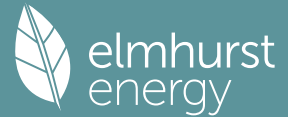


Full SAP Calculation Printout



Property Reference	33 Priory Road				Issued on Date	04/07/2024
Assessment Reference	New Build		Prop Type Ref	New Build		
Property	33, Priory Road, London, N8 8LP					
SAP Rating	93 A	DER	1.98	TER	12.93	
Environmental	99 A	% DER < TER				84.69
CO ₂ Emissions (t/year)	0.07	DFEE	31.19	TFEE	44.18	
Compliance Check	See BREL	% DFEE < TFEE				29.41
% DPER < TPER	65.56	DPER	23.31	TPER	67.70	
Assessor Details	Mr. Alexander Cotterill				Assessor ID	AV67-0001
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	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 180.7090 (5)

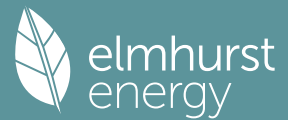
2. Ventilation rate

	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	1.0000 (17)
Infiltration rate	0.0500 (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) = 0.0425 (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	0.0542 0.0531 0.0521 0.0468 0.0457 0.0404 0.0404 0.0393 0.0425 0.0457 0.0478 0.0499 (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) =	43.5000 (23c)
Effective ac	0.3367 0.3356 0.3346 0.3292 0.3282 0.3229 0.3229 0.3218 0.3250 0.3282 0.3303 0.3324 (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
Windows (Uw = 0.90)			13.8200	0.8687	12.0058		(27)
Door			1.9500	1.0000	1.9500		(26)
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000 (28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000 (29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400 (29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200 (30)
Total net area of external elements Aum(A, m ²)			200.5900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		35.0582		(33)
Internal Wall 1			69.7300			75.0000	5229.7500 (32c)
Internal Floor 1			33.5300			18.0000	603.5400 (32d)
Internal Ceiling 1			33.5300			9.0000	301.7700 (32e)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	11311.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							165.5866 (35)

Full SAP Calculation Printout



Thermal bridges (User defined value 0.030 * total exposed area)
 Point Thermal bridges (36a) = 6.0177 (36)
 Total fabric heat loss (33) + (36) + (36a) = 41.0759 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	20.0780	20.0147	19.9513	19.6345	19.5711	19.2543	19.2543	19.1910	19.3810	19.5711	19.6978	19.8246	(38)
Heat transfer coeff	61.1539	61.0905	61.0272	60.7104	60.6470	60.3302	60.3302	60.2668	60.4569	60.6470	60.7737	60.9005	(39)
Average = Sum(39)m / 12 =												60.6945	
HLP	0.8952	0.8943	0.8934	0.8887	0.8878	0.8832	0.8832	0.8823	0.8850	0.8878	0.8897	0.8915	(40)
HLP (average)												0.8885	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2044 (42)
Hot water usage for mixer showers													
78.5648	77.3841	75.6636	72.3718	69.9425	67.2334	65.6936	67.4010	69.2727	72.1815	75.5440	78.2638		(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(42b)
Hot water usage for other uses													
37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053		(42c)
Average daily hot water use (litres/day)												106.2571	(43)
Daily hot water use													
115.7701	113.2365	110.1631	105.5184	101.7362	97.6741	96.1343	99.1946	102.4193	106.6809	111.3964	115.4691		(44)
Energy conte	183.3515	161.2473	169.3166	144.4494	136.9564	120.1017	116.2661	122.8237	126.2932	144.7650	158.7046	180.7967	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
27.5027	24.1871	25.3975	21.6674	20.5435	18.0153	17.4399	18.4236	18.9440	21.7148	23.8057	27.1195		(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.6000	(55)
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000		(56)
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000		(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967		(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													
201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967		(64)
12Total per year (kWh/year)												1984.0721	(64)
Electric shower(s)												1984	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
75.8444	67.0547	71.1778	62.4294	60.4180	54.3338	53.5385	55.7189	56.3925	63.0144	67.1693	74.9949		(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	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
98.0816	108.5903	98.0816	101.3510	98.0816	101.3510	98.0816	98.0816	101.3510	98.0816	101.3510	98.0816		(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
193.3210	195.3271	190.2718	179.5099	165.9248	153.1568	144.6269	142.6209	147.6761	158.4381	172.0231	184.7912		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220		(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)													
-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762		(71)
Water heating gains (Table 5)													
101.9414	99.7838	95.6690	86.7075	81.2070	75.4636	71.9603	74.8910	78.3229	84.6967	93.2907	100.7996		(72)
Total internal gains													
449.4100	459.7673	440.0886	423.6344	401.2795	386.0375	370.7349	371.6595	383.4160	397.2825	422.7308	439.7384		(73)

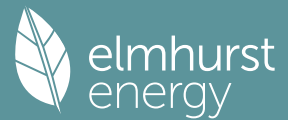
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
East				10.5000	19.6403		0.7600		0.7000		0.7700		76.0294 (76)
South				3.3200	46.7521		0.7600		0.7000		0.7700		57.2247 (78)
Solar gains	133.2541	242.4490	364.3183	492.1526	578.3956	583.4700	558.8727	494.8908	409.5797	277.5653	162.6305	111.9703	(83)
Total gains	582.6642	702.2163	804.4069	915.7871	979.6751	969.5074	929.6076	866.5503	792.9957	674.8478	585.3614	551.7087	(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		

Full SAP Calculation Printout



tau	51.3787	51.4319	51.4853	51.7540	51.8081	52.0801	52.0801	52.1349	51.9710	51.8081	51.7001	51.5925
alpha	4.4252	4.4288	4.4324	4.4503	4.4539	4.4720	4.4720	4.4757	4.4647	4.4539	4.4467	4.4395
util living area	0.9624	0.9234	0.8526	0.7171	0.5538	0.3943	0.2848	0.3186	0.5114	0.7880	0.9305	0.9692 (86)
MIT	19.9475	20.2339	20.5448	20.8216	20.9507	20.9913	20.9984	20.9974	20.9735	20.7734	20.3132	19.8828 (87)
Th 2	20.1715	20.1723	20.1731	20.1771	20.1779	20.1818	20.1818	20.1826	20.1802	20.1779	20.1763	20.1747 (88)
util rest of house	0.9554	0.9106	0.8305	0.6826	0.5103	0.3453	0.2322	0.2626	0.4554	0.7507	0.9166	0.9634 (89)
MIT 2	18.9577	19.3113	19.6851	20.0021	20.1360	20.1761	20.1811	20.1814	20.1612	19.9597	19.4181	18.8792 (90)
Living area fraction	19.4262	19.7479	20.0920	20.3900	20.5216	20.5619	20.5679	20.5676	20.5456	20.3448	19.8417	19.3542 (91)
MIT	19.4262	19.7479	20.0920	20.3900	20.5216	20.5619	20.5679	20.5676	20.5456	20.3448	19.8417	19.3542 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4262	19.7479	20.0920	20.3900	20.5216	20.5619	20.5679	20.5676	20.5456	20.3448	19.8417	19.3542 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9479	0.9032	0.8282	0.6918	0.5287	0.3682	0.2571	0.2890	0.4807	0.7587	0.9101	0.9564 (94)
Useful gains	552.3008	634.2365	666.2229	633.5368	517.9614	356.9867	238.9729	250.4662	381.2020	512.0284	532.7253	527.6396 (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	925.0251	907.0690	829.4816	697.5614	535.0024	359.6825	239.3852	251.1655	389.6839	590.9946	774.3620	922.8963 (97)
Space heating kWh	277.3069	183.3435	121.4645	46.0977	12.6786	0.0000	0.0000	0.0000	0.0000	58.7509	173.9784	294.0710 (98a)
Space heating requirement - total per year (kWh/year)												1167.6914
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	277.3069	183.3435	121.4645	46.0977	12.6786	0.0000	0.0000	0.0000	0.0000	58.7509	173.9784	294.0710 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1167.6914
Space heating per m2										(98c) / (4) =		17.0940 (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 %)												100.0000 (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	277.3069	183.3435	121.4645	46.0977	12.6786	0.0000	0.0000	0.0000	0.0000	58.7509	173.9784	294.0710 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	277.3069	183.3435	121.4645	46.0977	12.6786	0.0000	0.0000	0.0000	0.0000	58.7509	173.9784	294.0710 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (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	25.5120	23.0431	25.5120	24.6891	25.5120	24.6891	25.5120	25.5120	24.6891	25.5120	24.6891	25.5120 (231)
Lighting	19.3295	15.5068	13.9622	10.2293	7.9014	6.4555	7.2079	9.3691	12.1696	15.9671	18.0349	19.8667 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-86.1096	-140.1867	-228.5021	-283.2194	-323.0896	-305.5119	-301.3345	-276.1920	-230.3361	-172.4230	-100.9869	-72.3149 (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	-1.5418	-6.0782	-20.6038	-50.6316	-89.3553	-99.9871	-98.8057	-73.4125	-43.4743	-14.5573	-2.9803	-1.0344 (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												1167.6914 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1984.0721 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.3625)												
mechanical ventilation fans (SFP = 1.3625)												300.3835 (230a)
Total electricity for the above, kWh/year												300.3835 (231)
Electricity for lighting (calculated in Appendix L)												156.0001 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3022.6689 (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)

Full SAP Calculation Printout



Total delivered energy for all uses

585.4782 (238)

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1167.6914	0.1572	183.5800 (261)
Total CO ₂ associated with community systems			0.0000 (373)
Water heating (other fuel)	1984.0721	0.1413	280.3079 (264)
Space and water heating			463.8879 (265)
Pumps, fans and electric keep-hot	300.3835	0.1387	41.6669 (267)
Energy for lighting	156.0001	0.1443	22.5156 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2520.2067	0.1326	-334.2047
PV Unit electricity exported	-502.4623	0.1161	-58.3508
Total			-392.5555 (269)
Total CO ₂ , kg/year			135.5149 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.9800 (273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	1167.6914	1.5820	1847.2603 (275)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	1984.0721	1.5224	3020.5860 (278)
Space and water heating			4867.8463 (279)
Pumps, fans and electric keep-hot	300.3835	1.5128	454.4202 (281)
Energy for lighting	156.0001	1.5338	239.2781 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2520.2067	1.4900	-3755.1116
PV Unit electricity exported	-502.4623	0.4257	-213.8902
Total			-3969.0018 (283)
Total Primary energy kWh/year			1592.5428 (286)
Dwelling Primary energy Rate (DPER)			23.3100 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 180.7090 (5)

2. Ventilation rate

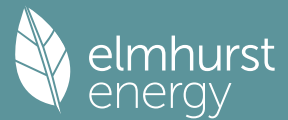
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1107 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3607 (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) = 0.3066 (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	0.3909	0.3832	0.3756	0.3372	0.3296	0.2912	0.2912	0.2836	0.3066	0.3296	0.3449	0.3602 (22b)
Effective ac	0.5764	0.5734	0.5705	0.5569	0.5543	0.5424	0.5424	0.5402	0.5470	0.5543	0.5595	0.5649 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
---------	-------	----------	---------	---------	-------	---------	-------

Full SAP Calculation Printout



	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opaque door			1.9500	1.0000	1.9500		(26)
TER Opening Type (Uw = 1.20)			13.8200	1.1450	15.8244		(27)
Basement Floor			34.7800	0.1300	4.5214		(28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1800	9.6840		(29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1800	11.0628		(29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258		(30)
Total net area of external elements Aum(A, m2)			200.5900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		46.8684		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 165.5866 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	8.7600	0.0500	0.4380
E2 Other lintels (including other steel lintels)	8.7600	0.0500	0.4380
E3 Sill	17.0000	0.0500	0.8500
E4 Jamb	26.0200	0.0700	1.8214
E22 Basement floor	23.6600	0.0000	0.0000
E6 Intermediate floor within a dwelling	26.0200	0.0800	2.0816
E14 Flat roof	21.2000	0.0900	1.9080
E16 Corner (normal)	5.3000	-0.0900	-0.4770
E17 Corner (inverted - internal area greater than external area)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.0600 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 53.9284 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	34.3727	34.1958	34.0224	33.2079	33.0555	32.3462	32.3462	32.2148	32.6194	33.0555	33.3638	33.6861 (38)
Heat transfer coeff	88.3011	88.1242	87.9508	87.1363	86.9840	86.2746	86.2746	86.1432	86.5478	86.9840	87.2922	87.6145 (39)
Average = Sum(39)m / 12 =												87.1356

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2927	1.2901	1.2875	1.2756	1.2734	1.2630	1.2630	1.2611	1.2670	1.2734	1.2779	1.2826 (40)
HLP (average)												1.2756
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

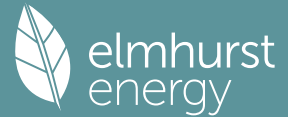
Assumed occupancy													2.2044 (42)
Hot water usage for mixer showers	78.5648	77.3841	75.6636	72.3718	69.9425	67.2334	65.6936	67.4010	69.2727	72.1815	75.5440	78.2638	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053	(42c)
Average daily hot water use (litres/day)													106.2571 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	115.7701	113.2365	110.1631	105.5184	101.7362	97.6741	96.1343	99.1946	102.4193	106.6809	111.3964	115.4691	(44)
Energy content (annual)	183.3515	161.2473	169.3166	144.4494	136.9564	120.1017	116.2661	122.8237	126.2932	144.7650	158.7046	180.7967	(45)
Distribution loss (46)m = 0.15 x (45)m	27.5027	24.1871	25.3975	21.6674	20.5435	18.0153	17.4399	18.4236	18.9440	21.7148	23.8057	27.1195	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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	229.9464	203.3330	215.9115	189.5412	183.5513	165.1936	162.8610	169.4186	171.3850	191.3599	203.7964	227.3916	(62)
WWHRS	-35.9165	-31.7649	-33.2623	-27.5425	-25.6687	-21.9649	-20.5885	-21.8939	-22.7257	-26.7911	-30.3510	-35.2514	(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	194.0299	171.5681	182.6491	161.9987	157.8827	143.2287	142.2724	147.5247	148.6593	164.5689	173.4454	192.1402	(64)
12Total per year (kWh/year)													1979.9681 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	98.2403	87.2833	93.5737	84.1029	82.8139	76.0073	75.9344	78.1148	78.0660	85.4103	88.8427	97.3908	(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	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.0816	108.5903	98.0816	101.3510	98.0816	101.3510	98.0816	98.0816	101.3510	98.0816	101.3510	98.0816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	193.3210	195.3271	190.2718	179.5099	165.9248	153.1568	144.6269	142.6209	147.6761	158.4381	172.0231	184.7912 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220 (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)	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762 (71)
Water heating gains (Table 5)	132.0434	129.8858	125.7711	116.8096	111.3091	105.5657	102.0624	104.9930	108.4249	114.7988	123.3927	130.9016 (72)
Total internal gains	482.5121	492.8693	473.1906	456.7365	434.3815	416.1395	400.8370	401.7615	413.5181	430.3845	455.8329	472.8405 (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
East			10.5000	19.6403	0.6300	0.7000	0.7700	63.0244 (76)
South			3.3200	46.7521	0.6300	0.7000	0.7700	47.4363 (78)

Solar gains	110.4606	200.9774	302.0007	407.9686	479.4596	483.6659	463.2760	410.2384	339.5200	230.0871	134.8121	92.8175 (83)
Total gains	592.9727	693.8468	775.1913	864.7051	913.8411	899.8054	864.1130	812.0000	753.0381	660.4716	590.6450	565.6580 (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	35.5829	35.6543	35.7246	36.0585	36.1217	36.4187	36.4187	36.4742	36.3037	36.1217	35.9941	35.8617
alpha	3.3722	3.3770	3.3816	3.4039	3.4081	3.4279	3.4279	3.4316	3.4202	3.4081	3.3996	3.3908
util living area	0.9718	0.9523	0.9179	0.8427	0.7239	0.5634	0.4242	0.4658	0.6772	0.8768	0.9536	0.9756 (86)
MIT	19.1427	19.4318	19.8331	20.3240	20.6938	20.9059	20.9729	20.9624	20.8186	20.3239	19.6512	19.0932 (87)
Th 2	19.8466	19.8486	19.8506	19.8600	19.8618	19.8699	19.8699	19.8715	19.8668	19.8618	19.8582	19.8545 (88)
util rest of house	0.9656	0.9422	0.9004	0.8097	0.6677	0.4800	0.3217	0.3606	0.5974	0.8431	0.9421	0.9702 (89)
MIT 2	17.7238	18.0871	18.5857	19.1811	19.5958	19.8091	19.8589	19.8549	19.7354	19.1987	18.3746	17.6666 (90)
Living area fraction									fLA = Living area / (4) =			0.4733 (91)
MIT	18.3953	18.7235	19.1761	19.7220	20.1155	20.3282	20.3861	20.3790	20.2481	19.7312	18.9788	18.3418 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3953	18.7235	19.1761	19.7220	20.1155	20.3282	20.3861	20.3790	20.2481	19.7312	18.9788	18.3418 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9553	0.9297	0.8881	0.8052	0.6811	0.5151	0.3695	0.4092	0.6260	0.8386	0.9306	0.9607 (94)
Useful gains	566.4592	645.0599	688.4198	696.2546	622.4161	463.4742	319.3106	332.2698	471.4324	553.8619	549.6824	543.4152 (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	1244.6325	1218.1871	1114.8717	942.9919	732.0121	494.1968	326.6470	342.7679	532.1019	794.2715	1036.9268	1239.0265 (97)
Space heating kWh	504.5610	385.1415	317.2803	177.6508	81.5394	0.0000	0.0000	0.0000	0.0000	178.8648	350.8160	517.5348 (98a)
Space heating requirement - total per year (kWh/year)												2513.3885
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	504.5610	385.1415	317.2803	177.6508	81.5394	0.0000	0.0000	0.0000	0.0000	178.8648	350.8160	517.5348 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2513.3885
Space heating per m2										(98c) / (4) =		36.7939 (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	504.5610	385.1415	317.2803	177.6508	81.5394	0.0000	0.0000	0.0000	0.0000	178.8648	350.8160	517.5348 (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)	546.6533	417.2714	343.7489	192.4711	88.3417	0.0000	0.0000	0.0000	0.0000	193.7863	380.0823	560.7095 (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	194.0299	171.5681	182.6491	161.9987	157.8827	143.2287	142.2724	147.5247	148.6593	164.5689	173.4454	192.1402 (64)
Efficiency of water heater (217)m	86.1029	85.8172	85.2858	84.2671	82.6529	79.8000	79.8000	79.8000	79.8000	84.2470	85.6058	79.8000 (216)
Fuel for water heating, kWh/month	225.3466	199.9227	214.1612	192.2443	191.0188	179.4846	178.2862	184.8681	186.2899	195.3409	202.6093	222.9810 (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	20.3794	16.3491	14.7206	10.7849	8.3306	6.8062	7.5994	9.8780	12.8306	16.8344	19.0145	20.9458 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-32.5649	-45.9257	-66.0497	-74.3246	-80.2198	-74.9252	-74.0118	-69.8356	-62.4724	-52.5490	-35.8111	-28.1535 (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	-18.3599	-38.6260	-76.7705	-115.2970	-152.4356	-153.1388	-151.3240	-128.1245	-93.9188	-55.2230	-24.5098	-14.5174 (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												

Full SAP Calculation Printout



Space heating fuel - main system 1	2723.0645	(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	2372.5539	(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)	164.4736	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1719.0886	(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	3627.0033	(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	2723.0645	0.2100	571.8435	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2372.5539	0.2100	498.2363	(264)
Space and water heating			1070.0799	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	164.4736	0.1443	23.7386	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-696.8434	0.1346	-93.7720	
PV Unit electricity exported	-1022.2452	0.1259	-128.7010	
Total			-222.4729	(269)
Total CO2, kg/year			883.2748	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.9300	(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	2723.0645	1.1300	3077.0629	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2372.5539	1.1300	2680.9859	(278)
Space and water heating			5758.0487	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	164.4736	1.5338	252.2751	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-696.8434	1.4973	-1043.4079	
PV Unit electricity exported	-1022.2452	0.4621	-472.4216	
Total			-1515.8294	(283)
Total Primary energy kWh/year			4624.5952	(286)
Target Primary Energy Rate (TPER)			67.7000	(287)

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

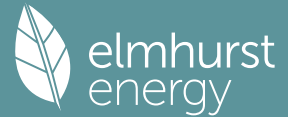
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)	
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	68.3100			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 180.7090	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1107 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	1.0000	(17)
Infiltration rate	0.1607	(18)
Number of sides sheltered	2	(19)

Full SAP Calculation Printout



Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.1366 (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	0.1741	0.1707	0.1673	0.1502	0.1468	0.1297	0.1297	0.1263	0.1366	0.1468	0.1536	0.1605	(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	0.5152	0.5146	0.5140	0.5113	0.5108	0.5084	0.5084	0.5080	0.5093	0.5108	0.5118	0.5129	(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	
Windows (Uw = 0.90)			13.8200	0.8687	12.0058			(27)
Door			1.9500	1.0000	1.9500			(26)
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000	(28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000	(29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400	(29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200	(30)
Total net area of external elements Aum(A, m2)			200.5900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.0582			(33)
Internal Wall 1			69.7300			75.0000	5229.7500	(32c)
Internal Floor 1			33.5300			18.0000	603.5400	(32d)
Internal Ceiling 1			33.5300			9.0000	301.7700	(32e)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =	11311.2200			(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							165.5866	(35)
Thermal bridges (User defined value 0.030 * total exposed area)							6.0177	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		41.0759	(37)

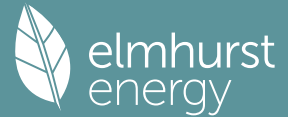
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2044 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths	26.4327	26.0402	25.4874	24.4681	23.7049	22.8586	22.4014	22.9504	23.5481	24.4536	25.4939	26.3434	(42b)
Hot water usage for other uses	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053	(42c)
Average daily hot water use (litres/day)													58.3303 (43)
Daily hot water use	63.6381	61.8926	59.9869	57.6146	55.4985	53.2993	52.8421	54.7440	56.6946	58.9531	61.3463	63.5487	(44)
Energy conte	100.7871	88.1342	92.1976	78.8716	74.7116	65.5377	63.9080	67.7845	69.9102	79.9988	87.3991	99.5019	(45)
Energy content (annual)										Total = Sum(45)m = 968.7423			
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	85.6691	74.9141	78.3679	67.0408	63.5049	55.7070	54.3218	57.6168	59.4236	67.9990	74.2892	84.5766	(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	(64a)
Output from w/h	85.6691	74.9141	78.3679	67.0408	63.5049	55.7070	54.3218	57.6168	59.4236	67.9990	74.2892	84.5766	(64)
Total per year (kWh/year) = Sum(64)m = 823.4310 (64)													823 (64)
12Total per year (kWh/year)													
Electric shower(s)	48.9952	43.6551	47.6697	45.4906	46.3443	44.2079	45.6815	46.3443	45.4906	47.6697	46.7734	48.9952	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 557.3176 (64a)													557.3176 (64a)
Heat gains from water heating, kWh/month	33.6661	29.6423	31.5094	28.1329	27.4623	24.9787	25.0008	25.9903	26.2286	28.9172	30.2656	33.3930	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.0816	108.5903	98.0816	101.3510	98.0816	101.3510	98.0816	98.0816	101.3510	98.0816	101.3510	98.0816	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	193.3210	195.3271	190.2718	179.5099	165.9248	153.1568	144.6269	142.6209	147.6761	158.4381	172.0231	184.7912	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	(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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	(71)
Water heating gains (Table 5)	45.2501	44.1106	42.3514	39.0734	36.9117	34.6927	33.6033	34.9332	36.4286	38.8672	42.0356	(72)
Total internal gains	392.7188	404.0940	386.7709	376.0004	356.9842	345.2665	332.3779	331.7017	341.5217	351.4529	371.4758	(73)

6. Solar gains

[Jan]			Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W				
East			10.5000	19.6403	0.7600	0.7000	0.7700	76.0294 (76)				
South			3.3200	46.7521	0.7600	0.7000	0.7700	57.2247 (78)				
Solar gains	133.2541	242.4490	364.3183	492.1526	578.3956	583.4700	558.8727	494.8908	409.5797	277.5653	162.6305	111.9703 (83)
Total gains	525.9729	646.5430	751.0892	868.1530	935.3798	928.7365	891.2506	826.5925	751.1014	629.0183	534.1063	495.7921 (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	43.7624	43.7838	43.8048	43.9037	43.9223	44.0089	44.0089	44.0250	43.9755	43.9223	43.8847	43.8456
alpha	3.9175	3.9189	3.9203	3.9269	3.9282	3.9339	3.9339	3.9350	3.9317	3.9282	3.9256	3.9230
util living area	0.9774	0.9520	0.9029	0.7960	0.6450	0.4762	0.3487	0.3908	0.6071	0.8580	0.9578	0.9817 (86)
MIT	19.4968	19.8150	20.2055	20.6159	20.8640	20.9677	20.9926	20.9884	20.9187	20.5512	19.9378	19.4252 (87)
Th 2	20.0410	20.0414	20.0419	20.0438	20.0442	20.0459	20.0459	20.0462	20.0452	20.0442	20.0434	20.0427 (88)
util rest of house	0.9727	0.9426	0.8847	0.7619	0.5937	0.4106	0.2748	0.3125	0.5377	0.8245	0.9478	0.9778 (89)
MIT 2	18.6835	18.9941	19.3683	19.7449	19.9529	20.0295	20.0434	20.0420	19.9993	19.6994	19.1200	18.6143 (90)
Living area fraction	f _{LA} = Living area / (4) = 0.4733 (91)											
MIT	19.0684	19.3826	19.7646	20.1571	20.3841	20.4735	20.4926	20.4899	20.4344	20.1025	19.5070	18.9981 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0684	19.3826	19.7646	20.1571	20.3841	20.4735	20.4926	20.4899	20.4344	20.1025	19.5070	18.9981 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9666	0.9349	0.8788	0.7662	0.6126	0.4404	0.3096	0.3493	0.5670	0.8268	0.9411	0.9724 (94)
Ext temp.	508.4092	604.4365	660.0548	665.1929	573.0025	409.0611	275.9537	288.7322	425.8423	520.0603	502.6305	482.0939 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	1060.3268	1039.3006	951.4333	805.6254	621.2225	419.3392	277.9128	291.8924	452.5900	679.7697	888.3037	1060.4407 (97)
Space heating requirement - total per year (kWh/year)	410.6267	292.2287	216.7856	101.1114	35.8757	0.0000	0.0000	0.0000	0.0000	118.8238	277.6847	430.2900 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	410.6267	292.2287	216.7856	101.1114	35.8757	0.0000	0.0000	0.0000	0.0000	118.8238	277.6847	430.2900 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating per m 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 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (101)
Useful 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 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	305.4388	371.1893	311.9469	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Intermittency factor (Table 10b)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	76.3597	92.7973	77.9867	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (108)
Energy for space heating	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)
Energy for space cooling	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)
Total	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)
Fabric Energy Efficiency (DFEE)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (109)

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

1. Overall dwelling characteristics

Full SAP Calculation Printout



	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 180.7090 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1107 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3607 (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) = 0.3066 (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	0.3909	0.3832	0.3756	0.3372	0.3296	0.2912	0.2912	0.2836	0.3066	0.3296	0.3449	0.3602 (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	0.5764	0.5734	0.5705	0.5569	0.5543	0.5424	0.5424	0.5402	0.5470	0.5543	0.5595	0.5649 (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
TER Opaque door			1.9500	1.0000	1.9500		(26)
TER Opening Type (Uw = 1.20)			13.8200	1.1450	15.8244		(27)
Basement Floor			34.7800	0.1300	4.5214		(28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1800	9.6840		(29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1800	11.0628		(29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258		(30)
Total net area of external elements Aum(A, m ²)			200.5900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		46.8684		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							165.5866 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7600	0.0500	0.4380	
E3 Sill				8.7600	0.0500	0.4380	
E4 Jamb				17.0000	0.0500	0.8500	
E22 Basement floor				26.0200	0.0700	1.8214	
E6 Intermediate floor within a dwelling				23.6600	0.0000	0.0000	
E14 Flat roof				26.0200	0.0800	2.0816	
E16 Corner (normal)				21.2000	0.0900	1.9080	
E17 Corner (inverted - internal area greater than external area)				5.3000	-0.0900	-0.4770	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						7.0600 (36)	
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	53.9284 (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	34.3727	34.1958	34.0224	33.2079	33.0555	32.3462	32.3462	32.2148	32.6194	33.0555	33.3638	33.6861 (38)
Average = Sum(39)m / 12 =	88.3011	88.1242	87.9508	87.1363	86.9840	86.2746	86.2746	86.1432	86.5478	86.9840	87.2922	87.6145 (39)
												87.1356
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2927	1.2901	1.2875	1.2756	1.2734	1.2630	1.2630	1.2611	1.2670	1.2734	1.2779	1.2826 (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												2.2044 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	26.4327	26.0402	25.4874	24.4681	23.7049	22.8586	22.4014	22.9504	23.5481	24.4536	25.4939	26.3434 (42b)
Hot water usage for other uses	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053 (42c)
Average daily hot water use (litres/day)												58.3303 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	63.6381	61.8926	59.9869	57.6146	55.4985	53.2993	52.8421	54.7440	56.6946	58.9531	61.3463	63.5487 (44)
Energy content (annual)	100.7871	88.1342	92.1976	78.8716	74.7116	65.5377	63.9080	67.7845	69.9102	79.9988	87.3991	99.5019 (45)
Distribution loss (46)m = 0.15 x (45)m												968.7423

Full SAP Calculation Printout



Water 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)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	85.6691	74.9141	78.3679	67.0408	63.5049	55.7070	54.3218	57.6168	59.4236	67.9990	74.2892	84.5766 (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	85.6691	74.9141	78.3679	67.0408	63.5049	55.7070	54.3218	57.6168	59.4236	67.9990	74.2892	84.5766 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											823.4310 (64)
Electric shower(s)	48.9952	43.6551	47.6697	45.4906	46.3443	44.2079	45.6815	46.3443	45.4906	47.6697	46.7734	48.9952 (64a)
Heat gains from water heating, kWh/month	33.6661	29.6423	31.5094	28.1329	27.4623	24.9787	25.0008	25.9903	26.2286	28.9172	30.2656	33.3930 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												557.3176 (64a)

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	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203	110.2203 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.0816	108.5903	98.0816	101.3510	98.0816	101.3510	98.0816	98.0816	101.3510	98.0816	101.3510	98.0816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	193.3210	195.3271	190.2718	179.5099	165.9248	153.1568	144.6269	142.6209	147.6761	158.4381	172.0231	184.7912 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220	34.0220 (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)	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762 (71)
Water heating gains (Table 5)	45.2501	44.1106	42.3514	39.0734	36.9117	34.6927	33.6033	34.9332	36.4286	38.8672	42.0356	44.8830 (72)
Total internal gains	392.7188	404.0940	386.7709	376.0004	356.9842	345.2665	332.3779	331.7017	341.5217	351.4529	371.4758	383.8218 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
East					10.5000	19.6403		0.6300	0.7000	0.7700		63.0244 (76)
South					3.3200	46.7521		0.6300	0.7000	0.7700		47.4363 (78)
Solar gains	110.4606	200.9774	302.0007	407.9686	479.4596	483.6659	463.2760	410.2384	339.5200	230.0871	134.8121	92.8175 (83)
Total gains	503.1794	605.0715	688.7716	783.9690	836.4437	828.9324	795.6539	741.9402	681.0417	581.5400	506.2879	476.6393 (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	35.5829	35.6543	35.7246	36.0585	36.1217	36.4187	36.4187	36.4742	36.3037	36.1217	35.9941	35.8617
alpha	3.3722	3.3770	3.3816	3.4039	3.4081	3.4279	3.4279	3.4316	3.4202	3.4081	3.3996	3.3908
util living area	0.9823	0.9669	0.9386	0.8717	0.7601	0.5999	0.4566	0.5033	0.7205	0.9076	0.9695	0.9851 (86)
MIT	18.9732	19.2753	19.6984	20.2299	20.6402	20.8857	20.9660	20.9523	20.7785	20.2173	19.5009	18.9227 (87)
Th 2	19.8466	19.8486	19.8506	19.8600	19.8618	19.8699	19.8699	19.8715	19.8668	19.8618	19.8582	19.8545 (88)
util rest of house	0.9783	0.9596	0.9246	0.8425	0.7061	0.5145	0.3480	0.3922	0.6423	0.8799	0.9614	0.9817 (89)
MIT 2	18.0262	18.3246	18.7384	19.2485	19.6139	19.8113	19.8590	19.8547	19.7385	19.2512	18.5574	17.9818 (90)
Living area fraction	18.4744	18.7745	19.1927	19.7130	20.0997	20.3198	20.3829	20.3742	20.2307	19.7085	19.0040	18.4271 (92)
MIT	18.4744	18.7745	19.1927	19.7130	20.0997	20.3198	20.3829	20.3742	20.2307	19.7085	19.0040	18.4271 (93)
Temperature adjustment	18.4744	18.7745	19.1927	19.7130	20.0997	20.3198	20.3829	20.3742	20.2307	19.7085	19.0040	18.4271 (93)
adjusted MIT	18.4744	18.7745	19.1927	19.7130	20.0997	20.3198	20.3829	20.3742	20.2307	19.7085	19.0040	18.4271 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	488.9879	575.2877	630.1763	657.0925	600.8354	455.9531	317.1179	328.9423	455.9125	509.0841	482.7651	465.1664 (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	1251.6134	1222.6816	1116.3366	942.2031	730.6368	493.4744	326.3703	342.3508	530.6003	792.2891	1039.1255	1246.4992 (97)
Space heating kWh	567.3933	435.0487	361.7032	205.2796	96.5723	0.0000	0.0000	0.0000	0.0000	210.7045	400.5795	581.3116 (98a)
Space heating requirement - total per year (kWh/year)												2858.5928
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	567.3933	435.0487	361.7032	205.2796	96.5723	0.0000	0.0000	0.0000	0.0000	210.7045	400.5795	581.3116 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2858.5928
Space heating per m2												41.8474 (99)

Full SAP Calculation Printout



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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	810.9913	638.4321	654.6886	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8246	0.8839	0.8576	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	668.7322	564.2940	561.4367	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	931.7093	894.7477	833.8718	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	189.3436	245.8576	202.6917	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	47.3359	61.4644	50.6729	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												159.4732 (107)
Energy for space heating												41.8474 (99)
Energy for space cooling												2.3346 (108)
Total												44.1819 (109)
Fabric Energy Efficiency (TFEE)												44.2 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 180.7090 (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	1.0000 (17)
Infiltration rate	0.0500 (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) = 0.0425 (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	0.0542	0.0531	0.0521	0.0468	0.0457	0.0404	0.0404	0.0393	0.0425	0.0457	0.0478	0.0499 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												43.5000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3367	0.3356	0.3346	0.3292	0.3282	0.3229	0.3229	0.3218	0.3250	0.3282	0.3303	0.3324 (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
Windows (Uw = 0.90)			13.8200	0.8687	12.0058		(27)
Door			1.9500	1.0000	1.9500		(26)
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000 (28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000 (29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400 (29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200 (30)
Total net area of external elements Aum(A, m ²)			200.5900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.0582		(33)
Internal Wall 1			69.7300			75.0000	5229.7500 (32c)
Internal Floor 1			33.5300			18.0000	603.5400 (32d)
Internal Ceiling 1			33.5300			9.0000	301.7700 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11311.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							165.5866 (35)
Thermal bridges (User defined value 0.030 * total exposed area)							6.0177 (36)

Full SAP Calculation Printout



Point Thermal bridges
Total fabric heat loss (33) + (36) + (36a) = 0.0000
41.0759 (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 20.0780 20.0147 19.9513 19.6345 19.5711 19.2543 19.2543 19.1910 19.3810 19.5711 19.6978 19.8246 (38)
61.1539 61.0905 61.0272 60.7104 60.6470 60.3302 60.3302 60.2668 60.4569 60.6470 60.7737 60.9005 (39)
Average = Sum(39)m / 12 = 60.6945

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP (average) 0.8952 0.8943 0.8934 0.8887 0.8878 0.8832 0.8832 0.8823 0.8850 0.8878 0.8897 0.8915 (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 2.2044 (42)
Hot water usage for mixer showers 78.5648 77.3841 75.6636 72.3718 69.9425 67.2334 65.6936 67.4010 69.2727 72.1815 75.5440 78.2638 (42a)
Hot water usage for baths 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42b)
Hot water usage for other uses 37.2053 35.8524 34.4995 33.1466 31.7936 30.4407 30.4407 31.7936 33.1466 34.4995 35.8524 37.2053 (42c)
Average daily hot water use (litres/day) 106.2571 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
115.7701 113.2365 110.1631 105.5184 101.7362 97.6741 96.1343 99.1946 102.4193 106.6809 111.3964 115.4691 (44)
Energy conte 183.3515 161.2473 169.3166 144.4494 136.9564 120.1017 116.2661 122.8237 126.2932 144.7650 158.7046 180.7967 (45)
Energy content (annual) Total = Sum(45)m = 1765.0721
Distribution loss (46)m = 0.15 x (45)m 27.5027 24.1871 25.3975 21.6674 20.5435 18.0153 17.4399 18.4236 18.9440 21.7148 23.8057 27.1195 (46)
Water storage loss:
Store volume 150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.0000 (48)
Temperature factor from Table 2b 0.6000 (49)
Enter (49) or (54) in (55) 0.6000 (55)
Total storage loss 18.6000 16.8000 18.6000 18.0000 18.6000 18.0000 18.6000 18.6000 18.0000 18.6000 18.0000 18.6000 (56)
If cylinder contains dedicated solar storage 18.6000 16.8000 18.6000 18.0000 18.6000 18.0000 18.6000 18.6000 18.0000 18.6000 18.0000 18.6000 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month 201.9515 178.0473 187.9166 162.4494 155.5564 138.1017 134.8661 141.4237 144.2932 163.3650 176.7046 199.3967 (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 201.9515 178.0473 187.9166 162.4494 155.5564 138.1017 134.8661 141.4237 144.2932 163.3650 176.7046 199.3967 (64)
Total per year (kWh/year) = Sum(64)m = 1984.0721 (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 75.8444 67.0547 71.1778 62.4294 60.4180 54.3338 53.5385 55.7189 56.3925 63.0144 67.1693 74.9949 (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 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 132.2644 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 22.0834 19.6143 15.9514 12.0763 9.0271 7.6211 8.2349 10.7040 14.3669 18.2420 21.2911 22.6972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 288.5388 291.5329 283.9878 267.9252 247.6490 228.5922 215.8611 212.8670 220.4121 236.4747 256.7509 275.8077 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 50.4308 (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) -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 -88.1762 (71)
Water heating gains (Table 5) 101.9414 99.7838 95.6690 86.7075 81.2070 75.4636 71.9603 74.8910 78.3229 84.6967 93.2907 100.7996 (72)
Total internal gains 507.0826 505.4500 490.1272 461.2279 432.4021 406.1959 390.5752 392.9809 407.6208 433.9324 465.8517 493.8234 (73)

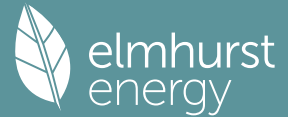
6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
East	10.5000	19.6403	0.7600	0.7000	0.7700	76.0294 (76)						
South	3.3200	46.7521	0.7600	0.7000	0.7700	57.2247 (78)						
Solar gains	133.2541	242.4490	364.3183	492.1526	578.3956	583.4700	558.8727	494.8908	409.5797	277.5653	162.6305	111.9703 (83)
Total gains	640.3367	747.8990	854.4456	953.3805	1010.7977	989.6658	949.4479	887.8717	817.2005	711.4978	628.4822	605.7937 (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 51.3787 51.4319 51.4853 51.7540 51.8081 52.0801 52.0801 52.1349 51.9710 51.8081 51.7001 51.5925
alpha 4.4252 4.4288 4.4324 4.4503 4.4539 4.4720 4.4720 4.4757 4.4647 4.4539 4.4467 4.4395

Full SAP Calculation Printout



util living area	0.9487	0.9080	0.8299	0.6974	0.5389	0.3866	0.2789	0.3111	0.4977	0.7643	0.9141	0.9577 (86)
MIT	20.0543	20.3040	20.5981	20.8405	20.9557	20.9919	20.9985	20.9976	20.9761	20.8010	20.3815	19.9867 (87)
Th 2	20.1715	20.1723	20.1731	20.1771	20.1779	20.1818	20.1818	20.1826	20.1802	20.1779	20.1763	20.1747 (88)
util rest of house												
MIT 2	0.9397	0.8934	0.8061	0.6626	0.4960	0.3385	0.2274	0.2563	0.4427	0.7257	0.8979	0.9501 (89)
Living area fraction	19.0897	19.3956	19.7458	20.0216	20.1404	20.1765	20.1812	20.1815	20.1632	19.9881	19.4996	19.0085 (90)
MIT	19.5462	19.8255	20.1492	20.4092	20.5262	20.5624	20.5680	20.5677	20.5480	20.3729	19.9170	19.4715 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	19.5462	19.8255	20.1492	20.4092	20.5262	20.5624	20.5680	20.5677	20.5480	20.3729	19.9170	19.4715 (93)

8. Space heating requirement												

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9317	0.8866	0.8054	0.6727	0.5144	0.3610	0.2517	0.2822	0.4677	0.7353	0.8921	0.9424 (94)
Useful gains	596.6106	663.0716	688.1575	641.3668	519.9663	357.2275	239.0130	250.5429	382.2072	523.1567	560.6701	570.9173 (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	932.3677	911.8064	832.9706	698.7274	535.2854	359.7158	239.3909	251.1763	389.8244	592.6943	778.9372	930.0419 (97)
Space heating kWh	249.8033	167.1498	107.7410	41.2996	11.3974	0.0000	0.0000	0.0000	0.0000	51.7359	157.1523	267.1887 (98a)
Space heating requirement - total per year (kWh/year)												1053.4680
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	249.8033	167.1498	107.7410	41.2996	11.3974	0.0000	0.0000	0.0000	0.0000	51.7359	157.1523	267.1887 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1053.4680
Space heating per m2										(98c) / (4) =		15.4219 (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 %)												100.0000 (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	249.8033	167.1498	107.7410	41.2996	11.3974	0.0000	0.0000	0.0000	0.0000	51.7359	157.1523	267.1887 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	249.8033	167.1498	107.7410	41.2996	11.3974	0.0000	0.0000	0.0000	0.0000	51.7359	157.1523	267.1887 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (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	25.5120	23.0431	25.5120	24.6891	25.5120	24.6891	25.5120	25.5120	24.6891	25.5120	24.6891	25.5120 (231)
Lighting	19.3295	15.5068	13.9622	10.2293	7.9014	6.4555	7.2079	9.3691	12.1696	15.9671	18.0349	19.8667 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-86.0399	-139.9914	-227.9230	-282.6188	-322.7867	-305.5119	-301.3345	-276.1920	-230.3361	-172.1602	-100.8837	-72.2695 (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	-1.6115	-6.2736	-21.1830	-51.2322	-89.6582	-99.9871	-98.8057	-73.4125	-43.4743	-14.8201	-3.0835	-1.0798 (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												1053.4680 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1984.0721 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.3625)												
mechanical ventilation fans (SFP = 1.3625)												300.3835 (230a)
Total electricity for the above, kWh/year												300.3835 (231)
Electricity for lighting (calculated in Appendix L)												156.0001 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3022.6689 (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												471.2548 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1053.4680	16.4900	173.7169 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1984.0721	16.4900	327.1735 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	300.3835	16.4900	49.5332 (249)
Energy for lighting	156.0001	16.4900	25.7244 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2518.0475	16.4900	-415.2260
PV Unit electricity exported	-504.6214	5.5900	-28.2083
Total			-443.4344 (252)
Total energy cost			132.7136 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.4216 (257)
SAP value		93.1651
SAP rating (Section 12)		93 (258)
SAP band		A

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	1053.4680	0.1573	165.6744 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1984.0721	0.1413	280.3079 (264)
Space and water heating			445.9823 (265)
Pumps, fans and electric keep-hot	300.3835	0.1387	41.6669 (267)
Energy for lighting	156.0001	0.1443	22.5156 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2518.0475	0.1326	-333.8889
PV Unit electricity exported	-504.6214	0.1163	-58.6966
Total			-392.5855 (269)
Total CO2, kg/year			117.5793 (272)
CO2 emissions per m2			1.7200 (273)
EI value			98.6095
EI rating			99 (274)
EI band			A

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

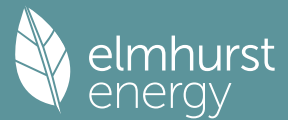
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	180.7090 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
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	1.0000 (17)
Infiltration rate	0.0500 (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) = 0.0425 (21)

Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

Full SAP Calculation Printout



Wind speed	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000 (22)
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)
Adj infilt rate	0.0489	0.0457	0.0468	0.0425	0.0425	0.0372	0.0383	0.0404	0.0393	0.0414	0.0414	0.0457 (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) =												43.5000 (23c)
Effective ac	0.3314	0.3282	0.3292	0.3250	0.3250	0.3197	0.3207	0.3229	0.3218	0.3239	0.3239	0.3282 (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	
Windows (Uw = 0.90)			13.8200	0.8687	12.0058			(27)
Door			1.9500	1.0000	1.9500			(26)
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000	(28)
ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000	(29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400	(29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200	(30)
Total net area of external elements Aum(A, m2)			200.5900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =		35.0582	(33)
Internal Wall 1			69.7300			75.0000	5229.7500	(32c)
Internal Floor 1			33.5300			18.0000	603.5400	(32d)
Internal Ceiling 1			33.5300			9.0000	301.7700	(32e)

Heat capacity Cm = Sum(A x k)												(28)...(30) + (32) + (32a)...(32e) =	11311.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													165.5866 (35)
Thermal bridges (User defined value 0.030 * total exposed area)													6.0177 (36)
Point Thermal bridges												(36a) =	0.0000
Total fabric heat loss												(33) + (36) + (36a) =	41.0759 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.7612	19.5711	19.6345	19.3810	19.3810	19.0642	19.1276	19.2543	19.1910	19.3177	19.3177	19.5711	(38)
Heat transfer coeff	60.8371	60.6470	60.7104	60.4569	60.4569	60.1401	60.2035	60.3302	60.2668	60.3936	60.3936	60.6470	(39)
Average = Sum(39)m / 12 =												60.4569	(39)
HLP	0.8906	0.8878	0.8887	0.8850	0.8850	0.8804	0.8813	0.8832	0.8823	0.8841	0.8841	0.8878	(40)
HLP (average)												0.8850	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	(40)

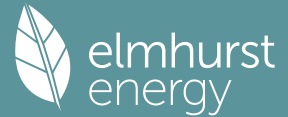
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2044 (42)
Hot water usage for mixer showers	78.5648	77.3841	75.6636	72.3718	69.9425	67.2334	65.6936	67.4010	69.2727	72.1815	75.5440	78.2638	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053	(42c)
Average daily hot water use (litres/day)												106.2571	(43)
Daily hot water use	115.7701	113.2365	110.1631	105.5184	101.7362	97.6741	96.1343	99.1946	102.4193	106.6809	111.3964	115.4691	(44)
Energy conte	183.3515	161.2473	169.3166	144.4494	136.9564	120.1017	116.2661	122.8237	126.2932	144.7650	158.7046	180.7967	(45)
Energy content (annual)										Total = Sum(45)m =		1765.0721	(45)
Distribution loss (46)m = 0.15 x (45)m	27.5027	24.1871	25.3975	21.6674	20.5435	18.0153	17.4399	18.4236	18.9440	21.7148	23.8057	27.1195	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.6000 (49)
Enter (49) or (54) in (55)													0.6000 (55)
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)
If cylinder contains dedicated solar storage	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967	(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	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	75.8444	67.0547	71.1778	62.4294	60.4180	54.3338	53.5385	55.7189	56.3925	63.0144	67.1693	74.9949	(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	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.0834	19.6143	15.9514	12.0763	9.0271	7.6211	8.2349	10.7040	14.3669	18.2420	21.2911	22.6972	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	288.5388	291.5329	283.9878	267.9252	247.6490	228.5922	215.8611	212.8670	220.4121	236.4747	256.7509	275.8077	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	(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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	(71)
Water heating gains (Table 5)	101.9414	99.7838	95.6690	86.7075	81.2070	75.4636	71.9603	74.8910	78.3229	84.6967	93.2907	(72)
Total internal gains	507.0826	505.4500	490.1272	461.2279	432.4021	406.1959	390.5752	392.9809	407.6208	433.9324	465.8517	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W	
East					10.5000	21.5869	0.7600	0.7000	0.7700		83.5652 (76)	
South					3.3200	49.2853	0.7600	0.7000	0.7700		60.3255 (78)	
Solar gains	143.8906	235.1292	354.8424	498.4376	566.8972	613.7079	589.3047	532.5965	441.6055	294.0576	181.3708	123.8500 (83)
Total gains	650.9732	740.5792	844.9696	959.6655	999.2993	1019.9038	979.8799	925.5773	849.2262	727.9900	647.2225	617.6734 (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	51.6462	51.8081	51.7540	51.9710	51.9710	52.2447	52.1898	52.0801	52.1349	52.0255	52.0255	51.8081
alpha	4.4431	4.4539	4.4503	4.4647	4.4647	4.4830	4.4793	4.4720	4.4757	4.4684	4.4684	4.4539
util living area	0.9325	0.8936	0.7943	0.6314	0.4519	0.2707	0.1536	0.1759	0.3800	0.6768	0.8791	0.9424 (86)
MIT	20.2174	20.4045	20.7018	20.9061	20.9820	20.9987	20.9999	20.9999	20.9937	20.8973	20.5461	20.1665 (87)
Th 2	20.1755	20.1779	20.1771	20.1802	20.1802	20.1842	20.1834	20.1818	20.1826	20.1810	20.1810	20.1779 (88)
util rest of house	0.9205	0.8765	0.7657	0.5918	0.4056	0.2229	0.1034	0.1227	0.3238	0.6287	0.8566	0.9318 (89)
MIT 2	19.2957	19.5231	19.8702	20.0939	20.1668	20.1836	20.1834	20.1818	20.1790	20.0918	19.7013	19.2356 (90)
Living area fraction	19.7319	19.9403	20.2638	20.4783	20.5526	20.5693	20.5698	20.5690	20.5646	20.4730	20.1011	19.6762 (92)
MIT	19.7319	19.9403	20.2638	20.4783	20.5526	20.5693	20.5698	20.5690	20.5646	20.4730	20.1011	19.6762 (93)
Temperature adjustment												0.0000
adjusted MIT	19.7319	19.9403	20.2638	20.4783	20.5526	20.5693	20.5698	20.5690	20.5646	20.4730	20.1011	19.6762 (93)

8. Space heating requirement

Utilisation	0.9131	0.8711	0.7688	0.6065	0.4268	0.2455	0.1272	0.1479	0.3502	0.6464	0.8542	0.9243 (94)
Useful gains	594.4174	645.1036	649.6428	582.0551	426.5388	250.3936	124.6014	136.8651	297.3754	470.5826	552.8543	570.9247 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W	871.9109	857.5654	756.6822	615.3484	432.4272	250.7446	124.6120	136.8878	299.1994	505.6772	712.7111	865.8092 (97)
Space heating kWh	206.4552	142.7743	79.6374	23.9712	4.3810	0.0000	0.0000	0.0000	0.0000	26.1104	115.0969	219.3940 (98a)
Space heating requirement - total per year (kWh/year)												817.8204
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	206.4552	142.7743	79.6374	23.9712	4.3810	0.0000	0.0000	0.0000	0.0000	26.1104	115.0969	219.3940 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												817.8204
Space heating per m ²										(98c) / (4) =		11.9722 (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 %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	206.4552	142.7743	79.6374	23.9712	4.3810	0.0000	0.0000	0.0000	0.0000	26.1104	115.0969	219.3940 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	206.4552	142.7743	79.6374	23.9712	4.3810	0.0000	0.0000	0.0000	0.0000	26.1104	115.0969	219.3940 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	201.9515	178.0473	187.9166	162.4494	155.5564	138.1017	134.8661	141.4237	144.2932	163.3650	176.7046	199.3967 (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	25.5120	23.0431	25.5120	24.6891	25.5120	24.6891	25.5120	25.5120	24.6891	25.5120	24.6891	25.5120 (231)
Lighting	19.3295	15.5068	13.9622	10.2293	7.9014	6.4555	7.2079	9.3691	12.1696	15.9671	18.0349	19.8667 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-92.9141	-136.1879	-222.2159	-284.0119	-317.3197	-316.2638	-312.4585	-291.5547	-245.0801	-180.7855	-112.0584	-79.9356 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)

Page 18 of 26

Full SAP Calculation Printout



V2 Wind turbine Not applicable

Recommended measures:
N Solar water heating

SAP change + 4.1 Cost change -£ 122 CO2 change -79 kg (118.5%)

Recommended measures
Solar water heating

Typical annual savings

Energy efficiency A 97 Environmental impact A 99

Total Savings £122 1.15 kg/m² 1.15 kg/m²

Potential energy efficiency rating: A 97
Potential environmental impact rating: A 99

Fuel prices for cost data on this page from database revision number 550 TEST (28 Jun 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current £849	Potential £683	Saving £166
Electricity			
Space heating	£291	£316	-£25
Water heating	£517	£326	£191
Lighting	£41	£41	£0
Generated (PV)	-£708	-£664	-£44
Total cost of fuels	£141	£19	£122
Total cost of uses	£141	£19	£122
Delivered energy	2 kWh/m ²	-8 kWh/m ²	9 kWh/m ²
Carbon dioxide emissions	0.1 tonnes	-0.0 tonnes	0.1 tonnes
CO2 emissions per m ²	1 kg/m ²	-0 kg/m ²	1 kg/m ²
Primary energy	13 kWh/m ²	3 kWh/m ²	10 kWh/m ²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.3100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	180.7090 (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)

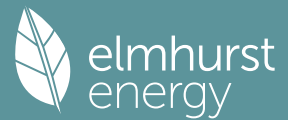
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.0000 (17)
Infiltration rate	0.0500 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.0425 (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	0.0542	0.0531	0.0521	0.0468	0.0457	0.0404	0.0404	0.0393	0.0425	0.0457	0.0478	0.0499 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												43.5000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.3367	0.3356	0.3346	0.3292	0.3282	0.3229	0.3229	0.3218	0.3250	0.3282	0.3303	0.3324 (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
Windows (Uw = 0.90)			13.8200	0.8687	12.0058		(27)
Door			1.9500	1.0000	1.9500		(26)
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000 (28)

Full SAP Calculation Printout



ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000 (29a)
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400 (29a)
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200 (30)
Total net area of external elements Aum(A, m2)			200.5900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	35.0582			(33)
Internal Wall 1			69.7300			75.0000	5229.7500 (32c)
Internal Floor 1			33.5300			18.0000	603.5400 (32d)
Internal Ceiling 1			33.5300			9.0000	301.7700 (32e)

Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =	11311.2200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K				165.5866 (35)
Thermal bridges (User defined value 0.030 * total exposed area)				6.0177 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	41.0759 (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	20.0780	20.0147	19.9513	19.6345	19.5711	19.2543	19.2543	19.1910	19.3810	19.5711	19.6978	19.8246 (38)
Average = Sum(39)m / 12 =	61.1539	61.0905	61.0272	60.7104	60.6470	60.3302	60.3302	60.2668	60.4569	60.6470	60.7737	60.9005 (39)
												60.6945
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8952	0.8943	0.8934	0.8887	0.8878	0.8832	0.8832	0.8823	0.8850	0.8878	0.8897	0.8915 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.8885
												31

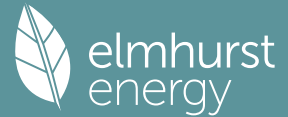
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2044 (42)
Hot water usage for mixer showers												
Hot water usage for baths	78.5648	77.3841	75.6636	72.3718	69.9425	67.2334	65.6936	67.4010	69.2727	72.1815	75.5440	78.2638 (42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Average daily hot water use (litres/day)	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053 (42c)
												106.2571 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	115.7701	113.2365	110.1631	105.5184	101.7362	97.6741	96.1343	99.1946	102.4193	106.6809	111.3964	115.4691 (44)
Energy content (annual)	183.3515	161.2473	169.3166	144.4494	136.9564	120.1017	116.2661	122.8237	126.2932	144.7650	158.7046	180.7967 (45)
Distribution loss (46)m = 0.15 x (45)m	27.5027	24.1871	25.3975	21.6674	20.5435	18.0153	17.4399	18.4236	18.9440	21.7148	23.8057	27.1195 (46)
Water storage loss:												
Store volume												190.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.6000 (55)
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (56)
If cylinder contains dedicated solar storage												
Primary loss	11.2579	10.1684	11.2579	10.8947	11.2579	10.8947	11.2579	11.2579	10.8947	11.2579	10.8947	11.2579 (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	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	194.6094	171.4157	180.5745	155.3441	148.2143	130.9965	127.5240	134.0816	137.1879	156.0229	169.5993	192.0546 (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)
Aperture area of solar collector	-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)
Zero-loss collector efficiency												3.0000 (H1)
Collector linear heat loss coefficient												0.8000 (H2)
Collector 2nd order heat loss coefficient												1.8000 (H3)
Collector loop efficiency												0.9000 (H4)
Incidence angle modifier												0.9000 (H5)
Overshading factor												1.0000 (H6)
Overall heat loss coefficient of system												0.8000 (H8)
Heat loss coefficient of collector loop												6.5000 (H10)
Dedicated solar storage volume												3.9667 (H11)
If combined cylinder, total volume of cylinder												75.0000 (H12)
Effective solar volume												190.0000 (H13)
Reference volume												109.5000 (H14)
Storage tank correction coefficient												225.0000 (H15)
Heat delivered to hot water												1.1973 (H16)
Heat delivered to space heating												601.6018 (H24)
Solar input												0.0000 (H29)
Solar input	-0.0000	-19.5750	-59.1316	-77.6803	-97.8505	-89.2331	-87.9738	-79.2054	-57.3301	-31.9372	-1.6848	-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	194.6094	151.8407	121.4429	77.6638	50.3638	41.7634	39.5501	54.8762	79.8579	124.0857	167.9145	192.0546 (64)
												1296.0229 (64)
Electric shower(s)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	69.9707	61.7495	65.3041	56.7452	54.5443	48.6496	47.6648	49.8452	50.7083	57.1407	61.4851	69.1212 (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	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	22.0834	19.6143	15.9514	12.0763	9.0271	7.6211	8.2349	10.7040	14.3669	18.2420	21.2911	22.6972 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	288.5388	291.5329	283.9878	267.9252	247.6490	228.5922	215.8611	212.8670	220.4121	236.4747	256.7509	275.8077 (68)
Pumps, fans	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308 (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)	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762 (71)
Total internal gains	94.0466	91.8891	87.7743	78.8128	73.3123	67.5689	64.0656	66.9962	70.4282	76.8020	85.3959	92.9049 (72)

Full SAP Calculation Printout



499.1878 497.5553 482.2325 453.3332 424.5073 398.3011 382.6805 385.0861 399.7260 426.0377 457.9569 485.9287 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
East	10.5000		19.6403		0.7600		0.7000		0.7700		76.0294 (76)	
South	3.3200		46.7521		0.7600		0.7000		0.7700		57.2247 (78)	
Solar gains	133.2541	242.4490	364.3183	492.1526	578.3956	583.4700	558.8727	494.8908	409.5797	277.5653	162.6305	111.9703 (83)
Total gains	632.4419	740.0042	846.5508	945.4858	1002.9030	981.7711	941.5532	879.9770	809.3057	703.6030	620.5875	597.8990 (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	51.3787	51.4319	51.4853	51.7540	51.8081	52.0801	52.0801	52.1349	51.9710	51.8081	51.7001	51.5925
alpha	4.4252	4.4288	4.4324	4.4503	4.4539	4.4720	4.4720	4.4757	4.4647	4.4539	4.4467	4.4395
util living area	0.9507	0.9107	0.8335	0.7015	0.5426	0.3896	0.2812	0.3138	0.5021	0.7694	0.9172	0.9595 (86)
MIT	20.0401	20.2922	20.5901	20.8367	20.9545	20.9917	20.9985	20.9975	20.9753	20.7954	20.3694	19.9719 (87)
Th 2	20.1715	20.1723	20.1731	20.1771	20.1779	20.1818	20.1818	20.1826	20.1802	20.1779	20.1763	20.1747 (88)
util rest of house	0.9420	0.8965	0.8100	0.6667	0.4996	0.3411	0.2293	0.2586	0.4468	0.7310	0.9014	0.9522 (89)
MIT 2	19.0723	19.3815	19.7367	20.0177	20.1393	20.1764	20.1811	20.1814	20.1626	19.9824	19.4853	18.9902 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.5303	19.8125	20.1406	20.4054	20.5251	20.5622	20.5680	20.5677	20.5472	20.3671	19.9037	19.4548 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5303	19.8125	20.1406	20.4054	20.5251	20.5622	20.5680	20.5677	20.5472	20.3671	19.9037	19.4548 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9340	0.8895	0.8090	0.6767	0.5180	0.3638	0.2538	0.2847	0.4719	0.7403	0.8955	0.9446 (94)
Useful gains	590.7284	658.2405	684.8590	639.7982	519.4809	357.1359	238.9976	250.5156	381.8932	520.8799	555.7204	564.7634 (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	931.3931	911.0144	832.4483	698.4946	535.2170	359.7032	239.3887	251.1725	389.7805	592.3480	778.1285	929.0254 (97)
Space heating kWh	253.4545	169.8640	109.8064	42.2614	11.7077	0.0000	0.0000	0.0000	0.0000	53.1723	160.1338	271.0109 (98a)
Space heating requirement - total per year (kWh/year)	1071.4111											
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	253.4545	169.8640	109.8064	42.2614	11.7077	0.0000	0.0000	0.0000	0.0000	53.1723	160.1338	271.0109 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1071.4111											
Space heating per m2	(98c) / (4) = 15.6845 (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 %)	100.0000 (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	253.4545	169.8640	109.8064	42.2614	11.7077	0.0000	0.0000	0.0000	0.0000	53.1723	160.1338	271.0109 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	253.4545	169.8640	109.8064	42.2614	11.7077	0.0000	0.0000	0.0000	0.0000	53.1723	160.1338	271.0109 (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	194.6094	151.8407	121.4429	77.6638	50.3638	41.7634	39.5501	54.8762	79.8579	124.0857	167.9145	192.0546 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	194.6094	151.8407	121.4429	77.6638	50.3638	41.7634	39.5501	54.8762	79.8579	124.0857	167.9145	192.0546 (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	32.3065	29.1801	32.3065	31.2644	32.3065	31.2644	32.3065	32.3065	31.2644	32.3065	31.2644	32.3065 (231)
Lighting	19.3295	15.5068	13.9622	10.2293	7.9014	6.4555	7.2079	9.3691	12.1696	15.9671	18.0349	19.8667 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-86.0480	-139.7689	-225.1312	-270.8243	-292.5757	-260.4853	-256.6281	-253.5471	-221.0576	-170.8857	-100.8885	-72.2752 (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	-1.6034	-6.4960	-23.9747	-63.0268	-119.8692	-145.0137	-143.5121	-96.0574	-52.7528	-16.0946	-3.0786	-1.0740 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

Full SAP Calculation Printout



(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												1071.4111	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1296.0229	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.3625)													
mechanical ventilation fans (SFP = 1.3625)												300.3835	(230a)
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												380.3835	(231)
Electricity for lighting (calculated in Appendix L)												156.0001	(232)

Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3022.6689	(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												-118.8513	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1071.4111	16.4900	176.6757	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1296.0229	16.4900	213.7142	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	300.3835	16.4900	49.5332	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	156.0001	16.4900	25.7244	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2350.1155	16.4900	-387.5340	
PV Unit electricity exported	-672.5534	5.5900	-37.5957	
Total			-425.1298	(252)
Total energy cost			53.7097	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):				0.3600	(256)
Energy cost factor (ECF)				0.1706	(257)
SAP value				97.2339	
SAP rating (Section 12)				97	(258)
SAP band				A	

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

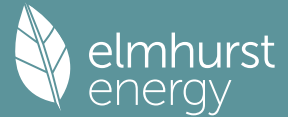
	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1071.4111	0.1572	168.4669	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1296.0229	0.1475	191.1767	(264)
Space and water heating			359.6436	(265)
Pumps, fans and electric keep-hot	380.3835	0.1387	52.7639	(267)
Energy for lighting	156.0001	0.1443	22.5156	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-2350.1155	0.1334	-313.5475	
PV Unit electricity exported	-672.5534	0.1147	-77.1140	
Total			-390.6615	(269)
Total CO2, kg/year			44.2616	(272)
CO2 emissions per m2			0.6500	(273)
EI value			99.4766	
EI rating			99	(274)
EI band			A	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	34.7800 (1b)	x 2.4000 (2b)	= 83.4720 (1b) - (3b)	
First floor	33.5300 (1c)	x 2.9000 (2c)	= 97.2370 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	68.3100		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n) =	180.7090 (5)	

Full SAP Calculation Printout



2. Ventilation rate

											m3 per hour		
Number of open chimneys											0 * 80 =	0.0000 (6a)	
Number of open flues											0 * 20 =	0.0000 (6b)	
Number of chimneys / flues attached to closed fire											0 * 10 =	0.0000 (6c)	
Number of flues attached to solid fuel boiler											0 * 20 =	0.0000 (6d)	
Number of flues attached to other heater											0 * 35 =	0.0000 (6e)	
Number of blocked chimneys											0 * 20 =	0.0000 (6f)	
Number of intermittent extract fans											0 * 10 =	0.0000 (7a)	
Number of passive vents											0 * 10 =	0.0000 (7b)	
Number of flueless gas fires											0 * 40 =	0.0000 (7c)	
											Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000 (8)	
Pressure test											Yes		
Pressure Test Method											Blower Door		
Measured/design AP50											1.0000 (17)		
Infiltration rate											0.0500 (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) =	0.0425 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	4.6000	4.3000	4.4000	4.0000	4.0000	3.5000	3.6000	3.8000	3.7000	3.9000	3.9000	4.3000 (22)	
Wind factor	1.1500	1.0750	1.1000	1.0000	1.0000	0.8750	0.9000	0.9500	0.9250	0.9750	0.9750	1.0750 (22a)	
Adj infilt rate													
	0.0489	0.0457	0.0468	0.0425	0.0425	0.0372	0.0383	0.0404	0.0393	0.0414	0.0414	0.0457 (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) =													43.5000 (23c)
Effective ac	0.3314	0.3282	0.3292	0.3250	0.3250	0.3197	0.3207	0.3229	0.3218	0.3239	0.3239	0.3282 (25)	

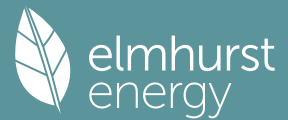
3. Heat losses and heat loss parameter

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						
Windows (Uw = 0.90)			13.8200	0.8687	12.0058			(27)					
Door			1.9500	1.0000	1.9500			(26)					
Basement Floor			34.7800	0.1300	4.5214	110.0000	3825.8000	(28)					
ICF Block - Basement	62.4400	8.6400	53.8000	0.1000	5.3800	9.0000	484.2000	(29a)					
ICF Block - GF	68.5900	7.1300	61.4600	0.1200	7.3752	9.0000	553.1400	(29a)					
Flat Roof	34.7800		34.7800	0.1100	3.8258	9.0000	313.0200	(30)					
Total net area of external elements Aum(A, m2)			200.5900					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.0582			(33)					
Internal Wall 1			69.7300			75.0000	5229.7500	(32c)					
Internal Floor 1			33.5300			18.0000	603.5400	(32d)					
Internal Ceiling 1			33.5300			9.0000	301.7700	(32e)					
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) = 11311.2200	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								165.5866	(35)				
Thermal bridges (User defined value 0.030 * total exposed area)								6.0177	(36)				
Point Thermal bridges								(36a) = 0.0000					
Total fabric heat loss								(33) + (36) + (36a) = 41.0759	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.7612	19.5711	19.6345	19.3810	19.3810	19.0642	19.1276	19.2543	19.1910	19.3177	19.3177	19.5711	(38)
Heat transfer coeff	60.8371	60.6470	60.7104	60.4569	60.4569	60.1401	60.2035	60.3302	60.2668	60.3936	60.3936	60.6470	(39)
Average = Sum(39)m / 12 =												60.4569	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8906	0.8878	0.8887	0.8850	0.8850	0.8804	0.8813	0.8832	0.8823	0.8841	0.8841	0.8878	(40)
HLP (average)												0.8850	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2044 (42)
Hot water usage for mixer showers												78.2638 (42a)
Hot water usage for baths	78.5648	77.3841	75.6636	72.3718	69.9425	67.2334	65.6936	67.4010	69.2727	72.1815	75.5440	78.2638 (42a)
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Average daily hot water use (litres/day)	37.2053	35.8524	34.4995	33.1466	31.7936	30.4407	30.4407	31.7936	33.1466	34.4995	35.8524	37.2053 (42c)
												106.2571 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	115.7701	113.2365	110.1631	105.5184	101.7362	97.6741	96.1343	99.1946	102.4193	106.6809	111.3964	115.4691 (44)
Energy content (annual)	183.3515	161.2473	169.3166	144.4494	136.9564	120.1017	116.2661	122.8237	126.2932	144.7650	158.7046	180.7967 (45)
Distribution loss (46)m = 0.15 x (45)m	27.5027	24.1871	25.3975	21.6674	20.5435	18.0153	17.4399	18.4236	18.9440	21.7148	23.8057	27.1195 (46)
Water storage loss:												
Store volume												190.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.6000 (55)
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (56)
If cylinder contains dedicated solar storage	11.2579	10.1684	11.2579	10.8947	11.2579	10.8947	11.2579	11.2579	10.8947	11.2579	10.8947	11.2579 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)

Full SAP Calculation Printout



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												
	194.6094	171.4157	180.5745	155.3441	148.2143	130.9965	127.5240	134.0816	137.1879	156.0229	169.5993	192.0546 (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)
Aperture area of solar collector												
Zero-loss collector efficiency												3.0000 (H1)
Collector linear heat loss coefficient												0.8000 (H2)
Collector 2nd order heat loss coefficient												1.8000 (H3)
Collector loop efficiency												0.0000 (H4)
Incidence angle modifier												0.9000 (H5)
Overshading factor												1.0000 (H6)
Overall heat loss coefficient of system												0.8000 (H8)
Heat loss coefficient of collector loop												6.5000 (H10)
Dedicated solar storage volume												3.9667 (H11)
If combined cylinder, total volume of cylinder												75.0000 (H12)
Effective solar volume												190.0000 (H13)
Reference volume												109.5000 (H14)
Storage tank correction coefficient												225.0000 (H15)
Heat delivered to hot water												1.1973 (H16)
Heat delivered to space heating												646.3693 (H24)
Solar input												0.0000 (H29)
Solar input	-1.5718	-19.1170	-58.7180	-80.6305	-97.9597	-95.5199	-94.4481	-87.7189	-65.1078	-37.7033	-7.8743	646.3693
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)
	193.0377	152.2987	121.8565	74.7136	50.2546	35.4766	33.0759	46.3627	72.0802	118.3196	161.7250	192.0546 (64)
Total per year (kWh/year) = Sum(64)m =												1251.2555 (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												
	69.9707	61.7495	65.3041	56.7452	54.5443	48.6496	47.6648	49.8452	50.7083	57.1407	61.4851	69.1212 (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	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644	132.2644 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	22.0834	19.6143	15.9514	12.0763	9.0271	7.6211	8.2349	10.7040	14.3669	18.2420	21.2911	22.6972 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	288.5388	291.5329	283.9878	267.9252	247.6490	228.5922	215.8611	212.8670	220.4121	236.4747	256.7509	275.8077 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308	50.4308 (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)												
	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762	-88.1762 (71)
Water heating gains (Table 5)												
	94.0466	91.8891	87.7743	78.8128	73.3123	67.5689	64.0656	66.9962	70.4282	76.8020	85.3959	92.9049 (72)
Total internal gains												
	499.1878	497.5553	482.2325	453.3332	424.5073	398.3011	382.6805	385.0861	399.7260	426.0377	457.9569	485.9287 (73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
East		10.5000	21.5869	0.7600	0.7000	0.7700	83.5652 (76)
South		3.3200	49.2853	0.7600	0.7000	0.7700	60.3255 (78)
Solar gains							
	143.8906	235.1292	354.8424	498.4376	566.8972	613.7079	589.3047
Total gains							
	643.0784	732.6845	837.0749	951.7708	991.4046	1012.0091	971.9851
							532.5965
							441.6055
							294.0576
							181.3708
							123.8500 (83)
							609.7787 (84)

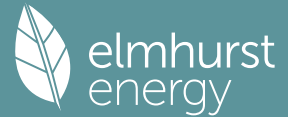
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
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	51.6462	51.8081	51.7540	51.9710	51.9710	52.2447	52.1898	52.0801	52.1349	52.0255	52.0255	51.8081
alpha	4.4431	4.4539	4.4503	4.4647	4.4647	4.4830	4.4793	4.4720	4.4757	4.4684	4.4684	4.4539
util living area												
	0.9350	0.8967	0.7983	0.6355	0.4553	0.2728	0.1548	0.1774	0.3834	0.6822	0.8830	0.9447 (86)
MIT												
	20.2042	20.3936	20.6952	20.9036	20.9815	20.9986	20.9999	20.9999	20.9934	20.8940	20.5359	20.1527 (87)
Th 2												
	20.1755	20.1779	20.1771	20.1802	20.1802	20.1842	20.1834	20.1818	20.1826	20.1810	20.1810	20.1779 (88)
util rest of house												
	0.9233	0.8800	0.7699	0.5959	0.4087	0.2247	0.1043	0.1237	0.3268	0.6341	0.8609	0.9345 (89)
MIT 2												
	19.2796	19.5102	19.8630	20.0916	20.1664	20.1835	20.1834	20.1818	20.1789	20.0887	19.6895	19.2188 (90)
Living area fraction												
	19.7172	19.9283	20.2568	20.4759	20.5522	20.5693	20.5698	20.5690	20.5644	20.4698	20.0901	19.6608 (92)
Temperature adjustment												
	19.7172	19.9283	20.2568	20.4759	20.5522	20.5693	20.5698	20.5690	20.5644	20.4698	20.0901	19.6608 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9159	0.8743	0.7728	0.6105	0.4300	0.2474	0.1282	0.1491	0.3534	0.6517	0.8582	0.9269 (94)
Useful gains	588.9916	640.6063	646.9146	581.0527	426.3343	250.3802	124.6010	136.8641	297.2963	469.2601	548.6937	565.2324 (95)
Ext temp.	5.4000	5.8000	7.8000	10.3000	13.4000	16.4000	18.5000	18.3000	15.6000	12.1000	8.3000	5.4000 (96)
Heat loss rate W												
	871.0183	856.8366	756.2596	615.2038	432.3989	250.7427	124.6119	136.8876	299.1883	505.4842	712.0446	864.8733 (97)
Space heating kWh												
	209.8279	145.3068	81.3527	24.5888	4.5120	0.0000	0.0000	0.0000	0.0000	26.9507	117.6126	222.9328 (98a)
Space heating requirement - total per year (kWh/year)												
												833.0843
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)

Full SAP Calculation Printout



Solar heating contribution - total per year (kWh/year)												0.0000
Space heating kWh	209.8279	145.3068	81.3527	24.5888	4.5120	0.0000	0.0000	0.0000	0.0000	26.9507	117.6126	222.9328 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												833.0843
Space heating per m2										(98c) / (4) =		12.1956 (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 %)												100.0000 (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	209.8279	145.3068	81.3527	24.5888	4.5120	0.0000	0.0000	0.0000	0.0000	26.9507	117.6126	222.9328 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	209.8279	145.3068	81.3527	24.5888	4.5120	0.0000	0.0000	0.0000	0.0000	26.9507	117.6126	222.9328 (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	193.0377	152.2987	121.8565	74.7136	50.2546	35.4766	33.0759	46.3627	72.0802	118.3196	161.7250	192.0546 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	193.0377	152.2987	121.8565	74.7136	50.2546	35.4766	33.0759	46.3627	72.0802	118.3196	161.7250	192.0546 (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	32.3065	29.1801	32.3065	31.2644	32.3065	31.2644	32.3065	32.3065	31.2644	32.3065	31.2644	32.3065 (231)
Lighting	19.3295	15.5068	13.9622	10.2293	7.9014	6.4555	7.2079	9.3691	12.1696	15.9671	18.0349	19.8667 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-92.9185	-135.9616	-219.2353	-270.0406	-286.7903	-254.1985	-250.1538	-261.8071	-232.4649	-178.7662	-112.0017	-79.9432 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-2.0630	-6.4438	-24.4003	-69.3751	-118.7615	-173.5334	-173.0520	-115.7937	-63.9674	-20.1287	-4.3695	-1.4632 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												833.0843 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1251.2555 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.3625)												
mechanical ventilation fans (SFP = 1.3625)												300.3835 (230a)
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												380.3835 (231)
Electricity for lighting (calculated in Appendix L)												156.0001 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-3147.6335 (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												-526.9102 (238)

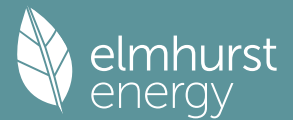
10a. Fuel costs - using BEDF prices (550)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	833.0843	26.0600	217.1018 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1251.2555	26.0600	326.0772 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	300.3835	26.0600	78.2799 (249)
Pump for solar water heating	80.0000	26.0600	20.8480 (249)
Energy for lighting	156.0001	26.0600	40.6536 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2374.2818	26.0600	-618.7378
PV Unit electricity exported	-773.3517	5.8100	-44.9317
Total			-663.6696 (252)
Total energy cost			19.2909 (255)

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

Energy	Emission factor	Emissions
--------	-----------------	-----------

Full SAP Calculation Printout



Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	833.0843	0.1582	131.7726 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	1251.2555	0.1483	185.5265 (264)
Pumps, fans and electric keep-hot	380.3835	0.1387	52.7639 (267)
Energy for lighting	156.0001	0.1443	22.5156 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2374.2818	0.1336	-317.1239
PV Unit electricity exported	-773.3517	0.1135	-87.7584
Total			-404.8823 (269)
Total CO2, kg/year			-12.3037 (272)

----- 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	833.0843	1.5855	1320.8677 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1251.2555	1.5486	1937.6586 (278)
Space and water heating			3258.5263 (279)
Pumps, fans and electric keep-hot	380.3835	1.5128	575.4442 (281)
Energy for lighting	156.0001	1.5338	239.2781 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2374.2818	1.4936	-3546.2066
PV Unit electricity exported	-773.3517	0.4155	-321.3322
Total			-3867.5388 (283)
Total Primary energy kWh/year			205.7098 (286)

Summary for Input Data



Property Reference	33 Priory Road		Issued on Date	04/07/2024
Assessment Reference	New Build	Prop Type Ref	New Build	
Property	33, Priory Road, London, N8 8LP			

SAP Rating	93 A	DER	1.98	TER	12.93
Environmental	99 A	% DER < TER			84.69
CO ₂ Emissions (t/year)	0.07	DFEE	31.19	TFEE	44.18
Compliance Check	See BREL	% DFEE < TFEE			29.41
% DPER < TPER	65.56	DPER	23.31	TPER	67.70

Assessor Details	Mr. Alexander Cotterill	Assessor ID	AV67-0001
Client			

SUMMARY FOR INPUT DATA FOR: New Build (As Designed)

Orientation	East
Property Tenure	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2024
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	26.02 m	34.78 m ²	2.40 m
1st Storey:	23.65 m	33.53 m ²	2.90 m

8.0 Living Area	32.33 m ²
-----------------	----------------------

9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	ICF Block - Basement	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.10	9.00	62.44	53.80	0.00	None	8.64	Enter Gross Area
	ICF Block - GF	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	0.12	9.00	68.59	61.46	0.00	None	7.13	Enter Gross Area

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Dense block, plasterboard on dabs	75.00	69.73

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
	Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.11	9.00	34.78	34.78	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings	Description	Storey	Construction	Area (m ²)
	Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	33.53

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Basement Floor	Basement Floor	Lowest occupied	Slab on ground, screed over insulation	0.13	None	0.00	110.00	34.78

11.2 Internal Floors	Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	33.53

Summary for Input Data

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows Door	Manufacturer Manufacturer	Window Solid Door	Double glazed			0.76		0.70	0.90 1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Windows E	Windows	ICF Block - Basement	East	6.98	
Windows E	Windows	ICF Block - GF	East	3.52	
Door E	Door	ICF Block - GF	East	1.95	
Windows S	Windows	ICF Block - Basement	South	1.66	
Windows S	Windows	ICF Block - GF	South	1.66	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)		8.76			No
E3 Sill		8.76			No
E4 Jamb		17.00			No
E22 Basement floor		26.02			No
E6 Intermediate floor within a dwelling		23.66			No
E14 Flat roof		26.02			No
E16 Corner (normal)		21.20			No
E17 Corner (inverted – internal area greater than external area)		5.30			No

Y-value W/m²K

Description

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

Approved Installation

Mechanical Ventilation data Type

Type

MV Reference Number

Configuration

MVHR Duct Insulated

Manufacturer SFP

Duct Type

MVHR Efficiency

Wet Rooms

SFP from Installer Commissioning Certificate

MVHR System Location

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	95.00	12	1140	20

24.0 Main Heating 1

Percentage of Heat %

Fuel Type

Summary for Input Data

SAP Code	691
In Winter	100.00
In Summer	100.00
Controls SAP Code	2603

25.0 Main Heating 2	None
---------------------	------

26.0 Heat Networks	None
--------------------	------

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1									
Heat source 2									
Heat source 3									
Heat source 4									
Heat source 5									

28.0 Water Heating	
Water Heating	Independent
SAP Code	903
Fuel Type	Electricity
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Immersion Heater	Dual
Cold Water Source	From mains
Bath Count	0

28.1 Showers					
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder In Heated Space	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.00	kWh/day
In Airing Cupboard	No	

32.0 Photovoltaic Unit	One Dwelling
Export Capable Meter?	Yes
Connected To Dwelling	Yes
Diverter	Yes
Battery Capacity [kWh]	8.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
3.50	South	30°	None Or Little		No	1.00		

34.0 Small-scale Hydro				None							
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations				
Lower cost measures				
None				
Further measures to achieve even higher standards				
	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact

Summary for Input Data



£4,000 - £6,000

£122

A 97
0
0

A 99
0
0