

Full SAP Calculation Printout



Property Reference	OP-D320 P2CHAL				Issued on Date	29/11/2024
Assessment Reference	P2CHAL	Prop Type Ref	P2CHAL			
Property	P2CHAL					
SAP Rating	80 C	DER	4.43	TER	11.04	
Environmental	96 A	% DER < TER				59.87
CO ₂ Emissions (t/year)	0.4	DFEE	39.05	TFEE	39.68	
Compliance Check	See BREL	% DFEE < TFEE				1.60
% DPER < TPER	18.79	DPER	46.77	TPER	57.59	
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	49.1600 (1b)	x 2.3100 (2b)	= 113.5596 (1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.8672 (5)

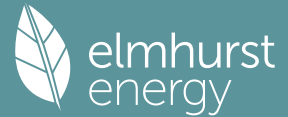
2. Ventilation rate

	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)			23.8900	1.2357	29.5219		(27)
Ground Floor			49.1600	0.1100	5.4076		(28a)
External Wall	142.1900	26.0300	116.1600	0.1700	19.7472		(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076		(30)
Total net area of external elements Aum(A, m ²)			240.5100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	62.2243		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7200	0.0500	0.8860	
E3 Sill				13.1900	0.0500	0.6595	
E4 Jamb				39.3000	0.0500	1.9650	

Full SAP Calculation Printout



E5 Ground floor (normal)													28.9000	0.1600	4.6240	
E6 Intermediate floor within a dwelling													28.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)													17.9400	0.0600	1.0764	
E12 Gable (insulation at ceiling level)													10.9600	0.0600	0.6576	
E16 Corner (normal)													19.6800	0.0900	1.7712	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)																11.6397 (36)
Point Thermal bridges																0.0000
Total fabric heat loss														(33) + (36) + (36a) =		73.8640 (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	26.6312	26.3343	26.0375	24.5535	24.2566	22.7726	22.7726	22.4757	23.3662	24.2566	24.8503	25.4439	(38)			
Average = Sum(39)m / 12 =	100.4951	100.1983	99.9015	98.4174	98.1206	96.6365	96.6365	96.3397	97.2301	98.1206	98.7142	99.3079	(39)			
												98.3432				
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP (average)	1.0221	1.0191	1.0161	1.0010	0.9980	0.9829	0.9829	0.9799	0.9889	0.9980	1.0040	1.0100	(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																2.7234 (42)
Hot water usage for mixer showers																
Hot water usage for baths	96.0885	94.6445	92.5403	88.5142	85.5431	82.2297	80.3464	82.4347	84.7239	88.2814	92.3940	95.7204	(42a)			
Hot water usage for other uses	31.7632	31.2914	30.6272	29.4023	28.4852	27.4682	26.9189	27.5785	28.2968	29.3850	30.6350	31.6558	(42b)			
Average daily hot water use (litres/day)	44.7585	43.1309	41.5033	39.8757	38.2481	36.6206	36.6206	38.2481	39.8757	41.5033	43.1309	44.7585	(42c)			
												158.7294	(43)			
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Energy conte	172.6102	169.0669	164.6708	157.7923	152.2764	146.3185	143.8859	148.2614	152.8964	159.1697	166.1599	172.1347	(44)			
Energy content (annual)	273.3723	240.7490	253.0928	216.0098	204.9934	179.9157	174.0175	183.5786	188.5365	215.9918	236.7252	269.5213	(45)			
Distribution loss (46)m = 0.15 x (45)m																
Water storage loss:	41.0059	36.1123	37.9639	32.4015	30.7490	26.9874	26.1026	27.5368	28.2805	32.3988	35.5088	40.4282	(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																
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	(56)			
Primary 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	(57)			
Combi 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)			
Total heat required for water heating calculated for each month	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)			
WWHRS	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029	(62)			
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)			
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)			
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)			
Output from w/h	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)			
12Total per year (kWh/year)	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029	(64)			
Electric shower(s)																3670.5254 (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)			
Heat gains from water heating, kWh/month																0.0000 (64a)
	134.7824	119.6881	128.0394	114.2936	112.0464	77.8316	76.4707	79.6498	80.6980	115.7034	121.1815	133.5019	(65)			

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

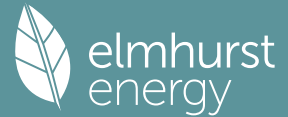
Metabolic gains (Table 5), Watts																
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	(66)			
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	127.9034	141.6074	127.9034	132.1669	127.9034	132.1669	127.9034	127.9034	132.1669	127.9034	132.1669	127.9034	(67)			
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941	(68)			
Pumps, fans	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	(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)	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	(71)			
Total internal gains	181.1591	178.1072	172.0960	158.7412	150.6000	108.0994	102.7833	107.0562	112.0806	155.5153	168.3077	179.4380	(72)			
	626.4967	639.7801	613.4340	590.2259	560.0014	505.0162	484.2479	485.8894	501.8083	555.0962	589.9719	613.5869	(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				9.1500	10.6334	0.6300	0.7000	0.7700	29.7348				(74)			
East				5.6100	19.6403	0.6300	0.7000	0.7700	33.6730				(76)			
South				9.1300	46.7521	0.6300	0.7000	0.7700	130.4498				(78)			

Solar gains	193.8576	336.3394	477.1836	620.8930	723.3468	730.6107	699.1704	620.6763	526.5492	376.2387	233.2955	165.2001	(83)			
Total gains	820.3543	976.1195	1090.6175	1211.1188	1283.3482	1235.6269	1183.4183	1106.5658	1028.3575	931.3349	823.2673	778.7869	(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	27.1766	27.2571	27.3380	27.7503	27.8342	28.2617	28.2617	28.3488	28.0891	27.8342	27.6668	27.5015
alpha	2.8118	2.8171	2.8225	2.8500	2.8556	2.8841	2.8841	2.8899	2.8726	2.8556	2.8445	2.8334
util living area	0.9269	0.8876	0.8325	0.7340	0.6050	0.4641	0.3470	0.3829	0.5702	0.7735	0.8912	0.9349 (86)
Living	19.0080	19.3775	19.8241	20.3397	20.7020	20.9009	20.9681	20.9572	20.8143	20.3430	19.6053	18.9504
Non living	17.7491	18.2089	18.7599	19.3863	19.8007	20.0197	20.0791	20.0740	19.9360	19.4076	18.5092	17.6835
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	19.9810	19.3775	19.8241	20.3397	20.7020	20.9009	20.9681	20.9572	20.8143	20.3430	19.6053	19.2371 (87)
Th 2	20.0649	20.0674	20.0700	20.0825	20.0850	20.0976	20.0976	20.1002	20.0926	20.0850	20.0800	20.0750 (88)
util rest of house	0.9175	0.8740	0.8126	0.7039	0.5622	0.4076	0.2801	0.3138	0.5126	0.7404	0.8757	0.9265 (89)
MIT 2	19.1417	18.2089	18.7599	19.3863	19.8007	20.0197	20.0791	20.0740	19.9360	19.4076	18.5092	18.1145 (90)
Living area fraction									FLA = Living area / (4) =			0.1861 (91)
MIT	19.2979	18.4264	18.9580	19.5637	19.9685	20.1837	20.2446	20.2383	20.0995	19.5817	18.7132	18.3234 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2979	18.4264	18.9580	19.5637	19.9685	20.1837	20.2446	20.2383	20.0995	19.5817	18.7132	18.3234 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9086	0.8446	0.7850	0.6852	0.5565	0.4132	0.2912	0.3247	0.5131	0.7198	0.8473	0.9062 (94)
Useful gains	745.3841	824.4510	856.1384	829.8346	714.1759	510.5643	344.6258	359.2707	527.6043	670.4205	697.5920	705.7284 (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	1507.2154	1355.3236	1244.5696	1049.4985	811.3086	539.5899	352.1984	369.7850	583.3333	881.2869	1146.3916	1402.5679 (97)
Space heating kWh	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98a)
Space heating requirement - total per year (kWh/year)												2441.4355
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	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2441.4355
Space heating per m2										(98c) / (4) =		24.8315 (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 %)

251.3534 (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	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98)
Space heating efficiency (main heating system 1)	251.3534	251.3534	251.3534	251.3534	251.3534	0.0000	0.0000	0.0000	0.0000	251.3534	251.3534	251.3534 (210)
Space heating fuel (main heating system)	225.5003	141.9302	114.9747	62.9226	28.7510	0.0000	0.0000	0.0000	0.0000	62.4159	128.5583	206.2629 (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	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029 (64)
Efficiency of water heater	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200 (216)
Fuel for water heating, kWh/month	137.9831	122.3405	130.4560	115.5140	112.6030	90.7682	89.3786	92.9274	93.9680	116.6852	123.2029	136.5537 (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	37.1911	33.5920	37.1911	35.9914	37.1911	35.9914	37.1911	37.1911	35.9914	37.1911	35.9914	37.1911 (231)
Lighting	26.5758	21.3201	19.1964	14.0641	10.8635	8.8756	9.9101	12.8815	16.7318	21.9530	24.7958	27.3144 (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												971.3160 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.4200
Water heating fuel used												1362.3805 (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)

437.8957 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	437.8957	(231)
Electricity for lighting (calculated in Appendix L)	214.4820	(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	2986.0741	(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	971.3160	0.1558	151.3713	(261)
Total CO2 associated with community systems			0.0000	(273)
Water heating (other fuel)	1362.3805	0.1415	192.8238	(264)
Space and water heating			344.1951	(265)
Pumps, fans and electric keep-hot	437.8957	0.1387	60.7415	(267)
Energy for lighting	214.4820	0.1443	30.9564	(268)
Total CO2, kg/year			435.8930	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4300	(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	971.3160	1.5769	1531.6641	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1362.3805	1.5234	2075.4328	(278)
Space and water heating			3607.0969	(279)
Pumps, fans and electric keep-hot	437.8957	1.5128	662.4487	(281)
Energy for lighting	214.4820	1.5338	328.9796	(282)
Total Primary energy kWh/year			4598.5252	(286)
Dwelling Primary energy Rate (DPER)			46.7700	(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	49.1600 (1b)	x 2.3100 (2b)	= 113.5596	(1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.8672	(5)

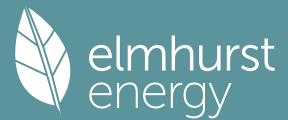
2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1240 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3740	(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) =	0.3179 (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	0.4054	0.3974	0.3895	0.3497	0.3418	0.3020	0.3020	0.2941	0.3179	0.3418	0.3577	0.3736	(22b)
Effective ac	0.5822	0.5790	0.5758	0.5612	0.5584	0.5456	0.5456	0.5432	0.5505	0.5584	0.5640	0.5698	(25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



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)			22.4400	1.1450	25.6947		(27)
Ground Floor			49.1600	0.1300	6.3908		(28a)
External Wall	142.1900	24.5800	117.6100	0.1800	21.1698		(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076		(30)
Total net area of external elements Aum(A, m2)			240.5100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.8029		(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)	17.7200	0.0500	0.8860
E3 Sill	13.1900	0.0500	0.6595
E4 Jamb	39.3000	0.0500	1.9650
E5 Ground floor (normal)	28.9000	0.1600	4.6240
E6 Intermediate floor within a dwelling	28.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764
E12 Gable (insulation at ceiling level)	10.9600	0.0600	0.6576
E16 Corner (normal)	19.6800	0.0900	1.7712

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.6397 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 72.4426 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.4657	46.2110	45.9614	44.7891	44.5697	43.5487	43.5487	43.3596	43.9420	44.5697	45.0135	45.4774 (38)
Average = Sum(39)m / 12 =	118.9082	118.6536	118.4040	117.2316	117.0123	115.9912	115.9912	115.8021	116.3845	117.0123	117.4560	117.9199 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2094	1.2068	1.2043	1.1923	1.1901	1.1797	1.1797	1.1778	1.1837	1.1901	1.1946	1.1993 (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												2.7234 (42)
Hot water usage for mixer showers												69.6148 (42a)
Hot water usage for baths												30.0730 (42b)
Hot water usage for other uses												42.5205 (42c)
Average daily hot water use (litres/day)												131.0614 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	142.5781	139.5336	135.8260	130.1881	125.6098	120.6878	118.7962	122.4879	126.3812	131.5485	137.2732	142.2084 (44)
Energy conte	225.8089	198.6940	208.7595	178.2211	169.0950	148.3997	143.6738	151.6656	155.8407	178.5101	195.5709	222.6640 (45)
Energy content (annual)												Total = Sum(45)m = 2176.9032
Distribution loss (46)m = 0.15 x (45)m												33.3996 (46)

Water storage loss:												230.0000 (47)
Store volume												1.7973 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												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	279.1585	246.8807	262.1091	229.8497	222.4446	200.0284	197.0234	205.0152	207.4694	231.8598	247.1996	276.0136 (62)
WWHRS	-31.9474	-28.2545	-29.5865	-24.4988	-22.8320	-19.5375	-18.3133	-19.4744	-20.2143	-23.8304	-26.9969	-31.3558 (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	247.2111	218.6262	232.5226	205.3509	199.6126	180.4909	178.7101	185.5408	187.2551	208.0294	220.2026	244.6578 (64)
12Total per year (kWh/year)												2508.2101 (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)

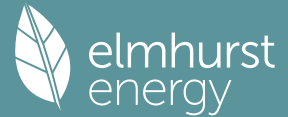
Heat gains from water heating, kWh/month	117.7612	104.6152	112.0922	100.5614	98.9038	90.6458	90.4512	93.1085	93.1200	102.0343	106.3303	116.7155 (65)
--	----------	----------	----------	----------	---------	---------	---------	---------	---------	----------	----------	---------------

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	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.8776	141.5788	127.8776	132.1402	127.8776	132.1402	127.8776	127.8776	132.1402	127.8776	132.1402	127.8776 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171 (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)	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368 (71)
Water heating gains (Table 5)	158.2811	155.6773	150.6616	139.6687	132.9352	125.8970	121.5742	125.1458	129.3333	137.1429	147.6809	156.8756 (72)
Total internal gains	606.5929	620.3216	594.9737	574.1267	545.3108	522.7872	503.0131	503.9533	519.0343	539.6981	572.3184	593.9986 (73)

6. Solar gains

Full SAP Calculation Printout



[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				8.5900	10.6334	0.6300		0.7000	0.7700		27.9149 (74)	
East				5.2700	19.6403	0.6300		0.7000	0.7700		31.6322 (76)	
South				8.5800	46.7521	0.6300		0.7000	0.7700		122.5914 (78)	

Solar gains	182.1385	315.9993	448.3052	583.2829	679.5001	686.3106	656.7820	583.0677	494.6717	353.4802	219.1909	155.2143 (83)
Total gains	788.7314	936.3210	1043.2789	1157.4096	1224.8109	1209.0977	1159.7950	1087.0210	1013.7061	893.1782	791.5094	749.2130 (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	22.9682	23.0175	23.0660	23.2967	23.3404	23.5458	23.5458	23.5843	23.4663	23.3404	23.2522	23.1607
alpha	2.5312	2.5345	2.5377	2.5531	2.5560	2.5697	2.5697	2.5723	2.5644	2.5560	2.5501	2.5440
util living area	0.9394	0.9090	0.8662	0.7872	0.6751	0.5319	0.4085	0.4468	0.6316	0.8191	0.9120	0.9459 (86)
MIT	18.4703	18.8456	19.3446	19.9629	20.4654	20.7964	20.9248	20.9033	20.6663	20.0072	19.1397	18.4053 (87)
Th 2	19.9125	19.9146	19.9166	19.9261	19.9279	19.9362	19.9362	19.9378	19.9330	19.9279	19.9243	19.9205 (88)
util rest of house	0.9307	0.8964	0.8474	0.7570	0.6280	0.4627	0.3201	0.3572	0.5657	0.7865	0.8976	0.9380 (89)
MIT 2	16.9857	17.4554	18.0763	18.8339	19.4198	19.7795	19.8950	19.8814	19.6556	18.9069	17.8385	16.9088 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.2620	17.7141	18.3124	19.0440	19.6145	19.9687	20.0866	20.0716	19.8437	19.1117	18.0807	17.1874 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.2620	17.7141	18.3124	19.0440	19.6145	19.9687	20.0866	20.0716	19.8437	19.1117	18.0807	17.1874 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9011	0.8628	0.8129	0.7282	0.6128	0.4649	0.3332	0.3691	0.5596	0.7567	0.8649	0.9100 (94)
Useful gains	710.7612	807.8993	848.1107	842.8504	750.6239	562.1661	386.4292	401.1952	567.2682	675.9020	684.5880	681.7884 (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	1541.2910	1520.4436	1398.6336	1189.1974	926.0883	622.7273	404.4206	425.1787	668.4794	995.9758	1289.7508	1531.4695 (97)
Space heating kWh	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (98a)
Space heating requirement - total per year (kWh/year)	3192.2633											
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	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3192.2633											
Space heating per m2	(98c) / (4) = 32.4681 (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	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (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)	669.4628	518.7755	443.7585	270.1732	141.4361	0.0000	0.0000	0.0000	0.0000	258.0010	472.0663	684.9000 (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	247.2111	218.6262	232.5226	205.3509	199.6126	180.4909	178.7101	185.5408	187.2551	208.0294	220.2026	244.6578 (64)
Efficiency of water heater	86.0275	85.7679	85.3156	84.4964	83.1315	79.8000	79.8000	79.8000	79.8000	84.3637	85.5605	79.8000 (216)
Fuel for water heating, kWh/month	287.3628	254.9046	272.5439	243.0291	240.1168	226.1790	223.9475	232.5073	234.6555	246.5865	257.3649	284.1858 (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	26.5704	21.3158	19.1925	14.0613	10.8613	8.8738	9.9081	12.8789	16.7284	21.9485	24.7908	27.3089 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-45.0277	-62.9952	-89.8623	-100.2340	-107.3878	-99.9494	-98.6608	-93.4410	-84.1815	-71.5952	-49.3081	-38.9819 (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	-26.9522	-56.5150	-112.0079	-167.7878	-221.4604	-222.4091	-219.8413	-186.3670	-136.8706	-80.7358	-35.9528	-21.3315 (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)

Full SAP Calculation Printout



Annual totals kWh/year	
Space heating fuel - main system 1	3458.5735 (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	3003.3838 (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)	214.4387 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2429.8562 (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	4332.5398 (238)

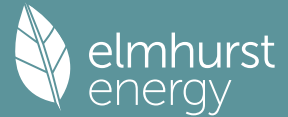
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3458.5735	0.2100	726.3004 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3003.3838	0.2100	630.7106 (264)
Space and water heating			1357.0110 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	214.4387	0.1443	30.9501 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-941.6248	0.1348	-126.8937
PV Unit electricity exported	-1488.2313	0.1260	-187.4703
Total			-314.3640 (269)
Total CO2, kg/year			1085.5264 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (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	3458.5735	1.1300	3908.1880 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3003.3838	1.1300	3393.8237 (278)
Space and water heating			7302.0117 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	214.4387	1.5338	328.9132 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-941.6248	1.4981	-1410.6115
PV Unit electricity exported	-1488.2313	0.4624	-688.1493
Total			-2098.7609 (283)
Total Primary energy kWh/year			5662.2648 (286)
Target Primary Energy Rate (TPER)			57.5900 (287)

Full SAP Calculation Printout



Property Reference	OP-D320 P2CHAL				Issued on Date	29/11/2024		
Assessment Reference	P2CHAL			Prop Type Ref	P2CHAL			
Property	P2CHAL							
SAP Rating	80 C		DER	4.43		TER	11.04	
Environmental	96 A		% DER < TER				59.87	
CO ₂ Emissions (t/year)	0.4		DFEE	39.05		TFEE	39.68	
Compliance Check	See BREL		% DFEE < TFEE				1.60	
% DPER < TPER	18.79		DPER	46.77		TPER	57.59	
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	49.1600 (1b)	x 2.3100 (2b)	= 113.5596 (1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.8672 (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) = 0.1240 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.2990 (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) = 0.2542 (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	0.3241	0.3177	0.3114	0.2796	0.2732	0.2415	0.2415	0.2351	0.2542	0.2732	0.2860	0.2987 (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	0.5525	0.5505	0.5485	0.5391	0.5373	0.5292	0.5292	0.5276	0.5323	0.5373	0.5409	0.5446 (25)

3. Heat losses and heat loss parameter

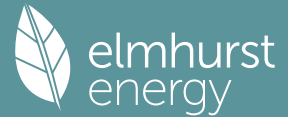
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			23.8900	1.2357	29.5219		(27)
Ground Floor			49.1600	0.1100	5.4076		(28a)
External Wall	142.1900	26.0300	116.1600	0.1700	19.7472		(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076		(30)
Total net area of external elements Aum(A, m ²)			240.5100				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	62.2243	(33)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	17.7200	0.0500	0.8860
E3 Sill	13.1900	0.0500	0.6595
E4 Jamb	39.3000	0.0500	1.9650
E5 Ground floor (normal)	28.9000	0.1600	4.6240
E6 Intermediate floor within a dwelling	28.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764

Full SAP Calculation Printout



E12 Gable (insulation at ceiling level)	10.9600	0.0600	0.6576
E16 Corner (normal)	19.6800	0.0900	1.7712
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.6397 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	73.8640 (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	44.0995	43.9368	43.7772	43.0279	42.8877	42.2351	42.2351	42.1142	42.4864	42.8877	43.1713	43.4678 (38)
Average = Sum(39)m / 12 =	117.9635	117.8007	117.6412	116.8919	116.7517	116.0990	116.0990	115.9782	116.3504	116.7517	117.0353	117.3318 (39)
												116.8912
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1998	1.1981	1.1965	1.1889	1.1875	1.1808	1.1808	1.1796	1.1834	1.1875	1.1904	1.1934 (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												2.7234 (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												
30.1750	29.7269	29.0958	27.9322	27.0609	26.0948	25.5730	26.1996	26.8819	27.9157	29.1033	30.0730	(42b)
Hot water usage for other uses												
42.5205	40.9743	39.4281	37.8819	36.3357	34.7895	34.7895	36.3357	37.8819	39.4281	40.9743	42.5205	(42c)
Average daily hot water use (litres/day)												66.6320 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
72.6956	70.7012	68.5239	65.8141	63.3967	60.8843	60.3625	62.5354	64.7639	67.3439	70.0776	72.5935	(44)
Energy conte	115.1320	100.6776	105.3187	90.0963	85.3441	74.8644	73.0032	77.4318	79.8603	91.3850	99.8384	113.6640 (45)
Energy content (annual)										Total = Sum(45)m =		1106.6158
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	(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	(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	(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	(61)
Total heat required for water heating calculated for each month												
97.8622	85.5760	89.5209	76.5818	72.5425	63.6347	62.0527	65.8171	67.8813	77.6772	84.8627	96.6144	(62)
WWHRS	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	(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	(63c)
FGHRS	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	97.8622	85.5760	89.5209	76.5818	72.5425	63.6347	62.0527	65.8171	67.8813	77.6772	84.8627	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		940.6235 (64)
Electric shower(s)	55.9643	49.8647	54.4503	51.9612	52.9363	50.4961	52.1793	52.9363	51.9612	54.4503	53.4264	55.9643 (64a)
												636.5906 (64a)
Heat gains from water heating, kWh/month	38.4566	33.8602	35.9928	32.1358	31.3697	28.5327	28.5580	29.6883	29.9606	33.0319	34.5723	38.1447 (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	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
127.9034	141.6074	127.9034	132.1669	127.9034	132.1669	127.9034	127.9034	132.1669	127.9034	132.1669	127.9034	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	(71)
Water heating gains (Table 5)												
51.6890	50.3871	48.3774	44.6330	42.1636	39.6288	38.3844	39.9037	41.6120	44.3977	48.0170	51.2697	(72)
Total internal gains	497.0266	512.0600	489.7154	476.1177	451.5650	436.5456	419.8490	418.7369	431.3397	443.9786	469.6812	485.4185 (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				9.1500	10.6334		0.6300		0.7000		0.7700		29.7348 (74)
East				5.6100	19.6403		0.6300		0.7000		0.7700		33.6730 (76)
South				9.1300	46.7521		0.6300		0.7000		0.7700		130.4498 (78)
Solar gains	193.8576	336.3394	477.1836	620.8930	723.3468	730.6107	699.1704	620.6763	526.5492	376.2387	233.2955	165.2001	(83)
Total gains	690.8842	848.3994	966.8989	1097.0107	1174.9118	1167.1563	1119.0194	1039.4133	957.8889	820.2174	702.9767	650.6186	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	23.1522	23.1842	23.2156	23.3644	23.3925	23.5240	23.5240	23.5485	23.4732	23.3925	23.3358	23.2768

Full SAP Calculation Printout



alpha	2.5435	2.5456	2.5477	2.5576	2.5595	2.5683	2.5683	2.5699	2.5649	2.5595	2.5557	2.5518
util living area	0.9537	0.9243	0.8823	0.8031	0.6902	0.5460	0.4212	0.4637	0.6535	0.8420	0.9299	0.9596 (86)
MIT	18.3268	18.7307	19.2595	19.9085	20.4371	20.7829	20.9190	20.8942	20.6374	19.9280	19.0096	18.2479 (87)
Th 2	19.9202	19.9215	19.9228	19.9289	19.9300	19.9354	19.9354	19.9364	19.9333	19.9300	19.9277	19.9253 (88)
util rest of house	0.9468	0.9135	0.8652	0.7742	0.6436	0.4761	0.3309	0.3719	0.5879	0.8120	0.9180	0.9536 (89)
MIT 2	17.4970	17.8926	18.4073	19.0287	19.5110	19.8045	19.9005	19.8879	19.6963	19.0634	18.1769	17.4229 (90)
Living area fraction	17.6514	18.0486	18.5659	19.1925	19.6834	19.9866	20.0901	20.0752	19.8715	19.2243	18.3319	17.5764 (92)
MIT												0.1861 (91)
Temperature adjustment												0.0000
adjusted MIT												17.5764 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9270	0.8892	0.8388	0.7512	0.6318	0.4797	0.3446	0.3845	0.5837	0.7883	0.8947	0.9353 (94)
Useful gains	640.4790	754.3857	811.0763	824.1232	742.3500	559.8466	385.6488	399.6972	559.0977	646.5466	628.9266	608.5069 (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	1574.9812	1548.9136	1419.4468	1203.1043	932.0754	625.3802	405.1971	426.2408	671.5128	1006.9069	1314.5257	1569.4810 (97)
Space heating kWh	695.2697	533.9227	452.6276	272.8664	141.1557	0.0000	0.0000	0.0000	0.0000	268.1081	493.6313	714.9648 (98a)
Space heating requirement - total per year (kWh/year)												3572.5463
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	695.2697	533.9227	452.6276	272.8664	141.1557	0.0000	0.0000	0.0000	0.0000	268.1081	493.6313	714.9648 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3572.5463
Space heating per m2										(98c) / (4) =		36.3359 (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	1091.3308	859.1327	881.4340	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7827	0.8402	0.8125	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	854.1589	721.8014	716.1357	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1313.1615	1259.3703	1168.8416	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	330.4818	399.9513	336.8132	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	82.6205	99.9878	84.2033	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												266.8116 (107)
Energy for space heating												36.3359 (99)
Energy for space cooling												2.7137 (108)
Total												39.0496 (109)
Fabric Energy Efficiency (DFEE)												39.0 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	49.1600 (1b)	x 2.3100 (2b)	= 113.5596 (1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.8672 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1240 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3740 (18)
Number of sides sheltered	2 (19)

Full SAP Calculation Printout



Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3179 (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	0.4054	0.3974	0.3895	0.3497	0.3418	0.3020	0.3020	0.2941	0.3179	0.3418	0.3577	0.3736	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5822	0.5790	0.5758	0.5612	0.5584	0.5456	0.5456	0.5432	0.5505	0.5584	0.5640	0.5698	(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)			22.4400	1.1450	25.6947			(27)
Ground Floor			49.1600	0.1300	6.3908			(28a)
External Wall	142.1900	24.5800	117.6100	0.1800	21.1698			(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076			(30)
Total net area of external elements Aum(A, m2)			240.5100					(31)
Fabric heat loss, W/K = Sum (A x U)						60.8029		(33)
(26)...(30) + (32) =								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000	(35)

List of Thermal Bridges		Length	Psi-value	Total	
K1 Element		17.7200	0.0500	0.8860	
E2 Other lintels (including other steel lintels)		13.1900	0.0500	0.6595	
E3 Sill		39.3000	0.0500	1.9650	
E4 Jamb		28.9000	0.1600	4.6240	
E5 Ground floor (normal)		28.9000	0.0000	0.0000	
E6 Intermediate floor within a dwelling		17.9400	0.0600	1.0764	
E10 Eaves (insulation at ceiling level)		10.9600	0.0600	0.6576	
E12 Gable (insulation at ceiling level)		19.6800	0.0900	1.7712	
E16 Corner (normal)					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.6397	(36)
Point Thermal bridges				0.0000	(36a)
Total fabric heat loss				72.4426	(37)
(33) + (36) + (36a) =					

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	46.4657	46.2110	45.9614	44.7891	44.5697	43.5487	43.5487	43.3596	43.9420	44.5697	45.0135	45.4774	(38)
Average = Sum(39)m / 12 =	118.9082	118.6536	118.4040	117.2316	117.0123	115.9912	115.9912	115.8021	116.3845	117.0123	117.4560	117.9199	(39)
												117.2306	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2094	1.2068	1.2043	1.1923	1.1901	1.1797	1.1797	1.1778	1.1837	1.1901	1.1946	1.1993	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

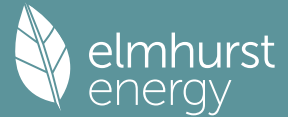
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7234 (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	30.1750	29.7269	29.0958	27.9322	27.0609	26.0948	25.5730	26.1996	26.8819	27.9157	29.1033	30.0730	(42b)
Hot water usage for other uses	42.5205	40.9743	39.4281	37.8819	36.3357	34.7895	34.7895	36.3357	37.8819	39.4281	40.9743	42.5205	(42c)
Average daily hot water use (litres/day)													66.6320 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	72.6956	70.7012	68.5239	65.8141	63.3967	60.8843	60.3625	62.5354	64.7639	67.3439	70.0776	72.5935	(44)
Distribution loss (46)m = 0.15 x (45)m	115.1320	100.6776	105.3187	90.0963	85.3441	74.8644	73.0032	77.4318	79.8603	91.3850	99.8384	113.6640	(45)
Water storage loss:										Total = Sum(45)m =		1106.6158	
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	(46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	97.8622	85.5760	89.5209	76.5818	72.5425	63.6347	62.0527	65.8171	67.8813	77.6772	84.8627	96.6144	(61)
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	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	97.8622	85.5760	89.5209	76.5818	72.5425	63.6347	62.0527	65.8171	67.8813	77.6772	84.8627	96.6144	(63d)
12Total per year (kWh/year)													(64)
Electric shower(s)	55.9643	49.8647	54.4503	51.9612	52.9363	50.4961	52.1793	52.9363	51.9612	54.4503	53.4264	55.9643	(64a)
Heat gains from water heating, kWh/month	38.4566	33.8602	35.9928	32.1358	31.3697	28.5327	28.5580	29.6883	29.9606	33.0319	34.5723	38.1447	(64a)
													636.5906 (64a)
													(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	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	(66)
	127.8776	141.5788	127.8776	132.1402	127.8776	132.1402	127.8776	127.8776	132.1402	127.8776	132.1402	127.8776	(67)

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171 (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)	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368 (71)
Water heating gains (Table 5)	51.6890	50.3871	48.3774	44.6330	42.1636	39.6288	38.3844	39.9037	41.6120	44.3977	48.0170	51.2697 (72)
Total internal gains	497.0008	512.0315	489.6896	476.0910	451.5392	436.5189	419.8232	418.7111	431.3130	443.9528	469.6546	485.3927 (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					8.5900	10.6334	0.6300	0.7000				0.7700	27.9149 (74)	
East					5.2700	19.6403	0.6300	0.7000				0.7700	31.6322 (76)	
South					8.5800	46.7521	0.6300	0.7000				0.7700	122.5914 (78)	
Solar gains	182.1385	315.9993	448.3052	583.2829	679.5001	686.3106	656.7820	583.0677	494.6717	353.4802	219.1909	155.2143	(83)	
Total gains	679.1393	828.0308	937.9947	1059.3740	1131.0393	1122.8295	1076.6052	1001.7788	925.9848	797.4330	688.8455	640.6070	(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	22.9682	23.0175	23.0660	23.2967	23.3404	23.5458	23.5458	23.5843	23.4663	23.3404	23.2522	23.1607
alpha	2.5312	2.5345	2.5377	2.5531	2.5560	2.5697	2.5697	2.5723	2.5644	2.5560	2.5501	2.5440
util living area	0.9555	0.9282	0.8891	0.8139	0.7048	0.5609	0.4347	0.4770	0.6665	0.8495	0.9328	0.9610 (86)
MIT	18.2832	18.6776	19.2026	19.8629	20.4046	20.7689	20.9130	20.8873	20.6190	19.8964	18.9778	18.2156 (87)
Th 2	19.9125	19.9146	19.9166	19.9261	19.9279	19.9362	19.9362	19.9378	19.9330	19.9279	19.9243	19.9205 (88)
util rest of house	0.9488	0.9177	0.8727	0.7858	0.6588	0.4905	0.3424	0.3837	0.6013	0.8204	0.9213	0.9551 (89)
MIT 2	17.4492	17.8366	18.3491	18.9856	19.4827	19.7961	19.8986	19.8858	19.6827	19.0334	18.1440	17.3880 (90)
Living area fraction	17.6044	17.9931	18.5079	19.1489	19.6543	19.9772	20.0874	20.0722	19.8570	19.1941	18.2992	17.5421 (92)
MIT	17.6044	17.9931	18.5079	19.1489	19.6543	19.9772	20.0874	20.0722	19.8570	19.1941	18.2992	17.5421 (93)
Temperature adjustment												0.0000
adjusted MIT	17.6044	17.9931	18.5079	19.1489	19.6543	19.9772	20.0874	20.0722	19.8570	19.1941	18.2992	17.5421 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9293	0.8937	0.8463	0.7622	0.6458	0.4934	0.3562	0.3962	0.5961	0.7963	0.8983	0.9371 (94)
Ext temp.	631.1344	740.0346	793.8149	807.4199	730.4331	553.9557	383.4572	396.9138	551.9851	634.9833	618.7581	600.3217 (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	1582.0069	1553.5455	1421.7870	1201.4917	930.7531	623.7057	404.5058	425.2475	670.0221	1005.6108	1315.4104	1573.2955 (97)
Space heating kWh	707.4491	546.6793	467.2112	283.7317	149.0381	0.0000	0.0000	0.0000	0.0000	275.7469	501.5897	723.8926 (98a)
Space heating requirement - total per year (kWh/year)												3655.3385
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	707.4491	546.6793	467.2112	283.7317	149.0381	0.0000	0.0000	0.0000	0.0000	275.7469	501.5897	723.8926 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3655.3385
Space heating per m2										(98c) / (4) =		37.1780 (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	1090.3175	858.3351	880.0962	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7701	0.8297	0.8017	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	839.6526	712.1879	705.6014	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1261.3798	1209.8230	1124.8803	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	303.6436	370.2405	311.9435	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	75.9109	92.5601	77.9859	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												246.4569 (107)
Energy for space heating												37.1780 (99)
Energy for space cooling												2.5067 (108)
Total												39.6847 (109)
Fabric Energy Efficiency (TFEE)												39.7 (109)

Full SAP Calculation Printout



Property Reference	OP-D320 P2CHAL				Issued on Date	29/11/2024
Assessment Reference	P2CHAL	Prop Type Ref	P2CHAL			
Property	P2CHAL					
SAP Rating	80 C	DER	4.43	TER	11.04	
Environmental	96 A	% DER < TER				59.87
CO ₂ Emissions (t/year)	0.4	DFEE	39.05	TFEE	39.68	
Compliance Check	See BREL	% DFEE < TFEE				1.60
% DPER < TPER	18.79	DPER	46.77	TPER	57.59	
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	49.1600 (1b)	x 2.3100 (2b)	= 113.5596 (1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 241.8672 (5)

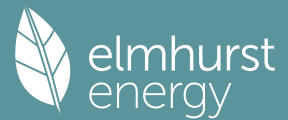
2. Ventilation rate

	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)			23.8900	1.2357	29.5219		(27)
Ground Floor			49.1600	0.1100	5.4076		(28a)
External Wall	142.1900	26.0300	116.1600	0.1700	19.7472		(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076		(30)
Total net area of external elements Aum(A, m ²)			240.5100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	62.2243		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.7200	0.0500	0.8860	
E3 Sill				13.1900	0.0500	0.6595	
E4 Jamb				39.3000	0.0500	1.9650	

Full SAP Calculation Printout



E5 Ground floor (normal)						28.9000		0.1600		4.6240			
E6 Intermediate floor within a dwelling						28.9000		0.0000		0.0000			
E10 Eaves (insulation at ceiling level)						17.9400		0.0600		1.0764			
E12 Gable (insulation at ceiling level)						10.9600		0.0600		0.6576			
E16 Corner (normal)						19.6800		0.0900		1.7712			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											11.6397	(36)	
Point Thermal bridges											0.0000		
Total fabric heat loss									(33) + (36) + (36a) =		73.8640	(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	26.6312	26.3343	26.0375	24.5535	24.2566	22.7726	22.7726	22.4757	23.3662	24.2566	24.8503	25.4439	(38)
Average = Sum(39)m / 12 =	100.4951	100.1983	99.9015	98.4174	98.1206	96.6365	96.6365	96.3397	97.2301	98.1206	98.7142	99.3079	(39)
												98.3432	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0221	1.0191	1.0161	1.0010	0.9980	0.9829	0.9829	0.9799	0.9889	0.9980	1.0040	1.0100	(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												2.7234	(42)
Hot water usage for mixer showers													
	96.0885	94.6445	92.5403	88.5142	85.5431	82.2297	80.3464	82.4347	84.7239	88.2814	92.3940	95.7204	(42a)
Hot water usage for baths													
	31.7632	31.2914	30.6272	29.4023	28.4852	27.4682	26.9189	27.5785	28.2968	29.3850	30.6350	31.6558	(42b)
Hot water usage for other uses													
	44.7585	43.1309	41.5033	39.8757	38.2481	36.6206	36.6206	38.2481	39.8757	41.5033	43.1309	44.7585	(42c)
Average daily hot water use (litres/day)												158.7294	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	172.6102	169.0669	164.6708	157.7923	152.2764	146.3185	143.8859	148.2614	152.8964	159.1697	166.1599	172.1347	(44)
Energy conte	273.3723	240.7490	253.0928	216.0098	204.9934	179.9157	174.0175	183.5786	188.5365	215.9918	236.7252	269.5213	(45)
Energy content (annual)										Total = Sum(45)m =		2636.5038	
Distribution loss (46)m = 0.15 x (45)m													
	41.0059	36.1123	37.9639	32.4015	30.7490	26.9874	26.1026	27.5368	28.2805	32.3988	35.5088	40.4282	(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													
	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029	(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													
	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029	(64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			3670.5254	(64)
Electric shower(s)												3671	(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													
	134.7824	119.6881	128.0394	114.2936	112.0464	77.8316	76.4707	79.6498	80.6980	115.7034	121.1815	133.5019	(65)

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

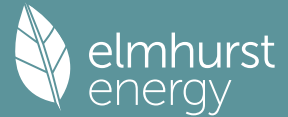
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	127.9034	141.6074	127.9034	132.1669	127.9034	132.1669	127.9034	127.9034	132.1669	127.9034	132.1669	127.9034	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941	(68)
Pumps, fans	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	(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)	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	(71)
Total internal gains	181.1591	178.1072	172.0960	158.7412	150.6000	108.0994	102.7833	107.0562	112.0806	155.5153	168.3077	179.4380	(72)
	626.4967	639.7801	613.4340	590.2259	560.0014	505.0162	484.2479	485.8894	501.8083	555.0962	589.9719	613.5869	(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				9.1500	10.6334	0.6300	0.7000	0.7700	29.7348				(74)
East				5.6100	19.6403	0.6300	0.7000	0.7700	33.6730				(76)
South				9.1300	46.7521	0.6300	0.7000	0.7700	130.4498				(78)

Solar gains	193.8576	336.3394	477.1836	620.8930	723.3468	730.6107	699.1704	620.6763	526.5492	376.2387	233.2955	165.2001	(83)
Total gains	820.3543	976.1195	1090.6175	1211.1188	1283.3482	1235.6269	1183.4183	1106.5658	1028.3575	931.3349	823.2673	778.7869	(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	27.1766	27.2571	27.3380	27.7503	27.8342	28.2617	28.2617	28.3488	28.0891	27.8342	27.6668	27.5015
alpha	2.8118	2.8171	2.8225	2.8500	2.8556	2.8841	2.8841	2.8899	2.8726	2.8556	2.8445	2.8334
util living area	0.9269	0.8876	0.8325	0.7340	0.6050	0.4641	0.3470	0.3829	0.5702	0.7735	0.8912	0.9349 (86)
Living	19.0080	19.3775	19.8241	20.3397	20.7020	20.9009	20.9681	20.9572	20.8143	20.3430	19.6053	18.9504
Non living	17.7491	18.2089	18.7599	19.3863	19.8007	20.0197	20.0791	20.0740	19.9360	19.4076	18.5092	17.6835
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	19.9810	19.3775	19.8241	20.3397	20.7020	20.9009	20.9681	20.9572	20.8143	20.3430	19.6053	19.2371 (87)
Th 2	20.0649	20.0674	20.0700	20.0825	20.0850	20.0976	20.0976	20.1002	20.0926	20.0850	20.0800	20.0750 (88)
util rest of house	0.9175	0.8740	0.8126	0.7039	0.5622	0.4076	0.2801	0.3138	0.5126	0.7404	0.8757	0.9265 (89)
MIT 2	19.1417	18.2089	18.7599	19.3863	19.8007	20.0197	20.0791	20.0740	19.9360	19.4076	18.5092	18.1145 (90)
Living area fraction									fLA = Living area / (4) =			0.1861 (91)
MIT	19.2979	18.4264	18.9580	19.5637	19.9685	20.1837	20.2446	20.2383	20.0995	19.5817	18.7132	18.3234 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2979	18.4264	18.9580	19.5637	19.9685	20.1837	20.2446	20.2383	20.0995	19.5817	18.7132	18.3234 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9086	0.8446	0.7850	0.6852	0.5565	0.4132	0.2912	0.3247	0.5131	0.7198	0.8473	0.9062 (94)
Useful gains	745.3841	824.4510	856.1384	829.8346	714.1759	510.5643	344.6258	359.2707	527.6043	670.4205	697.5920	705.7284 (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	1507.2154	1355.3236	1244.5696	1049.4985	811.3086	539.5899	352.1984	369.7850	583.3333	881.2869	1146.3916	1402.5679 (97)
Space heating kWh	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98a)
Space heating requirement - total per year (kWh/year)												2441.4355
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	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2441.4355
Space heating per m2										(98c) / (4) =		24.8315 (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 %)												251.3534 (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	566.8025	356.7464	288.9929	158.1580	72.2667	0.0000	0.0000	0.0000	0.0000	156.8846	323.1357	518.4486 (98)
Space heating efficiency (main heating system 1)	251.3534	251.3534	251.3534	251.3534	251.3534	0.0000	0.0000	0.0000	0.0000	251.3534	251.3534	251.3534 (210)
Space heating fuel (main heating system)	225.5003	141.9302	114.9747	62.9226	28.7510	0.0000	0.0000	0.0000	0.0000	62.4159	128.5583	206.2629 (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	371.7539	329.6098	351.4744	311.2178	303.3750	244.5477	240.8039	250.3650	253.1685	314.3734	331.9332	367.9029 (64)
Efficiency of water heater	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200	269.4200 (216)
Fuel for water heating, kWh/month	137.9831	122.3405	130.4560	115.5140	112.6030	90.7682	89.3786	92.9274	93.9680	116.6852	123.2029	136.5537 (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	37.1911	33.5920	37.1911	35.9914	37.1911	35.9914	37.1911	37.1911	35.9914	37.1911	35.9914	37.1911 (231)
Lighting	26.5758	21.3201	19.1964	14.0641	10.8635	8.8756	9.9101	12.8815	16.7318	21.9530	24.7958	27.3144 (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												971.3160 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.4200
Water heating fuel used												1362.3805 (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)												437.8957 (230a)

Full SAP Calculation Printout



Total electricity for the above, kWh/year	437.8957 (231)
Electricity for lighting (calculated in Appendix L)	214.4820 (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	2986.0741 (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	971.3160	0.1558	151.3713 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	1362.3805	0.1415	192.8238 (264)
Space and water heating			344.1951 (265)
Pumps, fans and electric keep-hot	437.8957	0.1387	60.7415 (267)
Energy for lighting	214.4820	0.1443	30.9564 (268)
Total CO2, kg/year			435.8930 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4300 (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	971.3160	1.5769	1531.6641 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1362.3805	1.5234	2075.4328 (278)
Space and water heating			3607.0969 (279)
Pumps, fans and electric keep-hot	437.8957	1.5128	662.4487 (281)
Energy for lighting	214.4820	1.5338	328.9796 (282)
Total Primary energy kWh/year			4598.5252 (286)
Dwelling Primary energy Rate (DPER)			46.7700 (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	49.1600 (1b)	x 2.3100 (2b)	= 113.5596 (1b) - (3b)
First floor	49.1600 (1c)	x 2.6100 (2c)	= 128.3076 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	98.3200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.8672 (5)

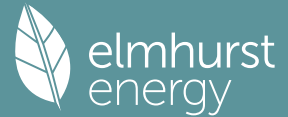
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1240 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3740 (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) = 0.3179 (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	0.4054	0.3974	0.3895	0.3497	0.3418	0.3020	0.3020	0.2941	0.3179	0.3418	0.3577	0.3736 (22b)
Effective ac	0.5822	0.5790	0.5758	0.5612	0.5584	0.5456	0.5456	0.5432	0.5505	0.5584	0.5640	0.5698 (25)

3. Heat losses and heat loss parameter

Full SAP Calculation Printout



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)			22.4400	1.1450	25.6947		(27)
Ground Floor			49.1600	0.1300	6.3908		(28a)
External Wall	142.1900	24.5800	117.6100	0.1800	21.1698		(29a)
Roof - ceiling	49.1600		49.1600	0.1100	5.4076		(30)
Total net area of external elements Aum(A, m2)			240.5100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	60.8029		(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)	17.7200	0.0500	0.8860	
E3 Sill	13.1900	0.0500	0.6595	
E4 Jamb	39.3000	0.0500	1.9650	
E5 Ground floor (normal)	28.9000	0.1600	4.6240	
E6 Intermediate floor within a dwelling	28.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764	
E12 Gable (insulation at ceiling level)	10.9600	0.0600	0.6576	
E16 Corner (normal)	19.6800	0.0900	1.7712	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.6397 (36)
Point Thermal bridges				(36a) = 0.0000
Total fabric heat loss				(33) + (36) + (36a) = 72.4426 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.4657	46.2110	45.9614	44.7891	44.5697	43.5487	43.5487	43.3596	43.9420	44.5697	45.0135	45.4774 (38)
Average = Sum(39)m / 12 =	118.9082	118.6536	118.4040	117.2316	117.0123	115.9912	115.9912	115.8021	116.3845	117.0123	117.4560	117.9199 (39)
												117.2306
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2094	1.2068	1.2043	1.1923	1.1901	1.1797	1.1797	1.1778	1.1837	1.1901	1.1946	1.1993 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

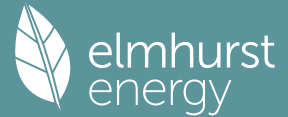
4. Water heating energy requirements (kWh/year)													

Assumed occupancy												2.7234 (42)	
Hot water usage for mixer showers													
	69.8826	68.8324	67.3020	64.3740	62.2132	59.8034	58.4338	59.9525	61.6174	64.2047	67.1956	69.6148 (42a)	
Hot water usage for baths													
	30.1750	29.7269	29.0958	27.9322	27.0609	26.0948	25.5730	26.1996	26.8819	27.9157	29.1033	30.0730 (42b)	
Hot water usage for other uses													
	42.5205	40.9743	39.4281	37.8819	36.3357	34.7895	34.7895	36.3357	37.8819	39.4281	40.9743	42.5205 (42c)	
Average daily hot water use (litres/day)												131.0614 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	142.5781	139.5336	135.8260	130.1881	125.6098	120.6878	118.7962	122.4879	126.3812	131.5485	137.2732	142.2084 (44)	
Energy content													
	225.8089	198.6940	208.7595	178.2211	169.0950	148.3997	143.6738	151.6656	155.8407	178.5101	195.5709	222.6640 (45)	
Energy content (annual)													
										Total = Sum(45)m =			2176.9032
Distribution loss (46)m = 0.15 x (45)m													
	33.8713	29.8041	31.3139	26.7332	25.3642	22.2600	21.5511	22.7498	23.3761	26.7765	29.3356	33.3996 (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													
	279.1585	246.8807	262.1091	229.8497	222.4446	200.0284	197.0234	205.0152	207.4694	231.8598	247.1996	276.0136 (62)	
WWHRS													
	-31.9474	-28.2545	-29.5865	-24.4988	-22.8320	-19.5375	-18.3133	-19.4744	-20.2143	-23.8304	-26.9969	-31.3558 (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													
	247.2111	218.6262	232.5226	205.3509	199.6126	180.4909	178.7101	185.5408	187.2551	208.0294	220.2026	244.6578 (64)	
										Total per year (kWh/year) = Sum(64)m =			2508.2101 (64)
12Total per year (kWh/year)												2508 (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													
	117.7612	104.6152	112.0922	100.5614	98.9038	90.6458	90.4512	93.1085	93.1200	102.0343	106.3303	116.7155 (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	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	136.1710	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	127.8776	141.5788	127.8776	132.1402	127.8776	132.1402	127.8776	127.8776	132.1402	127.8776	132.1402	127.8776	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	253.5828	256.2142	249.5832	235.4665	217.6467	200.8987	189.7099	187.0785	193.7095	207.8262	225.6460	242.3941	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	36.6171	(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)	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	-108.9368	(71)
Water heating gains (Table 5)	158.2811	155.6773	150.6616	139.6687	132.9352	125.8970	121.5742	125.1458	129.3333	137.1429	147.6809	156.8756	(72)
Total internal gains	606.5929	620.3216	594.9737	574.1267	545.3108	522.7872	503.0131	503.9533	519.0343	539.6981	572.3184	593.9986	(73)

6. Solar gains

Full SAP Calculation Printout



[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				8.5900	10.6334	0.6300		0.7000	0.7700		27.9149 (74)	
East				5.2700	19.6403	0.6300		0.7000	0.7700		31.6322 (76)	
South				8.5800	46.7521	0.6300		0.7000	0.7700		122.5914 (78)	

Solar gains	182.1385	315.9993	448.3052	583.2829	679.5001	686.3106	656.7820	583.0677	494.6717	353.4802	219.1909	155.2143 (83)
Total gains	788.7314	936.3210	1043.2789	1157.4096	1224.8109	1209.0977	1159.7950	1087.0210	1013.7061	893.1782	791.5094	749.2130 (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	22.9682	23.0175	23.0660	23.2967	23.3404	23.5458	23.5458	23.5843	23.4663	23.3404	23.2522	23.1607
alpha	2.5312	2.5345	2.5377	2.5531	2.5560	2.5697	2.5697	2.5723	2.5644	2.5560	2.5501	2.5440
util living area	0.9394	0.9090	0.8662	0.7872	0.6751	0.5319	0.4085	0.4468	0.6316	0.8191	0.9120	0.9459 (86)
MIT	18.4703	18.8456	19.3446	19.9629	20.4654	20.7964	20.9248	20.9033	20.6663	20.0072	19.1397	18.4053 (87)
Th 2	19.9125	19.9146	19.9166	19.9261	19.9279	19.9362	19.9362	19.9378	19.9330	19.9279	19.9243	19.9205 (88)
util rest of house	0.9307	0.8964	0.8474	0.7570	0.6280	0.4627	0.3201	0.3572	0.5657	0.7865	0.8976	0.9380 (89)
MIT 2	16.9857	17.4554	18.0763	18.8339	19.4198	19.7795	19.8950	19.8814	19.6556	18.9069	17.8385	16.9088 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.2620	17.7141	18.3124	19.0440	19.6145	19.9687	20.0866	20.0716	19.8437	19.1117	18.0807	17.1874 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.2620	17.7141	18.3124	19.0440	19.6145	19.9687	20.0866	20.0716	19.8437	19.1117	18.0807	17.1874 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9011	0.8628	0.8129	0.7282	0.6128	0.4649	0.3332	0.3691	0.5596	0.7567	0.8649	0.9100 (94)
Useful gains	710.7612	807.8993	848.1107	842.8504	750.6239	562.1661	386.4292	401.1952	567.2682	675.9020	684.5880	681.7884 (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	1541.2910	1520.4436	1398.6336	1189.1974	926.0883	622.7273	404.4206	425.1787	668.4794	995.9758	1289.7508	1531.4695 (97)
Space heating kWh	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (98a)
Space heating requirement - total per year (kWh/year)	3192.2633											
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	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3192.2633											
Space heating per m2	(98c) / (4) = 32.4681 (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	617.9141	478.8298	409.5891	249.3699	130.5455	0.0000	0.0000	0.0000	0.0000	238.1349	435.7172	632.1627 (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)	669.4628	518.7755	443.7585	270.1732	141.4361	0.0000	0.0000	0.0000	0.0000	258.0010	472.0663	684.9000 (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	247.2111	218.6262	232.5226	205.3509	199.6126	180.4909	178.7101	185.5408	187.2551	208.0294	220.2026	244.6578 (64)
Efficiency of water heater (217)m	86.0275	85.7679	85.3156	84.4964	83.1315	79.8000	79.8000	79.8000	79.8000	84.3637	85.5605	79.8000 (216)
Fuel for water heating, kWh/month	287.3628	254.9046	272.5439	243.0291	240.1168	226.1790	223.9475	232.5073	234.6555	246.5865	257.3649	284.1858 (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	26.5704	21.3158	19.1925	14.0613	10.8613	8.8738	9.9081	12.8789	16.7284	21.9485	24.7908	27.3089 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-45.0277	-62.9952	-89.8623	-100.2340	-107.3878	-99.9494	-98.6608	-93.4410	-84.1815	-71.5952	-49.3081	-38.9819 (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 FVs (Appendix M) (negative quantity)												
(233b)m	-26.9522	-56.5150	-112.0079	-167.7878	-221.4604	-222.4091	-219.8413	-186.3670	-136.8706	-80.7358	-35.9528	-21.3315 (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)

Full SAP Calculation Printout



Annual totals kWh/year		
Space heating fuel - main system 1	3458.5735	(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	3003.3838	(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)	214.4387	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2429.8562	(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	4332.5398	(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	3458.5735	0.2100	726.3004 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3003.3838	0.2100	630.7106 (264)
Space and water heating			1357.0110 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	214.4387	0.1443	30.9501 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-941.6248	0.1348	-126.8937
PV Unit electricity exported	-1488.2313	0.1260	-187.4703
Total			-314.3640 (269)
Total CO2, kg/year			1085.5264 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0400 (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	3458.5735	1.1300	3908.1880 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3003.3838	1.1300	3393.8237 (278)
Space and water heating			7302.0117 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	214.4387	1.5338	328.9132 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-941.6248	1.4981	-1410.6115
PV Unit electricity exported	-1488.2313	0.4624	-688.1493
Total			-2098.7609 (283)
Total Primary energy kWh/year			5662.2648 (286)
Target Primary Energy Rate (TPER)			57.5900 (287)