	42.6831	38.0310	41.5284	39.6300	40.3737	38.5126	39.7963	40.3737	39.6300	41.5284	40.7475	42.6831	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													485.5176 (64a)
Heat gains from water heating, kWh/month	29.3271	25.8221	27.4487	24.5073	23.9232	21.7598	21.7790	22.6408	22.8483	25.1904	26.3650	29.0892	(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	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

Full SAP Calculation Printout



Pumps, fans	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716 (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)
	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728 (71)
Water heating gains (Table 5)	39.4182	38.4257	36.8934	34.0379	32.1549	30.2219	29.2728	30.4312	31.7338	33.8580	36.6181	39.0984 (72)
Total internal gains	316.3978	325.2061	311.4894	302.7820	287.7176	278.3644	268.1859	267.7761	275.5918	283.5680	299.5093	309.4099 (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
East					3.7500	19.6403	0.6300	0.7000			0.7700			22.5087 (76)
South					2.7100	46.7521	0.6300	0.7000			0.7700			38.7206 (78)
West					3.7500	19.6403	0.6300	0.7000			0.7700			22.5087 (80)
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783	(83)	
Total gains	400.1358	476.6840	537.2962	605.5943	642.0746	635.2787	610.2736	571.6572	528.6483	456.4612	401.5378	379.8881	(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	23.8230	23.8856	23.9473	24.2412	24.2970	24.5601	24.5601	24.6095	24.4581	24.2970	24.1844	24.0678
alpha	2.5882	2.5924	2.5965	2.6161	2.6198	2.6373	2.6373	2.6406	2.6305	2.6198	2.6123	2.6045
util living area	0.9421	0.9116	0.8661	0.7801	0.6640	0.5174	0.3941	0.4320	0.6213	0.8199	0.9149	0.9484 (86)
MIT	18.5355	18.9118	19.4182	20.0418	20.5188	20.8242	20.9372	20.9185	20.7010	20.0551	19.1981	18.4763 (87)
Th 2	19.9473	19.9498	19.9522	19.9635	19.9657	19.9756	19.9756	19.9774	19.9718	19.9657	19.9614	19.9569 (88)
util rest of house	0.9339	0.8995	0.8477	0.7501	0.6178	0.4510	0.3110	0.3473	0.5571	0.7882	0.9012	0.9410 (89)
MIT 2	17.7188	18.0868	18.5783	19.1758	19.6085	19.8696	19.9484	19.9399	19.7771	19.2050	18.3811	17.6672 (90)
Living area fraction	18.0820	18.4536	18.9518	19.5609	20.0133	20.2940	20.3881	20.3751	20.1880	19.5830	18.7444	18.0270 (92)
MIT	18.0820	18.4536	18.9518	19.5609	20.0133	20.2940	20.3881	20.3751	20.1880	19.5830	18.7444	18.0270 (93)
Temperature adjustment												0.0000
adjusted MIT	18.0820	18.4536	18.9518	19.5609	20.0133	20.2940	20.3881	20.3751	20.1880	19.5830	18.7444	18.0270 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9150	0.8782	0.8270	0.7371	0.6201	0.4725	0.3454	0.3813	0.5715	0.7747	0.8812	0.9232 (94)
Useful gains	366.1207	418.6043	444.3222	446.3873	398.1279	300.1474	210.7711	217.9985	302.1260	353.6154	353.8524	350.7043 (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	827.5962	811.7522	743.8415	629.1349	489.4677	331.6615	220.6434	231.0724	356.0846	528.8994	688.7895	821.8564 (97)
Space heating kWh	343.3377	264.1954	222.8424	131.5783	67.9568	0.0000	0.0000	0.0000	0.0000	130.4113	241.1548	350.5372 (98a)
Space heating requirement - total per year (kWh/year)												1752.0139
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	343.3377	264.1954	222.8424	131.5783	67.9568	0.0000	0.0000	0.0000	0.0000	130.4113	241.1548	350.5372 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1752.0139
Space heating per m ²										(98c) / (4) =		34.0197 (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	547.5222	431.0281	441.7896	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8133	0.8665	0.8442	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	445.3136	373.4978	372.9610	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.6458	686.9559	643.2947	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	193.9192	233.2128	201.1282	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	48.4798	58.3032	50.2821	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												157.0651 (107)
Energy for space heating												34.0197 (99)
Energy for space cooling												3.0498 (108)
Total												37.0695 (109)
Fabric Energy Efficiency (TFEE)												37.1 (109)

Full SAP Calculation Printout



Property Reference	OP-D320 APT Top				Issued on Date	29/11/2024
Assessment Reference	APT Top		Prop Type Ref	APT Top		
Property	APT Top					
SAP Rating	82 B	DER	5.19	TER	15.16	
Environmental	96 A	% DER < TER				65.77
CO ₂ Emissions (t/year)	0.25	DFEE	36.36	TFEE	37.07	
Compliance Check	See BREL	% DFEE < TFEE				1.91
% DPER < TPER	31.51	DPER	54.97	TPER	80.26	
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	51.5000 (1b)	2.3700 (2b)	122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	122.0550 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												72.8000 (23c)
Effective ac	0.3257	0.3219	0.3182	0.2996	0.2959	0.2773	0.2773	0.2736	0.2848	0.2959	0.3033	0.3108 (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)			10.2100	1.2357	12.6169		(27)
External Wall	52.3800	10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall		2.1400	13.7400	0.1700	2.3358		(29a)
Roof - ceiling	51.5900		51.5900	0.1100	5.6749		(30)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9365		(33)
Party Floor			52.3800				(32d)

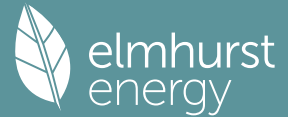
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K	100.0000 (35)
--	---------------

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

List of Thermal Bridges

K1 Element	
E2 Other lintels (including other steel lintels)	
E3 Sill	
E4 Jamb	

Full SAP Calculation Printout



E16 Corner (normal)						9.4800	0.0900	0.8532				
E7 Party floor between dwellings (in blocks of flats)						28.8000	0.0700	2.0160				
E10 Eaves (insulation at ceiling level)						15.4000	0.0600	0.9240				
E12 Gable (insulation at ceiling level)						13.4000	0.0600	0.8040				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											6.2892	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	36.2257 (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	13.1168	12.9670	12.8173	12.0683	11.9186	11.1696	11.1696	11.0199	11.4692	11.9186	12.2181	12.5177 (38)
Average = Sum(39)m / 12 =	49.3426	49.1928	49.0430	48.2941	48.1443	47.3954	47.3954	47.2456	47.6949	48.1443	48.4438	48.7434 (39)
												48.2566
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9581	0.9552	0.9523	0.9377	0.9348	0.9203	0.9203	0.9174	0.9261	0.9348	0.9407	0.9465 (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												1.7343 (42)
Hot water usage for mixer showers												
	73.2852	72.1839	70.5790	67.5084	65.2424	62.7153	61.2789	62.8717	64.6176	67.3309	70.4674	73.0044 (42a)
Hot water usage for baths												
	24.2561	23.8958	23.3885	22.4532	21.7528	20.9762	20.5567	21.0605	21.6089	22.4399	23.3945	24.1741 (42b)
Hot water usage for other uses												
	34.0960	32.8561	31.6163	30.3764	29.1366	27.8967	27.8967	29.1366	30.3764	31.6163	32.8561	34.0960 (42c)
Average daily hot water use (litres/day)												121.0520 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	131.6372	128.9358	125.5838	120.3380	116.1317	111.5882	109.7324	113.0687	116.6029	121.3871	126.7181	131.2745 (44)
Energy content (annual)	208.4812	183.6029	193.0176	164.7367	156.3356	137.2107	132.7118	140.0026	143.7830	164.7211	180.5331	205.5441 (45)
Distribution loss (46)m = 0.15 x (45)m												
	31.2722	27.5404	28.9526	24.7105	23.4503	20.5816	19.9068	21.0004	21.5675	24.7082	27.0800	30.8316 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.4040 (55)
Total storage loss												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)
If cylinder contains dedicated solar storage												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (64)
12Total per year (kWh/year)												3044.7022 (64)
Electric shower(s)												3045 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	113.2061	100.6870	108.0644	97.2454	95.8677	63.6322	62.7366	65.1608	65.8175	98.6558	102.4977	112.2295 (65)

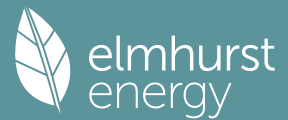
5. Internal gains (see Table 5 and 5a)

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	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605 (68)
Pumps, fans	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716 (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)	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728 (71)
Total internal gains	152.1587	149.8318	145.2479	135.0630	128.8544	88.3780	84.3234	87.5817	91.4131	132.6019	142.3579	150.8461 (72)
	429.1384	436.6122	419.8439	403.8070	384.4171	336.5205	323.2365	324.9266	335.2711	382.3119	405.2491	421.1576 (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
East					3.7500	19.6403	0.6300	0.7000			0.7700			22.5087 (76)
South					2.7100	46.7521	0.6300	0.7000			0.7700			38.7206 (78)
West					3.7500	19.6403	0.6300	0.7000			0.7700			22.5087 (80)
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285			70.4783 (83)
Total gains	512.8764	588.0901	645.6507	706.6194	738.7741	693.4347	665.3241	628.8077	588.3277	555.2051	507.2776			491.6358 (84)

Full SAP Calculation Printout



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	28.9923	29.0806	29.1694	29.6218	29.7139	30.1835	30.1835	30.2791	29.9939	29.7139	29.5302	29.3487
alpha	2.9328	2.9387	2.9446	2.9748	2.9809	3.0122	3.0122	3.0186	2.9996	2.9809	2.9687	2.9566
util living area	0.8888	0.8445	0.7813	0.6736	0.5439	0.4163	0.3068	0.3363	0.5115	0.7089	0.8424	0.8980 (86)
Living	19.4383	19.7459	20.1215	20.5367	20.8036	20.9369	20.9811	20.9749	20.8792	20.5417	19.9496	19.3923
Non living	18.3160	18.6945	19.1523	19.6511	19.9519	20.1006	20.1392	20.1372	20.0442	19.6712	18.9618	18.2662
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	20.2011	19.7459	20.1215	20.5367	20.8036	20.9369	20.9811	20.9749	20.8792	20.5417	19.9496	19.6172 (87)
Th 2	20.1184	20.1208	20.1233	20.1355	20.1380	20.1503	20.1503	20.1527	20.1454	20.1380	20.1331	20.1282 (88)
util rest of house	0.8762	0.8281	0.7591	0.6429	0.5040	0.3664	0.2499	0.2775	0.4589	0.6740	0.8232	0.8864 (89)
MIT 2	19.3998	18.6945	19.1523	19.6511	19.9519	20.1006	20.1392	20.1372	20.0442	19.6712	18.9618	18.6017 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7561	19.1620	19.5833	20.0449	20.3307	20.4725	20.5136	20.5097	20.4155	20.0583	19.4010	19.0533 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7561	19.1620	19.5833	20.0449	20.3307	20.4725	20.5136	20.5097	20.4155	20.0583	19.4010	19.0533 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8705	0.8077	0.7442	0.6395	0.5132	0.3856	0.2745	0.3026	0.4760	0.6705	0.8047	0.8696 (94)
Useful gains	446.4594	475.0226	480.4693	451.8986	379.1298	267.3937	182.6141	190.2644	280.0259	372.2729	408.2177	427.5295 (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	762.6445	701.5880	641.6446	538.2333	415.5169	278.3285	185.4849	194.1650	301.2158	455.3630	595.9083	723.9988 (97)
Space heating kWh	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98a)
Space heating requirement - total per year (kWh/year)	1014.1706											
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	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1014.1706											
Space heating per m2	(98c) / (4) = 19.6926 (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 %)	238.8193 (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	235.2417	152.2520	119.9144	62.1610	27.0720	0.0000	0.0000	0.0000	0.0000	61.8190	135.1373	220.5732 (98)
Space heating efficiency (main heating system 1)	238.8193	238.8193	238.8193	238.8193	238.8193	0.0000	0.0000	0.0000	0.0000	238.8193	238.8193	238.8193 (210)
Space heating fuel (main heating system)	98.5020	63.7520	50.2114	26.0285	11.3358	0.0000	0.0000	0.0000	0.0000	25.8853	56.5856	92.3599 (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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (64)
Efficiency of water heater	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439	273.1439 (216)
Fuel for water heating, kWh/month	112.3448	99.7510	106.6834	95.1677	93.2539	73.8961	73.0378	75.7070	76.3023	96.3238	100.9509	111.2694 (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	12.3940	11.1946	12.3940	11.9942	12.3940	11.9942	12.3940	12.3940	11.9942	12.3940	11.9942	12.3940 (231)
Lighting	19.5572	15.6895	14.1267	10.3498	7.9945	6.5316	7.2928	9.4795	12.3130	16.1553	18.2473	20.1008 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	424.6603 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	273.1439											
Water heating fuel used	1114.6880 (219)											
Space cooling fuel	0.0000 (221)											
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.9800)												
mechanical ventilation fans (SFP = 0.9800)	145.9290 (230a)											
Total electricity for the above, kWh/year	145.9290 (231)											

Full SAP Calculation Printout



Electricity for lighting (calculated in Appendix L)	157.8380 (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	1843.1153 (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	424.6603	0.1561	66.2764 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1114.6880	0.1415	157.7567 (264)
Space and water heating			224.0331 (265)
Pumps, fans and electric keep-hot	145.9290	0.1387	20.2421 (267)
Energy for lighting	157.8380	0.1443	22.7809 (268)
Total CO2, kg/year			267.0561 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1900 (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	424.6603	1.5777	670.0054 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1114.6880	1.5234	1698.0665 (278)
Space and water heating			2368.0719 (279)
Pumps, fans and electric keep-hot	145.9290	1.5128	220.7613 (281)
Energy for lighting	157.8380	1.5338	242.0972 (282)
Total Primary energy kWh/year			2830.9305 (286)
Dwelling Primary energy Rate (DPER)			54.9700 (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	51.5000 (1b)	x 2.3700 (2b)	= 122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 122.0550 (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	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1639 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4139 (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) = 0.3518 (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	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133 (22b)
Effective ac	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854 (25)

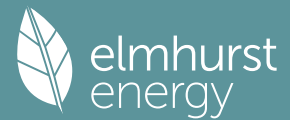
3. Heat losses and heat loss parameter

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
---------	-------------	----------------	---------------	------------------	--------------	-------------------	---------------

elmhurst
energy

Page 5 of 7

Full SAP Calculation Printout



			m2		Table 6a	Specific data		Specific data		factor		W
					W/m2	or Table 6b		or Table 6c		Table 6d		
East				3.7500	19.6403		0.6300		0.7000	0.7700		22.5087 (76)
South				2.7100	46.7521		0.6300		0.7000	0.7700		38.7206 (78)
West				3.7500	19.6403		0.6300		0.7000	0.7700		22.5087 (80)
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	498.0432	573.5987	631.9185	694.6885	727.9169	714.6865	687.3335	650.2822	609.1640	543.8082	494.1614	477.0434 (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	23.8230	23.8856	23.9473	24.2412	24.2970	24.5601	24.5601	24.6095	24.4581	24.2970	24.1844	24.0678
alpha	2.5882	2.5924	2.5965	2.6161	2.6198	2.6373	2.6373	2.6406	2.6305	2.6198	2.6123	2.6045
util living area	0.9105	0.8753	0.8242	0.7333	0.6148	0.4721	0.3550	0.3871	0.5649	0.7652	0.8745	0.9180 (86)
MIT	18.8367	19.1781	19.6371	20.1886	20.6029	20.8591	20.9512	20.9374	20.7634	20.2212	19.4548	18.7833 (87)
Th 2	19.9473	19.9498	19.9522	19.9635	19.9657	19.9756	19.9756	19.9774	19.9718	19.9657	19.9614	19.9569 (88)
util rest of house	0.8987	0.8597	0.8022	0.7007	0.5680	0.4087	0.2785	0.3089	0.5016	0.7288	0.8562	0.9072 (89)
MIT 2	17.4612	17.8847	18.4500	19.1181	19.5927	19.8682	19.9488	19.9412	19.7782	19.1756	18.2448	17.4007 (90)
Living area fraction	fLA = Living area / (4) = 0.4447 (91)											
MIT	18.0728	18.4598	18.9778	19.5941	20.0419	20.3088	20.3945	20.3842	20.2163	19.6406	18.7828	18.0155 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.0728	18.4598	18.9778	19.5941	20.0419	20.3088	20.3945	20.3842	20.2163	19.6406	18.7828	18.0155 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8722	0.8328	0.7786	0.6879	0.5716	0.4300	0.3104	0.3408	0.5174	0.7160	0.8310	0.8814 (94)
Useful gains	434.4175	477.7044	492.0267	477.8787	416.0933	307.3258	213.3732	221.6056	315.1739	389.3397	410.6704	420.4719 (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	827.0484	812.1227	745.3967	631.0953	491.1550	332.5198	221.0203	231.6013	357.7415	532.2896	691.0639	821.1736 (97)
Space heating kWh	292.1174	224.7291	188.5073	110.3160	55.8459	0.0000	0.0000	0.0000	0.0000	106.3547	201.8833	298.1221 (98a)
Space heating requirement - total per year (kWh/year)	1477.8758											
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	292.1174	224.7291	188.5073	110.3160	55.8459	0.0000	0.0000	0.0000	0.0000	106.3547	201.8833	298.1221 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1477.8758											
Space heating per m2	(98c) / (4) = 28.6966 (99)											
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	292.1174	224.7291	188.5073	110.3160	55.8459	0.0000	0.0000	0.0000	0.0000	106.3547	201.8833	298.1221 (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)	316.4869	243.4768	204.2332	119.5189	60.5047	0.0000	0.0000	0.0000	0.0000	115.2272	218.7251	322.9925 (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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426 (64)
Efficiency of water heater	84.8951	84.5816	84.0422	83.1292	81.9000	79.8000	79.8000	79.8000	79.8000	83.0230	84.3154	79.8000 (216)
(217)m	84.8951	84.5816	84.0422	83.1292	81.9000	79.8000	79.8000	79.8000	79.8000	83.0230	84.3154	84.9614 (217)
Fuel for water heating, kWh/month	236.9866	210.6443	226.0654	203.1298	201.3345	187.8473	186.6565	193.1835	194.3090	206.3398	213.7030	234.5094 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.9650	12.8078	11.5320	8.4488	6.5261	5.3319	5.9533	7.7384	10.0514	13.1879	14.8957	16.4088 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.7164	-25.8887	-38.5678	-45.0158	-50.0051	-47.2409	-46.6923	-43.3696	-37.7320	-30.3608	-19.8088	-15.2144 (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	-7.4190	-15.8442	-31.9252	-48.5774	-64.8287	-65.3266	-64.5286	-54.3394	-39.4593	-22.8331	-9.9643	-5.8471 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1601.1656 (211)											
Space heating fuel - main system 2	0.0000 (213)											

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2494.7090 (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)	128.8471 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-848.5055 (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	3462.2162 (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	1601.1656	0.2100	336.2448 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2494.7090	0.2100	523.8889 (264)
Space and water heating			860.1337 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.8471	0.1443	18.5966 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	0.1338	-55.8814
PV Unit electricity exported	-430.8929	0.1255	-54.0888
Total			-109.9702 (269)
Total CO2, kg/year			780.6893 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.1600 (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	1601.1656	1.1300	1809.3171 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2494.7090	1.1300	2819.0212 (278)
Space and water heating			4628.3383 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.8471	1.5338	197.6299 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	1.4945	-624.1223
PV Unit electricity exported	-430.8929	0.4608	-198.5361
Total			-822.6585 (283)
Total Primary energy kWh/year			4133.4106 (286)
Target Primary Energy Rate (TPER)			80.2600 (287)