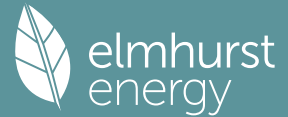


Full SAP Calculation Printout



Property Reference	THFC-L20-03		Issued on Date	24/07/2023	
Assessment Reference	V1 THFC-L20-03 DHN PlanA	Prop Type Ref			
Property					
SAP Rating		DER		TER	
Environmental		% DER < TER			
CO ₂ Emissions (t/year)	0	DFEE		TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER		TPER	
Assessor Details	Miss Laura Plazas			Assessor ID	T491-0001
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	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 409.2624 (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)

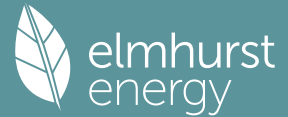
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	3.0000 (17)
Number of sides sheltered	0.1500 (18)
	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (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
Glazed (U _w = 0.64)			38.6400	0.6240	24.1123		(27)
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)
Total net area of external elements A _{um} (A, m ²)			84.0000				(31)

Full SAP Calculation Printout



Fabric heat loss, W/K = Sum (A x U)
 Party Floor 1 139.6800 (26)...(30) + (32) = 53.1427 (33)
 Party Ceiling 1 139.6800 (32d)
 (32b)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	0.0000	0.0500	0.0000
E7 Party floor between dwellings (in blocks of flats)	51.6100	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.1500	0.0000	0.0000
E16 Corner (normal)	5.8600	0.0900	0.5274
E18 Party wall between dwellings	5.8600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.5274 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss		(33) + (36) + (36a) =	53.6701 (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	35.3933	34.9628	34.5323	32.3798	31.9493	29.7969	29.7969	29.3664	30.6578	31.9493	32.8103	33.6713 (38)
Heat transfer coeff	89.0634	88.6329	88.2024	86.0499	85.6194	83.4670	83.4670	83.0365	84.3280	85.6194	86.4804	87.3414 (39)
Average = Sum(39)m / 12 =												85.9423
HLP	0.6376	0.6345	0.6315	0.6161	0.6130	0.5976	0.5976	0.5945	0.6037	0.6130	0.6191	0.6253 (40)
HLP (average)												0.6153
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

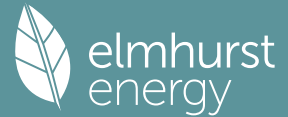
Assumed occupancy												2.9165 (42)
Hot water usage for mixer showers	73.1195	72.0207	70.4194	67.3558	65.0949	62.5735	61.1404	62.7295	64.4715	67.1786	70.3081	72.8394 (42a)
Hot water usage for baths	33.2284	32.7349	32.0400	30.7587	29.7992	28.7353	28.1607	28.8508	29.6021	30.7405	32.0482	33.1161 (42b)
Hot water usage for other uses	46.8396	45.1363	43.4331	41.7298	40.0266	38.3233	38.3233	40.0266	41.7298	43.4331	45.1363	46.8396 (42c)
Average daily hot water use (litres/day)												140.8032 (43)
Daily hot water use	153.1875	149.8919	145.8925	139.8442	134.9206	129.6321	127.6244	131.6068	135.8034	141.3522	147.4926	152.7950 (44)
Energy conte	242.6116	213.4441	224.2313	191.4398	181.6291	159.3978	154.3506	162.9567	167.4592	191.8136	210.1303	239.2401 (45)
Energy content (annual)										Total = Sum(45)m =		2338.7043
Distribution loss (46)m = 0.15 x (45)m	36.3917	32.0166	33.6347	28.7160	27.2444	23.9097	23.1526	24.4435	25.1189	28.7720	31.5195	35.8860 (46)
Water storage loss:												
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (62)
WVHRS	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	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2989.5440 (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	124.8898	110.9121	118.7784	106.4487	104.6131	95.7947	95.5430	98.4046	98.4751	107.9995	112.6633	123.7688 (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	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	155.8792	172.5805	155.8792	161.0752	155.8792	161.0752	155.8792	155.8792	161.0752	155.8792	161.0752	155.8792 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.0479	312.2549	304.1735	286.9691	265.2517	244.8403	231.2043	227.9974	236.0788	253.2832	275.0006	295.4119 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824 (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)

Water heating gains (Table 5)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	(71)
Total internal gains	167.8626	165.0478	159.6483	147.8454	140.6090	133.0482	128.4180	132.2642	136.7710	145.1606	156.4768	166.3559	(72)
	699.5368	716.6303	686.4481	662.6367	628.4870	605.7108	582.2487	582.8879	600.6721	621.0700	659.2996	684.3941	(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		
South				14.8500	46.7521		0.5000		1.0000		0.7700		240.5639 (78)		
West				23.7900	19.6403		0.5000		1.0000		0.7700		161.8993 (80)		
Solar gains				402.4632	710.6911	1023.4381	1327.9003	1523.3218	1523.1499	1464.3329	1320.1727	1130.8686	800.7486	487.0197	341.0075 (83)
Total gains				1102.0001	1427.3214	1709.8862	1990.5371	2151.8087	2128.8607	2046.5816	1903.0605	1731.5406	1421.8186	1146.3193	1025.4016 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
alpha	43.5645	43.7761	43.9897	45.0901	45.3168	46.4854	46.4854	46.7264	46.0108	45.3168	44.8656	44.4234		
util living area	3.9043	3.9184	3.9326	4.0060	4.0211	4.0990	4.0990	4.1151	4.0674	4.0211	3.9910	3.9616		
	0.8957	0.7966	0.6689	0.5037	0.3657	0.2503	0.1793	0.2005	0.3334	0.5869	0.8182	0.9124	(86)	
MIT	20.1119	20.4846	20.7595	20.9310	20.9834	20.9975	20.9995	20.9993	20.9917	20.8995	20.5274	20.0511	(87)	
Th 2	20.3963	20.3990	20.4018	20.4156	20.4183	20.4322	20.4322	20.4350	20.4267	20.4183	20.4128	20.4073	(88)	
util rest of house	0.8857	0.7812	0.6490	0.4820	0.3437	0.2282	0.1562	0.1759	0.3063	0.5598	0.8014	0.9037	(89)	
MIT 2	19.3542	19.8089	20.1360	20.3434	20.4024	20.4301	20.4319	20.4345	20.4195	20.3154	19.8787	19.2879	(90)	
Living area fraction									fLA = Living area / (4) =			0.4933	(91)	
MIT	19.7280	20.1422	20.4436	20.6333	20.6890	20.7100	20.7119	20.7131	20.7018	20.6036	20.1987	19.6644	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.7280	20.1422	20.4436	20.6333	20.6890	20.7100	20.7119	20.7131	20.7018	20.6036	20.1987	19.6644	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.8735	0.7742	0.6505	0.4902	0.3540	0.2390	0.1676	0.1880	0.3193	0.5685	0.7949	0.8915	(94)	
Ext temp.	962.5465	1105.0567	1112.2245	975.7160	761.6713	508.8774	343.0208	357.8439	552.9668	808.3540	911.1671	914.1460	(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	1374.0693	1350.9620	1229.8590	1009.6487	769.6334	509.9869	343.2101	358.1449	556.7179	856.4995	1132.7816	1350.6862	(97)	
Space heating requirement - total per year (kWh/year)	306.1730	165.2484	87.5201	24.4316	5.9238	0.0000	0.0000	0.0000	0.0000	35.8202	159.5624	324.7860	(98a)	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)	
Solar heating contribution - total per year (kWh/year)													0.0000	
Space heating kWh	306.1730	165.2484	87.5201	24.4316	5.9238	0.0000	0.0000	0.0000	0.0000	35.8202	159.5624	324.7860	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1109.4654		
Space heating per m2										(98c) / (4) =		7.9429	(99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b														
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
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		
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	784.5897	617.6557	631.0773	0.0000	0.0000	0.0000	0.0000	(100)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9932	0.9967	0.9954	0.0000	0.0000	0.0000	0.0000	(101)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	779.2188	615.6336	628.1874	0.0000	0.0000	0.0000	0.0000	(102)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	2405.7291	2313.0624	2147.8989	0.0000	0.0000	0.0000	0.0000	(103)	
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	1171.0875	1262.8870	1130.6653	0.0000	0.0000	0.0000	0.0000	(104)	
Intermittency factor (Table 10b)									fC = cooled area / (4) =				0.8970	(105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)	
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	262.6102	283.1957	253.5457	0.0000	0.0000	0.0000	0.0000	(107)	
													799.3516	(107)

Full SAP Calculation Printout



9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(301)
Fraction of space heat from community system	1.0000	(302)
Fraction of heat from community Waste Heat-Space and Water	0.9500	(303a)
Fraction of heat from community Boilers-Space and Water	0.0500	(303b)
Factor for control and charging method (Table 4c(3)) for space heating	1.0000	(305)
Factor for charging method (Table 4c(3)) for water heating	1.0000	(305a)
Distribution loss factor (Table 12c) for community heating system	1.5000	(306)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating:		
Space heating requirement		
306.1730 165.2484 87.5201 24.4316 5.9238 0.0000 0.0000 0.0000 0.0000 35.8202 159.5624 324.7860	(98)	
Space heat from Waste Heat = (98) x 0.95 x 1.00 x 1.50		
307a 436.2965 235.4789 124.7161 34.8150 8.4414 0.0000 0.0000 0.0000 0.0000 51.0438 227.3764 462.8200		
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.50		
307b 22.9630 12.3936 6.5640 1.8324 0.4443 0.0000 0.0000 0.0000 0.0000 2.6865 11.9672 24.3589		
Space heating requirement		
459.2595 247.8726 131.2801 36.6474 8.8857 0.0000 0.0000 0.0000 0.0000 53.7303 239.3436 487.1789	(307)	
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000	(308)
Space heating fuel for secondary/supplementary system		
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	(309)	
Water heating		
Annual water heating requirement		
297.8884 263.3715 279.5081 244.9335 236.9059 212.8915 209.6274 218.2335 220.9528 247.0904 263.6240 294.5169	(64)	
Water heat from Waste Heat = (64) x 0.95 x 1.00 x 1.50		
310a 424.4910 375.3045 398.2991 349.0302 337.5909 303.3704 298.7191 310.9828 314.8578 352.1038 375.6642 419.6866		
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.50		
310b 22.3416 19.7529 20.9631 18.3700 17.7679 15.9669 15.7221 16.3675 16.5715 18.5318 19.7718 22.0888		
Water heating fuel		
446.8326 395.0573 419.2622 367.4002 355.3589 319.3373 314.4411 327.3503 331.4293 370.6356 395.4360 441.7754	(310)	
Cooling System Energy Efficiency Ratio		
Space coolin 0.0000 0.0000 0.0000 0.0000 0.0000 57.0892 61.5643 55.1186 0.0000 0.0000 0.0000 4.6000	(314)	
Pumps and Fa 36.8087 33.2465 36.8087 35.6213 36.8087 35.6213 36.8087 36.8087 35.6213 36.8087 35.6213 36.8087	(315)	
Lighting 33.4734 26.8536 24.1787 17.7144 13.6831 11.1792 12.4822 16.2248 21.0744 27.6507 31.2315 34.4037	(332)	
Electricity generated by PVs (Appendix M) (negative quantity)		
(333a)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	(333a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)		
(334a)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	(334a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)		
(335a)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	(335a)	
Electricity generated by PVs (Appendix M) (negative quantity)		
(333b)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	(333b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)		
(334b)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	(334b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)		
(335b)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	(335b)	
Annual totals kWh/year		
Space heating fuel - community heating	1664.1981	(307)
Space heating fuel - secondary	0.0000	(309)
Water heating fuel - community heating	4484.3160	(310)
Efficiency of water heater	0.0000	(311)
Electricity used for heat distribution	16.6420	(313)
Space cooling fuel	173.7721	(321)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8680)		
mechanical ventilation fans (SFP = 0.8680)	433.3925	(330a)
Total electricity for the above, kWh/year	433.3925	(331)
Electricity for lighting (calculated in Appendix L)	270.1496	(332)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(333)
Wind generation	0.0000	(334)
Hydro-electric generation (Appendix N)	0.0000	(335a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(335)
Appendix Q - special features		
Energy saved or generated	-0.0000	(336)
Energy used	0.0000	(337)
Total delivered energy for all uses	7025.8284	(338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Waste Heat			100.0000 (367)
Space and Water heating from Waste Heat	5841.0884	0.0150	23.7148 (367)
Efficiency of heat source Boilers			85.0000 (367)
Space and Water heating from Boilers	361.6773	0.2100	20.5577 (368)
Electrical energy for heat distribution (space & water)	16.6420	0.0000	8.9596 (372)
Overall CO2 factor for heat network			0.0281 (386)
Total CO2 associated with community systems			172.5282 (373)
Space and water heating			172.5282 (376)
Space cooling	173.7721	0.1143	19.8576 (377)
Pumps, fans and electric keep-hot	433.3925	0.1387	60.1169 (378)
Energy for lighting	270.1496	0.1443	38.9909 (379)
Total CO2, kg/year			291.4936 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.0900 (384)

Full SAP Calculation Printout



13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Efficiency of heat source Waste Heat			100.0000	(467a)
Space and Water heating from Waste Heat	5841.0884	0.0630	99.6023	(467)
Efficiency of heat source Boilers			85.0000	(467b)
Space and Water heating from Boilers	361.6773	1.1300	110.6202	(468)
Electrical energy for heat distribution (space & water)	16.6420	0.0000	94.6241	(472)
Overall CO2 factor for heat network			0.1417	(486)
Total CO2 associated with community systems			871.3080	(473)
Space and water heating			871.3080	(476)
Space cooling	173.7721	1.4211	246.9538	(477)
Pumps, fans and electric keep-hot	433.3925	1.5128	655.6362	(478)
Energy for lighting	270.1496	1.5338	414.3645	(479)
Total Primary energy kWh/year			2188.2625	(483)
Dwelling Primary energy Rate (DPER)			15.6700	(484)

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	139.6800	(1b)	x	2.9300 (2b) = 409.2624 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800			
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	409.2624 (5)

2. Ventilation rate

	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

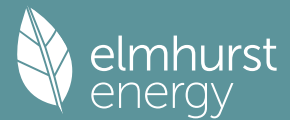
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0977 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3477	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2956	(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	0.3769	0.3695	0.3621	0.3251	0.3177	0.2808	0.2808	0.2734	0.2956	0.3177	0.3325	0.3473	(22b)
Effective ac	0.5710	0.5683	0.5656	0.5529	0.5505	0.5394	0.5394	0.5374	0.5437	0.5505	0.5553	0.5603	(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 Opening Type Curtain (Uw = 1.30)			34.8900	1.2357	43.1150			(27)
Curtain Wall	84.0000	34.8900	49.1100	0.1800	8.8398			(29a)
Total net area of external elements Aum(A, m ²)			84.0000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.9548			(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								100.0000 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	

Full SAP Calculation Printout



E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	0.0000	0.0500	0.0000
E7 Party floor between dwellings (in blocks of flats)	51.6100	0.0700	3.6127
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.1500	0.0200	0.1030
E16 Corner (normal)	5.8600	0.0900	0.5274
E18 Party wall between dwellings	5.8600	0.0600	0.3516
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.5947 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	56.5495 (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	77.1189	76.7465	76.3814	74.6669	74.3461	72.8527	72.8527	72.5762	73.4279	74.3461	74.9950	75.6735
Average = Sum(39)m / 12 =	133.6684	133.2960	132.9310	131.2164	130.8956	129.4022	129.4022	129.1257	129.9774	130.8956	131.5445	132.2230
												131.2148

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9570	0.9543	0.9517	0.9394	0.9371	0.9264	0.9264	0.9244	0.9305	0.9371	0.9418	0.9466
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9165 (42)
Hot water usage for mixer showers	73.1195	72.0207	70.4194	67.3558	65.0949	62.5735	61.1404	62.7295	64.4715	67.1786	70.3081	72.8394
Hot water usage for baths	31.5670	31.0982	30.4380	29.2207	28.3093	27.2986	26.7526	27.4082	28.1220	29.2035	30.4458	31.4603
Hot water usage for other uses	44.4976	42.8795	41.2614	39.6433	38.0252	36.4071	36.4071	38.0252	39.6433	41.2614	42.8795	44.4976
Average daily hot water use (litres/day)												137.1337

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	149.1841	145.9984	142.1188	136.2198	131.4293	126.2792	124.3002	128.1629	132.2368	137.6435	143.6334	148.7973
Distribution loss (46)m = 0.15 x (45)m	236.2712	207.8997	218.4314	186.4781	176.9292	155.2750	150.3303	158.6925	163.0612	186.7809	204.6321	232.9805
Total = Sum(45)m =												2277.7622

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
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
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
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
Total heat required for water heating calculated for each month	282.8661	249.9854	265.0263	231.5700	223.5241	200.3669	196.9252	205.2874	208.1530	233.3759	249.7240	279.5754
WWHRS	-33.4272	-29.5633	-30.9570	-25.6336	-23.8896	-20.4425	-19.1616	-20.3764	-21.1506	-24.9342	-28.2474	-32.8082
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
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
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
Output from w/h	249.4389	220.4222	234.0693	205.9364	199.6345	179.9244	177.7636	184.9110	187.0024	208.4416	221.4766	246.7673
Total per year (kWh/year)												2515.7881
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
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												2516 (64)

Heat gains from water heating, kWh/month	115.8361	102.7952	109.9044	98.0774	96.1049	87.7024	87.2607	90.0412	90.2913	99.3806	104.1137	114.7420
--	----------	----------	----------	---------	---------	---------	---------	---------	---------	---------	----------	----------

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	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	155.8792	172.5805	155.8792	161.0752	155.8792	161.0752	155.8792	155.8792	161.0752	155.8792	161.0752	155.8792
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.0479	312.2549	304.1735	286.9691	265.2517	244.8403	231.2043	227.9974	236.0788	253.2832	275.0006	295.4119
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824
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
Losses e.g. evaporation (negative values) (Table 5)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589
Water heating gains (Table 5)	155.6937	152.9691	147.7209	136.2187	129.1732	121.8089	117.2859	121.0231	125.4046	133.5761	144.6023	154.2231
Total internal gains	690.3679	707.5516	677.5207	654.0100	620.0512	594.4715	571.1166	571.6468	589.3057	612.4855	650.4252	675.2612

Full SAP Calculation Printout



6. Solar gains

[Jan]			Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF Access factor Table 6d		Gains W	
-----			-----		-----		-----		-----		-----		-----	
South			13.4200		46.7521		0.6300		0.7000		0.7700		191.7455	(78)
West			21.4700		19.6403		0.6300		0.7000		0.7700		128.8698	(80)
-----			-----		-----		-----		-----		-----		-----	
Solar gains	320.6153	566.1264	815.1855	1057.6041	1213.1828	1213.0220	1166.1904	1051.4233	900.7229	637.8444	387.9693	271.6620	(83)	
Total gains	1010.9832	1273.6780	1492.7061	1711.6141	1833.2340	1807.4936	1737.3069	1623.0701	1490.0286	1250.3299	1038.3944	946.9233	(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	29.0271	29.1082	29.1881	29.5695	29.6419	29.9840	29.9840	30.0482	29.8513	29.6419	29.4957	29.3444
alpha	2.9351	2.9405	2.9459	2.9713	2.9761	2.9989	2.9989	3.0032	2.9901	2.9761	2.9664	2.9563
util living area	0.9440	0.8995	0.8328	0.7194	0.5820	0.4332	0.3199	0.3544	0.5414	0.7794	0.9098	0.9522 (86)
MIT	19.0007	19.4332	19.9271	20.4388	20.7628	20.9285	20.9784	20.9703	20.8576	20.3903	19.6094	18.9273 (87)
Th 2	20.1194	20.1216	20.1238	20.1341	20.1361	20.1451	20.1451	20.1468	20.1416	20.1361	20.1322	20.1281 (88)
util rest of house	0.9367	0.8873	0.8136	0.6899	0.5412	0.3816	0.2605	0.2925	0.4872	0.7479	0.8968	0.9459 (89)
MIT 2	17.7753	18.3154	18.9238	19.5415	19.9094	20.0887	20.1324	20.1284	20.0213	19.5027	18.5510	17.6887 (90)
Living area fraction	18.3798	18.8669	19.4188	19.9842	20.3304	20.5030	20.5498	20.5438	20.4339	19.9406	19.0732	18.2998 (92)
MIT	18.3798	18.8669	19.4188	19.9842	20.3304	20.5030	20.5498	20.5438	20.4339	19.9406	19.0732	18.2998 (93)
Temperature adjustment												0.0000
adjusted MIT	18.3798	18.8669	19.4188	19.9842	20.3304	20.5030	20.5498	20.5438	20.4339	19.9406	19.0732	18.2998 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9182	0.8667	0.7963	0.6845	0.5507	0.4036	0.2889	0.3217	0.5062	0.7401	0.8775	0.9287 (94)
Useful gains	928.3034	1103.8670	1188.6162	1171.5209	1009.5292	729.4417	501.8418	522.1105	754.2950	925.3163	911.2085	879.4024 (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	1882.0290	1861.7259	1717.3080	1454.4278	1129.6868	763.8597	511.1089	535.0676	823.2636	1222.6421	1575.0048	1864.3169 (97)
Space heating kWh	709.5719	509.2811	393.3467	203.6929	89.3972	0.0000	0.0000	0.0000	0.0000	221.2104	477.9333	732.7764 (98a)
Space heating requirement - total per year (kWh/year)												3337.2100
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	709.5719	509.2811	393.3467	203.6929	89.3972	0.0000	0.0000	0.0000	0.0000	221.2104	477.9333	732.7764 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3337.2100
Space heating per m2										(98c) / (4) =		23.8918 (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	709.5719	509.2811	393.3467	203.6929	89.3972	0.0000	0.0000	0.0000	0.0000	221.2104	477.9333	732.7764 (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)	768.7669	551.7672	426.1611	220.6857	96.8551	0.0000	0.0000	0.0000	0.0000	239.6646	517.8043	793.9073 (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	249.4389	220.4222	234.0693	205.9364	199.6345	179.9244	177.7636	184.9110	187.0024	208.4416	221.4766	246.7673 (64)
Efficiency of water heater	86.2693	85.8744	85.2146	84.0352	82.3825	79.8000	79.8000	79.8000	79.8000	84.1934	85.7380	79.8000 (216)
Fuel for water heating, kWh/month	289.1397	256.6797	274.6823	245.0596	242.3263	225.4692	222.7614	231.7180	234.3389	247.5749	258.3179	285.7865 (219)
Space cooling fuel 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 (221)

Full SAP Calculation Printout



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	32.3886	25.9834	23.3951	17.1403	13.2396	10.8169	12.0776	15.6990	20.3914	26.7546	30.2193	33.2888	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-6.1914	-9.8025	-15.7982	-19.9823	-23.6065	-22.8050	-22.5233	-20.2052	-16.5583	-12.0998	-7.1749	-5.2349	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-0.8610	-1.9067	-3.9804	-6.2777	-8.6130	-8.7787	-8.6826	-7.2096	-5.0997	-2.8252	-1.1788	-0.6744	(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												3615.6122	(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												3013.8545	(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)												261.3947	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-238.0701	(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												6738.7912	(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	3615.6122	0.2100	759.2786 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3013.8545	0.2100	632.9094 (264)
Space and water heating			1392.1880 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	261.3947	0.1443	37.7273 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-181.9824	0.1323	-24.0703
PV Unit electricity exported	-56.0878	0.1245	-6.9819
Total			-31.0522 (269)
Total CO2, kg/year			1410.7924 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.1000 (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	3615.6122	1.1300	4085.6418 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3013.8545	1.1300	3405.6556 (278)
Space and water heating			7491.2973 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	261.3947	1.5338	400.9359 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-181.9824	1.4887	-270.9176
PV Unit electricity exported	-56.0878	0.4569	-25.6243
Total			-296.5419 (283)
Total Primary energy kWh/year			7725.7921 (286)
Target Primary Energy Rate (TPER)			55.3100 (287)

Full SAP Calculation Printout



1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 409.2624 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.0977 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2477 (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) = 0.2106 (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	0.2685	0.2632	0.2580	0.2316	0.2264	0.2000	0.2000	0.1948	0.2106	0.2264	0.2369	0.2474 (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	0.5360	0.5346	0.5333	0.5268	0.5256	0.5200	0.5200	0.5190	0.5222	0.5256	0.5281	0.5306 (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
Glazed (Uw = 0.64)			38.6400	0.6240	24.1123		(27)
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)
Total net area of external elements Aum(A, m ²)			84.0000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.1427		(33)
Party Floor 1			139.6800				(32d)
Party Ceiling 1			139.6800				(32b)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	0.0000	0.0500	0.0000
E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	51.6100	0.0000	0.0000
E7 Party floor between dwellings (in blocks of flats)	5.1500	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.8600	0.0900	0.5274
E16 Corner (normal)	5.8600	0.0000	0.0000
E18 Party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.5274 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 53.6701 (37)

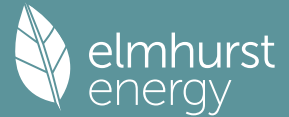
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	72.3960	72.2070	72.0217	71.1515	70.9887	70.2307	70.2307	70.0903	70.5227	70.9887	71.3180	71.6624 (38)
Heat transfer coeff	126.0661	125.8771	125.6918	124.8216	124.6588	123.9008	123.9008	123.7605	124.1928	124.6588	124.9882	125.3325 (39)
Average = Sum(39)m / 12 =												124.8208

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9025	0.9012	0.8999	0.8936	0.8925	0.8870	0.8870	0.8860	0.8891	0.8925	0.8948	0.8973 (40)
HLP (average)												0.8936
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Full SAP Calculation Printout



Assumed occupancy												2.9165 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	31.5670	31.0982	30.4380	29.2207	28.3093	27.2986	26.7526	27.4082	28.1220	29.2035	30.4458	31.4603 (42b)
Hot water usage for other uses	44.4976	42.8795	41.2614	39.6433	38.0252	36.4071	36.4071	38.0252	39.6433	41.2614	42.8795	44.4976 (42c)
Average daily hot water use (litres/day)												69.7200 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	76.0646	73.9777	71.6994	68.8641	66.3345	63.7057	63.1598	65.4334	67.7653	70.4649	73.3253	75.9579 (44)
Energy content (annual)	120.4677	105.3433	110.1993	94.2714	89.2990	78.3336	76.3863	81.0203	83.5614	95.6202	104.4654	118.9317 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											1157.8996
	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	102.3976	89.5418	93.6694	80.1307	75.9041	66.5836	64.9283	68.8672	71.0272	81.2772	88.7956	101.0919 (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	102.3976	89.5418	93.6694	80.1307	75.9041	66.5836	64.9283	68.8672	71.0272	81.2772	88.7956	101.0919 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											984.2147 (64)
Electric shower(s)	58.5565	52.1744	56.9724	54.3681	55.3883	52.8350	54.5962	55.3883	54.3681	56.9724	55.9011	58.5565 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											666.0772 (64a)
Heat gains from water heating, kWh/month	40.2385	35.4290	37.6605	33.6247	32.8231	29.8546	29.8811	31.0639	31.3488	34.5624	36.1742	39.9121 (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	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	155.8792	172.5805	155.8792	161.0752	155.8792	161.0752	155.8792	155.8792	161.0752	155.8792	161.0752	155.8792 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.0479	312.2549	304.1735	286.9691	265.2517	244.8403	231.2043	227.9974	236.0788	253.2832	275.0006	295.4119 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824 (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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589 (71)
Water heating gains (Table 5)	54.0840	52.7218	50.6189	46.7010	44.1171	41.4648	40.1628	41.7525	43.5400	46.4548	50.2419	53.6453 (72)
Total internal gains	585.7583	604.3043	577.4186	561.4923	531.9950	514.1274	493.9934	492.3762	507.4411	522.3643	553.0648	571.6835 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g	FF Specific data or Table 6c		Access factor Table 6d		Gains W
South				14.8500	46.7521		0.5000	1.0000		0.7700		240.5639 (78)
West				23.7900	19.6403		0.5000	1.0000		0.7700		161.8993 (80)
Solar gains	402.4632	710.6911	1023.4381	1327.9003	1523.3218	1523.1499	1464.3329	1320.1727	1130.8686	800.7486	487.0197	341.0075 (83)
Total gains	988.2215	1314.9954	1600.8567	1889.3927	2055.3168	2037.2773	1958.3263	1812.5488	1638.3097	1323.1129	1040.0844	912.6910 (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	30.7775	30.8237	30.8691	31.0844	31.1250	31.3154	31.3154	31.3509	31.2418	31.1250	31.0429	30.9576
alpha	3.0518	3.0549	3.0579	3.0723	3.0750	3.0877	3.0877	3.0901	3.0828	3.0750	3.0695	3.0638
util living area	0.9446	0.8867	0.8001	0.6646	0.5172	0.3760	0.2745	0.3080	0.4866	0.7469	0.9051	0.9547 (86)
MIT	19.1289	19.6251	20.1341	20.5921	20.8458	20.9569	20.9877	20.9823	20.9042	20.5059	19.7253	19.0252 (87)
Th 2	20.1653	20.1665	20.1676	20.1729	20.1739	20.1785	20.1785	20.1794	20.1768	20.1739	20.1719	20.1698 (88)
util rest of house	0.9376	0.8738	0.7795	0.6347	0.4794	0.3312	0.2246	0.2551	0.4369	0.7144	0.8920	0.9488 (89)

Full SAP Calculation Printout



MIT 2	18.4511	18.9321	19.4162	19.8399	20.0601	20.1522	20.1729	20.1709	20.1142	19.7760	19.0410	18.3529 (90)
Living area fraction									fLA = Living area / (4) =			0.4933 (91)
MIT	18.7854	19.2740	19.7704	20.2110	20.4477	20.5492	20.5749	20.5712	20.5040	20.1361	19.3786	18.6846 (92)
Temperature adjustment												0.0000
adjusted MIT	18.7854	19.2740	19.7704	20.2110	20.4477	20.5492	20.5749	20.5712	20.5040	20.1361	19.3786	18.6846 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9232	0.8580	0.7688	0.6362	0.4922	0.3516	0.2488	0.2806	0.4571	0.7128	0.8771	0.9356	(94)
Useful gains	912.3055	1128.2767	1230.7717	1201.9958	1011.6107	716.4006	487.2804	508.5673	748.7928	943.1542	912.2880	853.9026	(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	1826.1239	1809.3549	1667.9765	1411.8598	1090.4754	737.1049	492.4938	516.2296	795.3270	1188.7575	1534.6828	1815.3919	(97)
Space heating kWh	679.8809	457.6845	325.2804	151.1021	58.6753	0.0000	0.0000	0.0000	0.0000	182.7289	448.1243	715.3480	(98a)
Space heating requirement - total per year (kWh/year)												3018.8244	
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	679.8809	457.6845	325.2804	151.1021	58.6753	0.0000	0.0000	0.0000	0.0000	182.7289	448.1243	715.3480	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3018.8244	
Space heating per m2											(98c) / (4) =	21.6124	(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	1164.6678	916.8662	940.5796	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9366	0.9609	0.9496	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1090.7984	881.0237	893.2190	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2314.5868	2225.2838	2058.0069	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	881.1277	1000.1295	866.6022	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	220.2819	250.0324	216.6505	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												686.9648	(107)
Energy for space heating												21.6124	(99)
Energy for space cooling												4.9181	(108)
Total												26.5306	(109)
Fabric Energy Efficiency (DFEE)												26.5	(109)

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

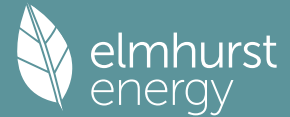
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) -	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	409.2624 (5)	

2. Ventilation rate

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

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour 40.0000 / (5) =	0.0977 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												5.0000	(17)
Infiltration rate												0.3477	(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) =											0.2956	(21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	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)
	0.3769	0.3695	0.3621	0.3251	0.3177	0.2808	0.2808	0.2734	0.2956	0.3177	0.3325	0.3473	(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	0.5710	0.5683	0.5656	0.5529	0.5505	0.5394	0.5394	0.5374	0.5437	0.5505	0.5553	0.5603	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Opening Type Curtain (Uw = 1.30)			34.8900	1.2357	43.1150		(27)						
Curtain Wall	84.0000	34.8900	49.1100	0.1800	8.8398		(29a)						
Total net area of external elements Aum(A, m2)			84.0000				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.9548		(33)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				0.0000	0.0500	0.0000							
E4 Jamb				0.0000	0.0500	0.0000							
E7 Party floor between dwellings (in blocks of flats)				51.6100	0.0700	3.6127							
E23 Balcony within or between dwellings, balcony support penetrates wall insulation				5.1500	0.0200	0.1030							
E16 Corner (normal)				5.8600	0.0900	0.5274							
E18 Party wall between dwellings				5.8600	0.0600	0.3516							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.5947 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	56.5495 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 77.1189	Feb 76.7465	Mar 76.3814	Apr 74.6669	May 74.3461	Jun 72.8527	Jul 72.8527	Aug 72.5762	Sep 73.4279	Oct 74.3461	Nov 74.9950	Dec 75.6735	(38)
Heat transfer coeff	133.6684	133.2960	132.9310	131.2164	130.8956	129.4022	129.4022	129.1257	129.9774	130.8956	131.5445	132.2230	(39)
Average = Sum(39)m / 12 =												131.2148	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9570	0.9543	0.9517	0.9394	0.9371	0.9264	0.9264	0.9244	0.9305	0.9371	0.9418	0.9466	(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												2.9165	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	31.5670	31.0982	30.4380	29.2207	28.3093	27.2986	26.7526	27.4082	28.1220	29.2035	30.4458	31.4603	(42b)
Hot water usage for other uses	44.4976	42.8795	41.2614	39.6433	38.0252	36.4071	36.4071	38.0252	39.6433	41.2614	42.8795	44.4976	(42c)
Average daily hot water use (litres/day)												69.7200	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	76.0646	73.9777	71.6994	68.8641	66.3345	63.7057	63.1598	65.4334	67.7653	70.4649	73.3253	75.9579	(44)
Energy content (annual)	120.4677	105.3433	110.1993	94.2714	89.2990	78.3336	76.3863	81.0203	83.5614	95.6202	104.4654	118.9317	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	102.3976	89.5418	93.6694	80.1307	75.9041	66.5836	64.9283	68.8672	71.0272	81.2772	88.7956	101.0919	(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)

Full SAP Calculation Printout



Output from w/h	102.3976	89.5418	93.6694	80.1307	75.9041	66.5836	64.9283	68.8672	71.0272	81.2772	88.7956	101.0919 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											984.2147 (64)
Electric shower(s)	58.5565	52.1744	56.9724	54.3681	55.3883	52.8350	54.5962	55.3883	54.3681	56.9724	55.9011	58.5565 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											666.0772 (64a)
Heat gains from water heating, kWh/month	40.2385	35.4290	37.6605	33.6247	32.8231	29.8546	29.8811	31.0639	31.3488	34.5624	36.1742	39.9121 (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)
(66)m	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	145.8237	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	155.8792	172.5805	155.8792	161.0752	155.8792	161.0752	155.8792	155.8792	161.0752	155.8792	161.0752	155.8792	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.0479	312.2549	304.1735	286.9691	265.2517	244.8403	231.2043	227.9974	236.0788	253.2832	275.0006	295.4119	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	37.5824	(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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	(71)
Water heating gains (Table 5)	54.0840	52.7218	50.6189	46.7010	44.1171	41.4648	40.1628	41.7525	43.5400	46.4548	50.2419	53.6453	(72)
Total internal gains	585.7583	604.3043	577.4186	561.4923	531.9950	514.1274	493.9934	492.3762	507.4411	522.3643	553.0648	571.6835	(73)

6. Solar gains

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

South				13.4200	46.7521	0.6300		0.7000	0.7700	191.7455 (78)		
West				21.4700	19.6403	0.6300		0.7000	0.7700	128.8698 (80)		

Solar gains	320.6153	566.1264	815.1855	1057.6041	1213.1828	1213.0220	1166.1904	1051.4233	900.7229	637.8444	387.9693	271.6620 (83)
Total gains	906.3735	1170.4306	1392.6041	1619.0964	1745.1779	1727.1494	1660.1838	1543.7995	1408.1640	1160.2087	941.0340	843.3455 (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, n _{l,m} (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	29.0271	29.1082	29.1881	29.5695	29.6419	29.9840	29.9840	30.0482	29.8513	29.6419	29.4957	29.3444
alpha	2.9351	2.9405	2.9459	2.9713	2.9761	2.9989	2.9989	3.0032	2.9901	2.9761	2.9664	2.9563
util living area	0.9566	0.9158	0.8526	0.7408	0.6027	0.4504	0.3337	0.3710	0.5650	0.8048	0.9271	0.9638 (86)
MIT	18.8640	19.3177	19.8397	20.3886	20.7390	20.9205	20.9758	20.9664	20.8400	20.3261	19.4957	18.7878 (87)
Th 2	20.1194	20.1216	20.1238	20.1341	20.1361	20.1451	20.1451	20.1468	20.1416	20.1361	20.1322	20.1281 (88)
util rest of house	0.9507	0.9052	0.8349	0.7121	0.5617	0.3975	0.2721	0.3067	0.5100	0.7752	0.9161	0.9588 (89)
MIT 2	18.1592	18.6033	19.1074	19.6284	19.9407	20.0960	20.1339	20.1305	20.0356	19.5862	18.7912	18.0903 (90)
Living area fraction	f _{LA} = Living area / (4) = 0.4933 (91)											
MIT	18.5069	18.9558	19.4687	20.0034	20.3345	20.5028	20.5492	20.5429	20.4324	19.9512	19.1388	18.4344 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.5069	18.9558	19.4687	20.0034	20.3345	20.5028	20.5492	20.5429	20.4324	19.9512	19.1388	18.4344 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9369	0.8884	0.8200	0.7075	0.5715	0.4200	0.3015	0.3370	0.5293	0.7682	0.9008	0.9463 (94)
Useful gains	849.2182	1039.8534	1141.8686	1145.4511	997.2885	725.4813	500.6166	520.2452	745.2919	891.2418	847.6510	798.0851 (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												
	1899.0131	1873.5764	1723.9393	1456.9490	1130.2236	763.8319	511.0407	534.9523	823.0752	1224.0340	1583.6366	1882.1135 (97)
Space heating kWh					98.9038	0.0000	0.0000	0.0000	0.0000	247.5974	529.9096	806.5171 (98a)
Space heating requirement - total per year (kWh/year)	781.0474	560.2618	433.0606	224.2785								3681.5762
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												
	781.0474	560.2618	433.0606	224.2785	98.9038	0.0000	0.0000	0.0000	0.0000	247.5974	529.9096	806.5171 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3681.5762
Space heating per m2											(98c) / (4) =	26.3572 (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	0.0000	0.0000	0.0000	0.0000	0.0000	1216.3810	957.5765	981.3552	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8926	0.9302	0.9136	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1085.7017	890.7037	896.5362	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1952.0997	1876.8056	1743.8842	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	623.8066	733.6598	630.4269	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	155.9516	183.4149	157.6067	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												496.9733 (107)
Energy for space heating												26.3572 (99)
Energy for space cooling												3.5579 (108)
Total												29.9152 (109)
Fabric Energy Efficiency (TFEE)												29.9 (109)

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

1. Overall dwelling characteristics

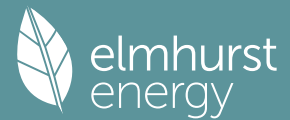
	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	139.6800 (1b)	2.9300 (2b)	409.2624 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		409.2624 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 409.2624 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (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) = 0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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)												80.1000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (25)

Full SAP Calculation Printout



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						
Glazed (Uw = 0.64)			38.6400	0.6240	24.1123		(27)						
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)						
Total net area of external elements Aum(A, m2)			84.0000				(31)						
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.1427		(33)						
Party Floor 1			139.6800				(32d)						
Party Ceiling 1			139.6800				(32b)						
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000 (35)						
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				0.0000	0.0500	0.0000							
E4 Jamb				0.0000	0.0500	0.0000							
E7 Party floor between dwellings (in blocks of flats)				51.6100	0.0000	0.0000							
E23 Balcony within or between dwellings, balcony support penetrates wall insulation				5.1500	0.0000	0.0000							
E16 Corner (normal)				5.8600	0.0900	0.5274							
E18 Party wall between dwellings				5.8600	0.0000	0.0000							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							0.5274 (36)						
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	53.6701 (37)						
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 35.3933	Feb 34.9628	Mar 34.5323	Apr 32.3798	May 31.9493	Jun 29.7969	Jul 29.7969	Aug 29.3664	Sep 30.6578	Oct 31.9493	Nov 32.8103	Dec 33.6713	(38)
Heat transfer coeff	89.0634	88.6329	88.2024	86.0499	85.6194	83.4670	83.4670	83.0365	84.3280	85.6194	86.4804	87.3414	(39)
Average = Sum(39)m / 12 =												85.9423	
HLP	Jan 0.6376	Feb 0.6345	Mar 0.6315	Apr 0.6161	May 0.6130	Jun 0.5976	Jul 0.5976	Aug 0.5945	Sep 0.6037	Oct 0.6130	Nov 0.6191	Dec 0.6253	(40)
HLP (average)												0.6153	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

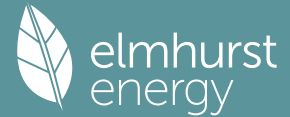
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9165 (42)
Hot water usage for mixer showers													
73.1195	72.0207	70.4194	67.3558	65.0949	62.5735	61.1404	62.7295	64.4715	67.1786	70.3081	72.8394	72.8394	(42a)
Hot water usage for baths													
33.2284	32.7349	32.0400	30.7587	29.7992	28.7353	28.1607	28.8508	29.6021	30.7405	32.0482	33.1161	33.1161	(42b)
Hot water usage for other uses													
46.8396	45.1363	43.4331	41.7298	40.0266	38.3233	38.3233	40.0266	41.7298	43.4331	45.1363	46.8396	46.8396	(42c)
Average daily hot water use (litres/day)												140.8032	(43)
Daily hot water use	Jan 153.1875	Feb 149.8919	Mar 145.8925	Apr 139.8442	May 134.9206	Jun 129.6321	Jul 127.6244	Aug 131.6068	Sep 135.8034	Oct 141.3522	Nov 147.4926	Dec 152.7950	(44)
Energy conte	242.6116	213.4441	224.2313	191.4398	181.6291	159.3978	154.3506	162.9567	167.4592	191.8136	210.1303	239.2401	(45)
Energy content (annual)										Total =	Sum(45)m =	2338.7043	
Distribution loss (46)m = 0.15 x (45)m													
36.3917	32.0166	33.6347	28.7160	27.2444	23.9097	23.1526	24.4435	25.1189	28.7720	31.5195	35.8860	35.8860	(46)
Water storage loss:													
Store volume												110.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												1.0294	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.0327	(55)
Total storage loss													
32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	(56)
If cylinder contains dedicated solar storage													
32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	(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													
297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169	294.5169	(62)
WVHRS	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	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169	(64)
Total per year (kWh/year) = Sum(64)m =												2989.5440	(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	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													
124.8898	110.9121	118.7784	106.4487	104.6131	95.7947	95.5430	98.4046	98.4751	107.9995	112.6633	123.7688	123.7688	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 174.9884	Feb 174.9884	Mar 174.9884	Apr 174.9884	May 174.9884	Jun 174.9884	Jul 174.9884	Aug 174.9884	Sep 174.9884	Oct 174.9884	Nov 174.9884	Dec 174.9884	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

Full SAP Calculation Printout



Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	38.2425	33.9666	27.6235	20.9128	15.6325	13.1977	14.2605	18.5364	24.8795	31.5902	36.8705	39.3054 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	461.2656	466.0520	453.9902	428.3121	395.8980	365.4334	345.0811	340.2946	352.3564	378.0346	410.4486	440.9133 (68)
Pumps, fans	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153 (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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589 (71)
Total internal gains	167.8626	165.0478	159.6483	147.8454	140.6090	133.0482	128.4180	132.2642	136.7710	145.1606	156.4768	166.3559 (72)
	781.1154	778.8112	755.0069	710.8150	665.8844	625.4240	601.5045	604.8400	627.7517	668.5302	717.5407	760.3193 (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			
South				14.8500	46.7521		0.5000	1.0000		0.7700		240.5639 (78)			
West				23.7900	19.6403		0.5000	1.0000		0.7700		161.8993 (80)			
Solar gains				402.4632	710.6911	1023.4381	1327.9003	1523.3218	1523.1499	1464.3329	1320.1727	1130.8686	800.7486	487.0197	341.0075 (83)
Total gains				1183.5787	1489.5024	1778.4450	2038.7154	2189.2061	2148.5739	2065.8373	1925.0126	1758.6203	1469.2788	1204.5603	1101.3268 (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	43.5645	43.7761	43.9897	45.0901	45.3168	46.4854	46.4854	46.7264	46.0108	45.3168	44.8656	44.4234
alpha	3.9043	3.9184	3.9326	4.0060	4.0211	4.0990	4.0990	4.1151	4.0674	4.0211	3.9910	3.9616
util living area	0.8758	0.7793	0.6504	0.4932	0.3597	0.2480	0.1777	0.1982	0.3284	0.5714	0.7988	0.8946 (86)
MIT	20.1998	20.5267	20.7824	20.9359	20.9843	20.9976	20.9995	20.9993	20.9922	20.9086	20.5709	20.1397 (87)
Th 2	20.3963	20.3990	20.4018	20.4156	20.4183	20.4322	20.4322	20.4350	20.4267	20.4183	20.4128	20.4073 (88)
util rest of house	0.8646	0.7633	0.6304	0.4718	0.3380	0.2262	0.1548	0.1739	0.3017	0.5445	0.7812	0.8847 (89)
MIT 2	19.4617	19.8588	20.1620	20.3487	20.4033	20.4302	20.4319	20.4345	20.4199	20.3250	19.9300	19.3970 (90)
Living area fraction	19.8258	20.1883	20.4681	20.6384	20.6900	20.7101	20.7119	20.7131	20.7022	20.6129	20.2462	19.7634 (92)
MIT	19.8258	20.1883	20.4681	20.6384	20.6900	20.7101	20.7119	20.7131	20.7022	20.6129	20.2462	19.7634 (93)
Temperature adjustment												0.0000
adjusted MIT	19.8258	20.1883	20.4681	20.6384	20.6900	20.7101	20.7119	20.7131	20.7022	20.6129	20.2462	19.7634 (93)

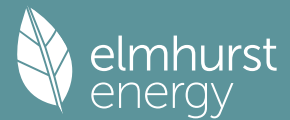
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8529	0.7574	0.6327	0.4800	0.3482	0.2369	0.1660	0.1859	0.3146	0.5536	0.7759	0.8728 (94)
Ext temp.	1009.5198	1128.1220	1125.1840	978.5732	762.2152	508.9220	343.0287	357.8593	553.2057	813.4491	934.5983	961.2136 (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	1382.7826	1355.0485	1232.0170	1010.0906	769.7150	509.9934	343.2113	358.1471	556.7533	857.3019	1136.8858	1359.3328 (97)
Space heating requirement - total per year (kWh/year)	277.7075	152.4946	79.4838	22.6926	5.5799	0.0000	0.0000	0.0000	0.0000	32.6265	145.6470	296.2008 (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)
Space heating contribution - total per year (kWh/year)	277.7075	152.4946	79.4838	22.6926	5.5799	0.0000	0.0000	0.0000	0.0000	32.6265	145.6470	296.2008 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1012.4325
Space heating per m2										(98c) / (4) =		7.2482 (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	784.5897	617.6557	631.0773	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9932	0.9967	0.9954	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.2188	615.6336	628.1874	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2405.7291	2313.0624	2147.8989	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1171.0875	1262.8870	1130.6653	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.8970 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												

Full SAP Calculation Printout



0.0000	0.0000	0.0000	0.0000	0.0000	262.6102	283.1957	253.5457	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement											799.3516 (107)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)											0.0000 (301)
Fraction of space heat from community system											1.0000 (302)
Fraction of heat from community Waste Heat-Space and Water											0.9500 (303a)
Fraction of heat from community Boilers-Space and Water											0.0500 (303b)
Factor for control and charging method (Table 4c(3)) for space heating											1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating											1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system											1.5000 (306)
Efficiency of secondary/supplementary heating system, %											0.0000 (208)
Space heating:											
Space heating requirement											
277.7075	152.4946	79.4838	22.6926	5.5799	0.0000	0.0000	0.0000	0.0000	32.6265	145.6470	296.2008 (98)
Space heat from Waste Heat = (98) x 0.95 x 1.00 x 1.50											
307a	395.7332	217.3048	113.2644	32.3369	7.9513	0.0000	0.0000	0.0000	46.4927	207.5470	422.0861
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.50											
307b	20.8281	11.4371	5.9613	1.7019	0.4185	0.0000	0.0000	0.0000	2.4470	10.9235	22.2151
Space heating requirement											
416.5612	228.7419	119.2257	34.0388	8.3698	0.0000	0.0000	0.0000	0.0000	48.9397	218.4705	444.3011 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)											0.0000 (308)
Space heating fuel for secondary/supplementary system											
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)

Water heating

Annual water heating requirement											
297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)
Water heat from Waste Heat = (64) x 0.95 x 1.00 x 1.50											
310a	424.4910	375.3045	398.2991	349.0302	337.5909	303.3704	298.7191	310.9828	314.8578	352.1038	419.6866
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.50											
310b	22.3416	19.7529	20.9631	18.3700	17.7679	15.9669	15.7221	16.3675	16.5715	18.5318	22.0888
Water heating fuel											
446.8326	395.0573	419.2622	367.4002	355.3589	319.3373	314.4411	327.3503	331.4293	370.6356	395.4360	441.7754 (310)
Cooling System Energy Efficiency Ratio											4.6000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	57.0892	61.5643	55.1186	0.0000	0.0000	0.0000 (315)
Pumps and Fa	36.8087	33.2465	36.8087	35.6213	36.8087	35.6213	36.8087	36.8087	35.6213	36.8087	36.8087 (331)
Lighting	33.4734	26.8536	24.1787	17.7144	13.6831	11.1792	12.4822	16.2248	21.0744	27.6507	31.2315 (332)
Electricity generated by PVs (Appendix M) (negative quantity)											
(333a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)											
(334a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)											
(335a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)											
(333b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)											
(334b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)											
(335b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)
Annual totals kWh/year											
Space heating fuel - community heating											1518.6488 (307)
Space heating fuel - secondary											0.0000 (309)
Water heating fuel - community heating											4484.3160 (310)
Efficiency of water heater											0.0000 (311)
Electricity used for heat distribution											15.1865 (313)
Space cooling fuel											173.7721 (321)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8680)											
mechanical ventilation fans (SFP = 0.8680)											433.3925 (330a)
Total electricity for the above, kWh/year											433.3925 (331)
Electricity for lighting (calculated in Appendix L)											270.1496 (332)

Energy saving/generation technologies (Appendices M ,N and Q)

PV generation											0.0000 (333)
Wind generation											0.0000 (334)
Hydro-electric generation (Appendix N)											0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)											0.0000 (335)
Appendix Q - special features											
Energy saved or generated											-0.0000 (336)
Energy used											0.0000 (337)
Total delivered energy for all uses											6880.2791 (338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Waste Heat	1442.7164	3.1100	44.8685 (340a)
Space heating from Boilers	75.9324	4.4400	3.3714 (340b)
Space heating total			48.2399 (340)
Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Waste Heat	4260.1002	3.1100	132.4891 (342a)
Water heating from Boilers	224.2158	4.4400	9.9552 (342b)
Water heating total			142.4443 (342)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (347a)
Space cooling	173.7721	16.4900	28.6550 (348)

Full SAP Calculation Printout



Pumps, fans and electric keep-hot	433.3925	16.4900	71.4664 (349)
Energy for lighting	270.1496	16.4900	44.5477 (350)
Additional standing charges			92.0000 (351)
Total energy cost			427.3533 (355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):		0.3600 (356)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8330 (357)
SAP value		86.4963
SAP rating (Section 12)		86 (358)
SAP band		B

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Waste Heat			100.0000 (367)
Space and Water heating from Waste Heat	5702.8166	0.0150	21.6407 (367)
Efficiency of heat source Boilers			85.0000 (367)
Space and Water heating from Boilers	353.1156	0.2100	18.7598 (368)
Electrical energy for heat distribution (space & water)	15.1865	0.0000	8.7286 (372)
Overall CO2 factor for heat network			0.0281 (386)
Total CO2 associated with community systems			168.4251 (373)
Space and water heating			168.4251 (376)
Space cooling	173.7721	0.1143	19.8576 (377)
Pumps, fans and electric keep-hot	433.3925	0.1387	60.1169 (378)
Energy for lighting	270.1496	0.1443	38.9909 (379)
Total CO2, kg/year			287.3906 (383)
CO2 emissions per m2			2.0600 (384)
EI value			97.9148 (384a)
EI rating			98 (385)
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	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	409.2624 (5)

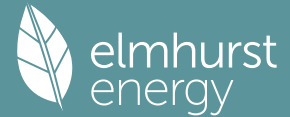
2. Ventilation rate

	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		3.0000 (17)	
Infiltration rate		0.1500 (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) =	0.1275 (21)	

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

Full SAP Calculation Printout



Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infiltr rate	0.1339	0.1275	0.1275	0.1179	0.1179	0.1052	0.1084	0.1020	0.1052	0.1116	0.1116	0.1211 (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) =												80.1000 (23c)
Effective ac	0.2334	0.2270	0.2270	0.2174	0.2174	0.2047	0.2079	0.2015	0.2047	0.2111	0.2111	0.2206 (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
Glazed (Uw = 0.64)			38.6400	0.6240	24.1123		(27)
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)
Total net area of external elements Aum(A, m2)			84.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	53.1427	(33)
Party Floor 1			139.6800				(32d)
Party Ceiling 1			139.6800				(32b)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	0.0000	0.0500	0.0000
E7 Party floor between dwellings (in blocks of flats)	51.6100	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.1500	0.0000	0.0000
E16 Corner (normal)	5.8600	0.0900	0.5274
E18 Party wall between dwellings	5.8600	0.0000	0.0000

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

0.5274 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 53.6701 (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	31.5188	30.6578	30.6578	29.3664	29.3664	27.6444	28.0749	27.2139	27.6444	28.5054	28.5054	29.7969 (38)
Heat transfer coeff	85.1890	84.3280	84.3280	83.0365	83.0365	81.3145	81.7450	80.8840	81.3145	82.1755	82.1755	83.4670 (39)
Average = Sum(39)m / 12 =												82.7495

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6099	0.6037	0.6037	0.5945	0.5945	0.5821	0.5852	0.5791	0.5821	0.5883	0.5883	0.5976 (40)
HLP (average)												0.5924
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9165 (42)
Hot water usage for mixer showers												
	73.1195	72.0207	70.4194	67.3558	65.0949	62.5735	61.1404	62.7295	64.4715	67.1786	70.3081	72.8394 (42a)
Hot water usage for baths												
	33.2284	32.7349	32.0400	30.7587	29.7992	28.7353	28.1607	28.8508	29.6021	30.7405	32.0482	33.1161 (42b)
Hot water usage for other uses												
	46.8396	45.1363	43.4331	41.7298	40.0266	38.3233	38.3233	40.0266	41.7298	43.4331	45.1363	46.8396 (42c)
Average daily hot water use (litres/day)												140.8032 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.1875	149.8919	145.8925	139.8442	134.9206	129.6321	127.6244	131.6068	135.8034	141.3522	147.4926	152.7950 (44)
Energy conte	242.6116	213.4441	224.2313	191.4398	181.6291	159.3978	154.3506	162.9567	167.4592	191.8136	210.1303	239.2401 (45)
Energy content (annual)										Total = Sum(45)m =		2338.7043

Distribution loss (46)m = 0.15 x (45)m	36.3917	32.0166	33.6347	28.7160	27.2444	23.9097	23.1526	24.4435	25.1189	28.7720	31.5195	35.8860 (46)
--	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--------------

Water storage loss:

Store volume 110.0000 (47)

b) If manufacturer declared loss factor is not known :

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0152 (51)

Volume factor from Table 2a 1.0294 (52)

Temperature factor from Table 2b 0.6000 (53)

Enter (49) or (54) in (55) 1.0327 (55)

Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
--------------------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	---------	--------------

If cylinder contains dedicated solar storage

32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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

297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (62)
----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

WVHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------------

PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------------

Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
-------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------------

FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
-------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------------

Output from w/h	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)
-----------------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	----------	---------------

Total per year (kWh/year) = Sum(64)m = 2989.5440 (64)

Full SAP Calculation Printout



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	124.8898	110.9121	118.7784	106.4487	104.6131	95.7947	95.5430	98.4046	98.4751	107.9995	112.6633	123.7688 (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	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.2425	33.9666	27.6235	20.9128	15.6325	13.1977	14.2605	18.5364	24.8795	31.5902	36.8705	39.3054	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	461.2656	466.0520	453.9902	428.3121	395.8980	365.4334	345.0811	340.2946	352.3564	378.0346	410.4486	440.9133	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	(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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	(71)
Water heating gains (Table 5)	167.8626	165.0478	159.6483	147.8454	140.6090	133.0482	128.4180	132.2642	136.7710	145.1606	156.4768	166.3559	(72)
Total internal gains	781.1154	778.8112	755.0069	710.8150	665.8844	625.4240	601.5045	604.8400	627.7517	668.5302	717.5407	760.3193	(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			
South				14.8500	50.9848	0.5000	1.0000	0.7700	262.3437 (78)			
West				23.7900	22.3313	0.5000	1.0000	0.7700	184.0823 (80)			
Solar gains	446.4260	709.5055	1010.3811	1354.4531	1518.0261	1626.7139	1545.9971	1421.8151	1211.1920	853.7705	553.4522	374.6077 (83)
Total gains	1227.5414	1488.3168	1765.3880	2065.2681	2183.9105	2252.1379	2147.5016	2026.6550	1838.9436	1522.3006	1270.9928	1134.9270 (84)

7. Mean internal temperature (heating season)

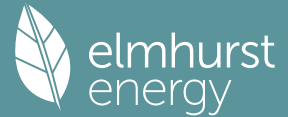
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, n _{l,m} (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.5458	46.0108	46.0108	46.7264	46.7264	47.7160	47.4647	47.9699	47.7160	47.2160	47.2160	46.4854	
alpha	4.0364	4.0674	4.0674	4.1151	4.1151	4.1811	4.1643	4.1980	4.1811	4.1477	4.1477	4.0990	
util living area	0.8388	0.7445	0.6053	0.4372	0.3026	0.1804	0.1180	0.1277	0.2558	0.4920	0.7302	0.8612 (86)	
MIT	20.4166	20.6568	20.8590	20.9661	20.9937	20.9995	20.9999	20.9999	20.9978	20.9573	20.7459	20.3687 (87)	
Th 2	20.4211	20.4267	20.4267	20.4350	20.4350	20.4461	20.4433	20.4489	20.4461	20.4405	20.4405	20.4322 (88)	
util rest of house	0.8252	0.7273	0.5847	0.4164	0.2816	0.1605	0.0968	0.1057	0.2316	0.4654	0.7097	0.8489 (89)	
MIT 2	19.7477	20.0389	20.2736	20.4004	20.4293	20.4458	20.4433	20.4488	20.4444	20.3985	20.1607	19.6995 (90)	
Living area fraction	0.0777	0.0343	0.0524	0.0795	0.1078	0.1190	0.1179	0.1207	0.1174	0.1242	0.1494	0.1933 (91)	
MIT	20.0777	20.3437	20.5624	20.6795	20.7078	20.7190	20.7179	20.7207	20.7174	20.6742	20.4494	20.0296 (92)	
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
adjusted MIT	20.0777	20.3437	20.5624	20.6795	20.7078	20.7190	20.7179	20.7207	20.7174	20.6742	20.4494	20.0296 (93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.8166	0.7247	0.5897	0.4254	0.2917	0.1703	0.1073	0.1166	0.2435	0.4766	0.7100	0.8395 (94)	
Ext temp.	1002.4453	1078.6504	1040.9751	878.6107	637.1222	383.5248	230.3311	236.2140	447.7160	725.4551	902.4476	952.8173 (95)	
Heat loss rate W	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)	
Space heating kWh	1275.9347	1243.3092	1109.9570	895.0919	640.0255	383.7195	230.3499	236.2392	448.6475	745.6778	1023.0361	1246.1318 (97)	
Space heating requirement - total per year (kWh/year)	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260 (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)	
Space heating contribution - total per year (kWh/year)	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	699.5712	
Space heating per m ²	(98c) / (4) =												5.0084 (99)

8c. Space cooling requirement

Full SAP Calculation Printout



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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000
Heat loss rate W												
	0.0000	0.0000	0.0000	0.0000	0.0000	650.5162	498.6446	501.4810	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9974	0.9989	0.9986	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	648.8549	498.0836	500.7867	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2526.7779	2408.5141	2266.7017	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	1352.1046	1421.3603	1313.8408	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.8970 (105)
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	303.2023	318.7325	294.6218	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												916.5566 (107)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Waste Heat-Space and Water												0.9500 (303a)
Fraction of heat from community Boilers-Space and Water												0.0500 (303b)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement												
	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260 (98)
Space heat from Waste Heat = (98) x 0.95 x 1.00 x 1.50												
307a	289.9535	157.6773	73.1346	16.9097	3.0781	0.0000	0.0000	0.0000	0.0000	21.4400	123.7238	310.9720
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.50												
307b	15.2607	8.2988	3.8492	0.8900	0.1620	0.0000	0.0000	0.0000	0.0000	1.1284	6.5118	16.3669
Space heating requirement												
	305.2142	165.9761	76.9838	17.7997	3.2401	0.0000	0.0000	0.0000	0.0000	22.5685	130.2355	327.3389 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement												
	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)
Water heat from Waste Heat = (64) x 0.95 x 1.00 x 1.50												
310a	424.4910	375.3045	398.2991	349.0302	337.5909	303.3704	298.7191	310.9828	314.8578	352.1038	375.6642	419.6866
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.50												
310b	22.3416	19.7529	20.9631	18.3700	17.7679	15.9669	15.7221	16.3675	16.5715	18.5318	19.7718	22.0888
Water heating fuel												
	446.8326	395.0573	419.2622	367.4002	355.3589	319.3373	314.4411	327.3503	331.4293	370.6356	395.4360	441.7754 (310)
Cooling System Energy Efficiency Ratio												4.6000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	65.9135	69.2897	64.0482	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	36.8087	33.2465	36.8087	35.6213	36.8087	35.6213	36.8087	36.8087	35.6213	36.8087	35.6213	36.8087 (331)
Lighting	33.4734	26.8536	24.1787	17.7144	13.6831	11.1792	12.4822	16.2248	21.0744	27.6507	31.2315	34.4037 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)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 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)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 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)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 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)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 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)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 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335b)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 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												1049.3568 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												4484.3160 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												10.4936 (313)
Space cooling fuel												199.2514 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8680)												
mechanical ventilation fans (SFP = 0.8680)												433.3925 (330a)
Total electricity for the above, kWh/year												433.3925 (331)
Electricity for lighting (calculated in Appendix L)												270.1496 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												0.0000 (333)
Wind generation												0.0000 (334)
Hydro-electric generation (Appendix N)												0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (335)
Appendix Q - special features												
Energy saved or generated												-0.0000 (336)
Energy used												0.0000 (337)
Total delivered energy for all uses												6436.4664 (338)

Full SAP Calculation Printout



10b. Fuel costs - using BEDF prices (522)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Waste Heat	996.8890	4.1000	40.8724 (340a)
Space heating from Boilers	52.4678	4.8000	2.5185 (340b)
Space heating total			43.3909 (340)
Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Waste Heat	4260.1002	4.1000	174.6641 (342a)
Water heating from Boilers	224.2158	4.8000	10.7624 (342b)
Water heating total			185.4265 (342)
Energy for instantaneous electric shower(s)	0.0000	21.5100	0.0000 (347a)
Space cooling	199.2514	21.5100	42.8590 (348)
Pumps, fans and electric keep-hot	433.3925	21.5100	93.2227 (349)
Energy for lighting	270.1496	21.5100	58.1092 (350)
Additional standing charges			98.0000 (351)
Total energy cost			521.0083 (355)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Waste Heat			100.0000 (367)
Space and Water heating from Waste Heat	5256.9892	0.0150	14.9533 (367)
Efficiency of heat source Boilers			85.0000 (367)
Space and Water heating from Boilers	325.5102	0.2100	12.9626 (368)
Electrical energy for heat distribution (space & water)	10.4936	0.0000	7.9923 (372)
Overall CO2 factor for heat network			0.0280 (386)
Total CO2 associated with community systems			155.2043 (373)
Space and water heating			155.2043 (376)
Space cooling	199.2514	0.1143	22.7742 (377)
Pumps, fans and electric keep-hot	433.3925	0.1387	60.1169 (378)
Energy for lighting	270.1496	0.1443	38.9909 (379)
Total CO2, kg/year			277.0863 (383)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Waste Heat			100.0000 (467a)
Space and Water heating from Waste Heat	5256.9892	0.0630	62.8040 (467)
Efficiency of heat source Boilers			85.0000 (467b)
Space and Water heating from Boilers	325.5102	1.1300	69.7514 (468)
Electrical energy for heat distribution (space & water)	10.4936	0.0000	84.8956 (472)
Overall CO2 factor for heat network			0.1417 (486)
Total CO2 associated with community systems			783.9124 (473)
Space and water heating			783.9124 (476)
Space cooling	199.2514	1.4212	283.1800 (477)
Pumps, fans and electric keep-hot	433.3925	1.5128	655.6362 (478)
Energy for lighting	270.1496	1.5338	414.3645 (479)
Total Primary energy kWh/year			2137.0931 (483)

SAP 10 EPC IMPROVEMENTS

V1 THFC-L20-03 DHN PlanA

Current energy efficiency rating: B 86
Current environmental impact rating: A 98

N Solar water heating Not applicable
U Solar photovoltaic panels Not applicable
V2 Wind turbine Not applicable

Recommended measures: SAP change Cost change CO2 change
(none)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: B 86
Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 522 TEST (30 Jun 2023)
Recommendation texts revision number 6.1 (11 Jun 2019)

Full SAP Calculation Printout



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

	Current	Potential	Saving
Electricity	£194	£194	£0
Community scheme	£327	£327	£0
Space heating	£235	£235	£0
Space cooling	£43	£43	£0
Water heating	£185	£185	£0
Lighting	£58	£58	£0
Total cost of fuels	£521	£521	£0
Total cost of uses	£521	£521	£0
Delivered energy	46 kWh/m ²	46 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m ²	2 kg/m ²	2 kg/m ²	0 kg/m ²
Primary energy	15 kWh/m ²	15 kWh/m ²	0 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	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	409.2624 (5)

2. Ventilation rate

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

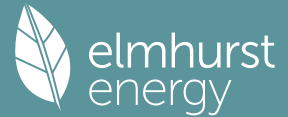
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000 (17)	
Infiltration rate	0.1500 (18)	
Number of sides sheltered	2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (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) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (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
Glazed (Uw = 0.64)			38.6400	0.6240	24.1123		(27)
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)
Total net area of external elements Aum(A, m ²)			84.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 53.1427		(33)

Full SAP Calculation Printout



Party Floor 1 139.6800 (32d)
Party Ceiling 1 139.6800 (32b)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	0.0000	0.0500	0.0000
E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	0.0000	0.0500	0.0000
E7 Party floor between dwellings (in blocks of flats)	51.6100	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.1500	0.0000	0.0000
E16 Corner (normal)	5.8600	0.0900	0.5274
E18 Party wall between dwellings	5.8600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.5274 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 53.6701 (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	35.3933	34.9628	34.5323	32.3798	31.9493	29.7969	29.7969	29.3664	30.6578	31.9493	32.8103	33.6713 (38)
Heat transfer coeff	89.0634	88.6329	88.2024	86.0499	85.6194	83.4670	83.4670	83.0365	84.3280	85.6194	86.4804	87.3414 (39)
Average = Sum(39)m / 12 =												85.9423
HLP	0.6376	0.6345	0.6315	0.6161	0.6130	0.5976	0.5976	0.5945	0.6037	0.6130	0.6191	0.6253 (40)
HLP (average)												0.6153
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9165 (42)
Hot water usage for mixer showers												
73.1195	72.0207	70.4194	67.3558	65.0949	62.5735	61.1404	62.7295	64.4715	67.1786	70.3081	72.8394 (42a)	
Hot water usage for baths												
33.2284	32.7349	32.0400	30.7587	29.7992	28.7353	28.1607	28.8508	29.6021	30.7405	32.0482	33.1161 (42b)	
Hot water usage for other uses												
46.8396	45.1363	43.4331	41.7298	40.0266	38.3233	38.3233	40.0266	41.7298	43.4331	45.1363	46.8396 (42c)	
Average daily hot water use (litres/day)												140.8032 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
153.1875	149.8919	145.8925	139.8442	134.9206	129.6321	127.6244	131.6068	135.8034	141.3522	147.4926	152.7950 (44)	
Energy conte	242.6116	213.4441	224.2313	191.4398	181.6291	159.3978	154.3506	162.9567	167.4592	191.8136	210.1303	239.2401 (45)
Energy content (annual)	Total = Sum(45)m =											2338.7043
Distribution loss (46)m = 0.15 x (45)m												
36.3917	32.0166	33.6347	28.7160	27.2444	23.9097	23.1526	24.4435	25.1189	28.7720	31.5195	35.8860 (46)	
Water storage loss:												
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss												
32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)	
If cylinder contains dedicated solar storage												
32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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 (61)	
Total heat required for water heating calculated for each month												
297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h												
297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)	
Total per year (kWh/year) = Sum(64)m =												2989.5440 (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												
124.8898	110.9121	118.7784	106.4487	104.6131	95.7947	95.5430	98.4046	98.4751	107.9995	112.6633	123.7688 (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	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.2425	33.9666	27.6235	20.9128	15.6325	13.1977	14.2605	18.5364	24.8795	31.5902	36.8705	39.3054 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	461.2656	466.0520	453.9902	428.3121	395.8980	365.4334	345.0811	340.2946	352.3564	378.0346	410.4486	440.9133 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153 (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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589 (71)

Full SAP Calculation Printout



Water heating gains (Table 5)

	167.8626	165.0478	159.6483	147.8454	140.6090	133.0482	128.4180	132.2642	136.7710	145.1606	156.4768	166.3559 (72)
Total internal gains	781.1154	778.8112	755.0069	710.8150	665.8844	625.4240	601.5045	604.8400	627.7517	668.5302	717.5407	760.3193 (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
South	14.8500	46.7521	0.5000	1.0000	0.7700	240.5639 (78)
West	23.7900	19.6403	0.5000	1.0000	0.7700	161.8993 (80)

Solar gains	402.4632	710.6911	1023.4381	1327.9003	1523.3218	1523.1499	1464.3329	1320.1727	1130.8686	800.7486	487.0197	341.0075 (83)
Total gains	1183.5787	1489.5024	1778.4450	2038.7154	2189.2061	2148.5739	2065.8373	1925.0126	1758.6203	1469.2788	1204.5603	1101.3268 (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	43.5645	43.7761	43.9897	45.0901	45.3168	46.4854	46.4854	46.7264	46.0108	45.3168	44.8656	44.4234
alpha	3.9043	3.9184	3.9326	4.0060	4.0211	4.0990	4.0990	4.1151	4.0674	4.0211	3.9910	3.9616
util living area	0.8758	0.7793	0.6504	0.4932	0.3597	0.2480	0.1777	0.1982	0.3284	0.5714	0.7988	0.8946 (86)
MIT	20.1998	20.5267	20.7824	20.9359	20.9843	20.9976	20.9995	20.9993	20.9922	20.9086	20.5709	20.1397 (87)
Th 2	20.3963	20.3990	20.4018	20.4156	20.4183	20.4322	20.4322	20.4350	20.4267	20.4183	20.4128	20.4073 (88)
util rest of house	0.8646	0.7633	0.6304	0.4718	0.3380	0.2262	0.1548	0.1739	0.3017	0.5445	0.7812	0.8847 (89)
MIT 2	19.4617	19.8588	20.1620	20.3487	20.4033	20.4302	20.4319	20.4345	20.4199	20.3250	19.9300	19.3970 (90)
Living area fraction	fLA = Living area / (4) =											0.4933 (91)
MIT	19.8258	20.1883	20.4681	20.6384	20.6900	20.7101	20.7119	20.7131	20.7022	20.6129	20.2462	19.7634 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.8258	20.1883	20.4681	20.6384	20.6900	20.7101	20.7119	20.7131	20.7022	20.6129	20.2462	19.7634 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8529	0.7574	0.6327	0.4800	0.3482	0.2369	0.1660	0.1859	0.3146	0.5536	0.7759	0.8728 (94)
Useful gains	1009.5198	1128.1220	1125.1840	978.5732	762.2152	508.9220	343.0287	357.8593	553.2057	813.4491	934.5983	961.2136 (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	1382.7826	1355.0485	1232.0170	1010.0906	769.7150	509.9934	343.2113	358.1471	556.7533	857.3019	1136.8858	1359.3328 (97)
Space heating kWh	277.7075	152.4946	79.4838	22.6926	5.5799	0.0000	0.0000	0.0000	0.0000	32.6265	145.6470	296.2008 (98a)
Space heating requirement - total per year (kWh/year)	1012.4325											
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	277.7075	152.4946	79.4838	22.6926	5.5799	0.0000	0.0000	0.0000	0.0000	32.6265	145.6470	296.2008 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1012.4325											
Space heating per m2	(98c) / (4) = 7.2482 (99)											

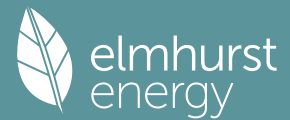
8c. Space cooling requirement

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	784.5897	617.6557	631.0773	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9932	0.9967	0.9954	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.2188	615.6336	628.1874	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2405.7291	2313.0624	2147.8989	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	1171.0875	1262.8870	1130.6653	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fC = cooled area / (4) =											0.8970 (105)
Intermittency factor (Table 10b)												
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	262.6102	283.1957	253.5457	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	799.3516 (107)											

9b. Energy requirements

Full SAP Calculation Printout



Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(301)
Fraction of space heat from community system	1.0000	(302)
Fraction of heat from community Waste Heat-Space and Water	0.9500	(303a)
Fraction of heat from community Boilers-Space and Water	0.0500	(303b)
Factor for control and charging method (Table 4c(3)) for space heating	1.0000	(305)
Factor for charging method (Table 4c(3)) for water heating	1.0000	(305a)
Distribution loss factor (Table 12c) for community heating system	1.5000	(306)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)
Space heating:		
Space heating requirement		
277.7075 152.4946 79.4838 22.6926 5.5799 0.0000 0.0000 0.0000 0.0000 32.6265 145.6470 296.2008	(98)	
Space heat from Waste Heat = (98) x 0.95 x 1.00 x 1.50		
307a 395.7332 217.3048 113.2644 32.3369 7.9513 0.0000 0.0000 0.0000 0.0000 46.4927 207.5470 422.0861		
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.50		
307b 20.8281 11.4371 5.9613 1.7019 0.4185 0.0000 0.0000 0.0000 0.0000 2.4470 10.9235 22.2151		
Space heating requirement		
416.5612 228.7419 119.2257 34.0388 8.3698 0.0000 0.0000 0.0000 0.0000 48.9397 218.4705 444.3011	(307)	
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000	(308)
Space heating fuel for secondary/supplementary system		
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000	(309)	
Water heating		
Annual water heating requirement		
297.8884 263.3715 279.5081 244.9335 236.9059 212.8915 209.6274 218.2335 220.9528 247.0904 263.6240 294.5169	(64)	
Water heat from Waste Heat = (64) x 0.95 x 1.00 x 1.50		
310a 424.4910 375.3045 398.2991 349.0302 337.5909 303.3704 298.7191 310.9828 314.8578 352.1038 375.6642 419.6866		
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.50		
310b 22.3416 19.7529 20.9631 18.3700 17.7679 15.9669 15.7221 16.3675 16.5715 18.5318 19.7718 22.0888		
Water heating fuel		
446.8326 395.0573 419.2622 367.4002 355.3589 319.3373 314.4411 327.3503 331.4293 370.6356 395.4360 441.7754	(310)	
Cooling System Energy Efficiency Ratio		
Space coolin 0.0000 0.0000 0.0000 0.0000 0.0000 57.0892 61.5643 55.1186 0.0000 0.0000 0.0000 4.6000	(314)	
Pumps and Fa 36.8087 33.2465 36.8087 35.6213 36.8087 35.6213 36.8087 36.8087 35.6213 36.8087 35.6213 0.0000	(315)	
Lighting 33.4734 26.8536 24.1787 17.7144 13.6831 11.1792 12.4822 16.2248 21.0744 27.6507 31.2315 34.4037	(332)	
Electricity generated by PVs (Appendix M) (negative quantity)		
(333a)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	(333a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)		
(334a)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	(334a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)		
(335a)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	(335a)	
Electricity generated by PVs (Appendix M) (negative quantity)		
(333b)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	(333b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)		
(334b)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	(334b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)		
(335b)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	(335b)	
Annual totals kWh/year		
Space heating fuel - community heating	1518.6488	(307)
Space heating fuel - secondary	0.0000	(309)
Water heating fuel - community heating	4484.3160	(310)
Efficiency of water heater	0.0000	(311)
Electricity used for heat distribution	15.1865	(313)
Space cooling fuel	173.7721	(321)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8680)		
mechanical ventilation fans (SFP = 0.8680)	433.3925	(330a)
Total electricity for the above, kWh/year	433.3925	(331)
Electricity for lighting (calculated in Appendix L)	270.1496	(332)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	0.0000	(333)
Wind generation	0.0000	(334)
Hydro-electric generation (Appendix N)	0.0000	(335a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(335)
Appendix Q - special features		
Energy saved or generated	-0.0000	(336)
Energy used	0.0000	(337)
Total delivered energy for all uses	6880.2791	(338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Waste Heat	1442.7164	3.1100	44.8685 (340a)
Space heating from Boilers	75.9324	4.4400	3.3714 (340b)
Space heating total			48.2399 (340)
Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Waste Heat	4260.1002	3.1100	132.4891 (342a)
Water heating from Boilers	224.2158	4.4400	9.9552 (342b)
Water heating total			142.4443 (342)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (347a)
Space cooling	173.7721	16.4900	28.6550 (348)
Pumps, fans and electric keep-hot	433.3925	16.4900	71.4664 (349)
Energy for lighting	270.1496	16.4900	44.5477 (350)
Additional standing charges			92.0000 (351)
Total energy cost			427.3533 (355)

Full SAP Calculation Printout



11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):		0.3600 (356)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.8330 (357)
SAP value		86.4963
SAP rating (Section 12)		86 (358)
SAP band		B

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Waste Heat			100.0000 (367)
Space and Water heating from Waste Heat	5702.8166	0.0150	21.6407 (367)
Efficiency of heat source Boilers			85.0000 (367)
Space and Water heating from Boilers	353.1156	0.2100	18.7598 (368)
Electrical energy for heat distribution (space & water)	15.1865	0.0000	8.7286 (372)
Overall CO2 factor for heat network			0.0281 (386)
Total CO2 associated with community systems			168.4251 (373)
Space and water heating			168.4251 (376)
Space cooling	173.7721	0.1143	19.8576 (377)
Pumps, fans and electric keep-hot	433.3925	0.1387	60.1169 (378)
Energy for lighting	270.1496	0.1443	38.9909 (379)
Total CO2, kg/year			287.3906 (383)
CO2 emissions per m2			2.0600 (384)
EI value			97.9148 (384a)
EI rating			98 (385)
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	139.6800 (1b)	x 2.9300 (2b)	= 409.2624 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	139.6800		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	409.2624 (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		3.0000	(17)
Infiltration rate		0.1500	(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) =	0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.1339	0.1275	0.1275	0.1179	0.1179	0.1052	0.1084	0.1020	0.1052	0.1116	0.1116	0.1211 (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) =												80.1000 (23c)

Full SAP Calculation Printout



Effective ac 0.2334 0.2270 0.2270 0.2174 0.2174 0.2047 0.2079 0.2015 0.2047 0.2111 0.2111 0.2206 (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
Glazed (Uw = 0.64)			38.6400	0.6240	24.1123		(27)
Curtain Wall	84.0000	38.6400	45.3600	0.6400	29.0304		(29a)
Total net area of external elements Aum(A, m2)			84.0000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 53.1427		(33)
Party Floor 1			139.6800				(32d)
Party Ceiling 1			139.6800				(32b)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	0.0000	0.0500	0.0000
E4 Jamb	0.0000	0.0500	0.0000
E7 Party floor between dwellings (in blocks of flats)	51.6100	0.0000	0.0000
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.1500	0.0000	0.0000
E16 Corner (normal)	5.8600	0.0900	0.5274
E18 Party wall between dwellings	5.8600	0.0000	0.0000

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

0.5274 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 53.6701 (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	31.5188	30.6578	30.6578	29.3664	29.3664	27.6444	28.0749	27.2139	27.6444	28.5054	28.5054	29.7969
Heat transfer coeff	85.1890	84.3280	84.3280	83.0365	83.0365	81.3145	81.7450	80.8840	81.3145	82.1755	82.1755	83.4670
Average = Sum(39)m / 12 =												82.7495

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.6099	0.6037	0.6037	0.5945	0.5945	0.5821	0.5852	0.5791	0.5821	0.5883	0.5883	0.5976
HLP (average)												0.5924
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9165
Hot water usage for mixer showers												72.8394
Hot water usage for baths												33.1161
Hot water usage for other uses												46.8396
Average daily hot water use (litres/day)												140.8032

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	153.1875	149.8919	145.8925	139.8442	134.9206	129.6321	127.6244	131.6068	135.8034	141.3522	147.4926	152.7950
Energy conte	242.6116	213.4441	224.2313	191.4398	181.6291	159.3978	154.3506	162.9567	167.4592	191.8136	210.1303	239.2401
Energy content (annual)										Total = Sum(45)m =		2338.7043
Distribution loss (46)m = 0.15 x (45)m	36.3917	32.0166	33.6347	28.7160	27.2444	23.9097	23.1526	24.4435	25.1189	28.7720	31.5195	35.8860

Water storage loss:

Store volume 110.0000 (47)

b) If manufacturer declared loss factor is not known :

Hot water storage loss factor from Table 2 (kWh/litre/day)

0.0152 (51)

Volume factor from Table 2a

1.0294 (52)

Temperature factor from Table 2b

0.6000 (53)

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

1.0327 (55)

Total storage loss

32.0144 28.9162 32.0144 30.9817 32.0144 30.9817 32.0144 32.0144 30.9817 32.0144 30.9817 32.0144 (56)

If cylinder contains dedicated solar storage

32.0144 28.9162 32.0144 30.9817 32.0144 30.9817 32.0144 32.0144 30.9817 32.0144 30.9817 32.0144 (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

297.8884 263.3715 279.5081 244.9335 236.9059 212.8915 209.6274 218.2335 220.9528 247.0904 263.6240 294.5169 (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)

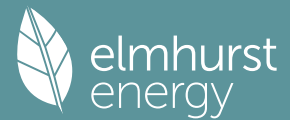
Output from w/h 297.8884 263.3715 279.5081 244.9335 236.9059 212.8915 209.6274 218.2335 220.9528 247.0904 263.6240 294.5169 (64)

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 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 124.8898 110.9121 118.7784 106.4487 104.6131 95.7947 95.5430 98.4046 98.4751 107.9995 112.6633 123.7688 (65)

Full SAP Calculation Printout



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	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	174.9884	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	38.2425	33.9666	27.6235	20.9128	15.6325	13.1977	14.2605	18.5364	24.8795	31.5902	36.8705	39.3054	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	461.2656	466.0520	453.9902	428.3121	395.8980	365.4334	345.0811	340.2946	352.3564	378.0346	410.4486	440.9133	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	55.4153	(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)	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	-116.6589	(71)
Water heating gains (Table 5)	167.8626	165.0478	159.6483	147.8454	140.6090	133.0482	128.4180	132.2642	136.7710	145.1606	156.4768	166.3559	(72)
Total internal gains	781.1154	778.8112	755.0069	710.8150	665.8844	625.4240	601.5045	604.8400	627.7517	668.5302	717.5407	760.3193	(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			
South				14.8500	50.9848	0.5000	1.0000	0.7700	262.3437 (78)			
West				23.7900	22.3313	0.5000	1.0000	0.7700	184.0823 (80)			
Solar gains	446.4260	709.5055	1010.3811	1354.4531	1518.0261	1626.7139	1545.9971	1421.8151	1211.1920	853.7705	553.4522	374.6077 (83)
Total gains	1227.5414	1488.3168	1765.3880	2065.2681	2183.9105	2252.1379	2147.5016	2026.6550	1838.9436	1522.3006	1270.9928	1134.9270 (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, n _{li,m} (see Table 9a)													
tau	45.5458	46.0108	46.0108	46.7264	46.7264	47.7160	47.4647	47.9699	47.7160	47.2160	47.2160	46.4854	
alpha	4.0364	4.0674	4.0674	4.1151	4.1151	4.1811	4.1643	4.1980	4.1811	4.1477	4.1477	4.0990	
util living area	0.8388	0.7445	0.6053	0.4372	0.3026	0.1804	0.1180	0.1277	0.2558	0.4920	0.7302	0.8612	(86)
MIT	20.4166	20.6568	20.8590	20.9661	20.9937	20.9995	20.9999	20.9999	20.9978	20.9573	20.7459	20.3687	(87)
Th 2	20.4211	20.4267	20.4267	20.4350	20.4350	20.4461	20.4433	20.4489	20.4461	20.4405	20.4405	20.4322	(88)
util rest of house	0.8252	0.7273	0.5847	0.4164	0.2816	0.1605	0.0968	0.1057	0.2316	0.4654	0.7097	0.8489	(89)
MIT 2	19.7477	20.0389	20.2736	20.4004	20.4293	20.4458	20.4433	20.4488	20.4444	20.3985	20.1607	19.6995	(90)
Living area fraction									flA = Living area / (4) =			0.4933	(91)
MIT	20.0777	20.3437	20.5624	20.6795	20.7078	20.7190	20.7179	20.7207	20.7174	20.6742	20.4494	20.0296	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0777	20.3437	20.5624	20.6795	20.7078	20.7190	20.7179	20.7207	20.7174	20.6742	20.4494	20.0296	(93)

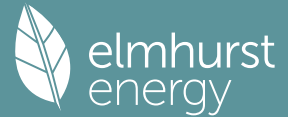
8. Space heating requirement

Utilisation	0.8166	0.7247	0.5897	0.4254	0.2917	0.1703	0.1073	0.1166	0.2435	0.4766	0.7100	0.8395	(94)
Useful gains	1002.4453	1078.6504	1040.9751	878.6107	637.1222	383.5248	230.3311	236.2140	447.7160	725.4551	902.4476	952.8173	(95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	(96)
Heat loss rate W	1275.9347	1243.3092	1109.9570	895.0919	640.0255	383.7195	230.3499	236.2392	448.6475	745.6778	1023.0361	1246.1318	(97)
Space heating kWh	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260	(98a)
Space heating requirement - total per year (kWh/year)												699.5712	
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	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												699.5712	
Space heating per m ²										(98c) / (4) =		5.0084	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	650.5162	498.6446	501.4810	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9974	0.9989	0.9986	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	648.8549	498.0836	500.7867	0.0000	0.0000	0.0000	0.0000	(102)

Full SAP Calculation Printout



Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2526.7779	2408.5141	2266.7017	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	1352.1046	1421.3603	1313.8408	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			0.8970 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	303.2023	318.7325	294.6218	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												916.5566 (107)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Waste Heat-Space and Water												0.9500 (303a)
Fraction of heat from community Boilers-Space and Water												0.0500 (303b)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	203.4761	110.6508	51.3225	11.8665	2.1601	0.0000	0.0000	0.0000	0.0000	15.0456	86.8237	218.2260 (98)
Space heat from Waste Heat = (98) x 0.95 x 1.00 x 1.50												
307a	289.9535	157.6773	73.1346	16.9097	3.0781	0.0000	0.0000	0.0000	0.0000	21.4400	123.7238	310.9720
Space heat from Boilers = (98) x 0.05 x 1.00 x 1.50												
307b	15.2607	8.2988	3.8492	0.8900	0.1620	0.0000	0.0000	0.0000	0.0000	1.1284	6.5118	16.3669
Space heating requirement	305.2142	165.9761	76.9838	17.7997	3.2401	0.0000	0.0000	0.0000	0.0000	22.5685	130.2355	327.3389 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)

Water heating

Annual water heating requirement	297.8884	263.3715	279.5081	244.9335	236.9059	212.8915	209.6274	218.2335	220.9528	247.0904	263.6240	294.5169 (64)
Water heat from Waste Heat = (64) x 0.95 x 1.00 x 1.50												
310a	424.4910	375.3045	398.2991	349.0302	337.5909	303.3704	298.7191	310.9828	314.8578	352.1038	375.6642	419.6866
Water heat from Boilers = (64) x 0.05 x 1.00 x 1.50												
310b	22.3416	19.7529	20.9631	18.3700	17.7679	15.9669	15.7221	16.3675	16.5715	18.5318	19.7718	22.0888
Water heating fuel	446.8326	395.0573	419.2622	367.4002	355.3589	319.3373	314.4411	327.3503	331.4293	370.6356	395.4360	441.7754 (310)
Cooling System Energy Efficiency Ratio												4.6000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	65.9135	69.2897	64.0482	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	36.8087	33.2465	36.8087	35.6213	36.8087	35.6213	36.8087	36.8087	35.6213	36.8087	35.6213	36.8087 (331)
Lighting	33.4734	26.8536	24.1787	17.7144	13.6831	11.1792	12.4822	16.2248	21.0744	27.6507	31.2315	34.4037 (332)
Electricity generated by PVs (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 (333a)
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 (334a)
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 (335a)
Electricity generated by PVs (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 (333b)
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 (334b)
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 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												1049.3568 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												4484.3160 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												10.4936 (313)
Space cooling fuel												199.2514 (321)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8680)												
mechanical ventilation fans (SFP = 0.8680)												433.3925 (330a)
Total electricity for the above, kWh/year												433.3925 (331)
Electricity for lighting (calculated in Appendix L)												270.1496 (332)

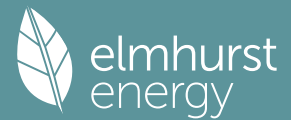
Energy saving/generation technologies (Appendices M ,N and Q)

PV generation												0.0000 (333)
Wind generation												0.0000 (334)
Hydro-electric generation (Appendix N)												0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (335)
Appendix Q - special features												
Energy saved or generated												-0.0000 (336)
Energy used												0.0000 (337)
Total delivered energy for all uses												6436.4664 (338)

10b. Fuel costs - using BEDF prices (522)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Waste Heat	996.8890	4.1000	40.8724 (340a)
Space heating from Boilers	52.4678	4.8000	2.5185 (340b)
Space heating total			43.3909 (340)

Full SAP Calculation Printout



Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Waste Heat	4260.1002	4.1000	174.6641 (342a)
Water heating from Boilers	224.2158	4.8000	10.7624 (342b)
Water heating total			185.4265 (342)
Energy for instantaneous electric shower(s)	0.0000	21.5100	0.0000 (347a)
Space cooling	199.2514	21.5100	42.8590 (348)
Pumps, fans and electric keep-hot	433.3925	21.5100	93.2227 (349)
Energy for lighting	270.1496	21.5100	58.1092 (350)
Additional standing charges			98.0000 (351)
Total energy cost			521.0083 (355)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Waste Heat			100.0000 (367)
Space and Water heating from Waste Heat	5256.9892	0.0150	14.9533 (367)
Efficiency of heat source Boilers			85.0000 (367)
Space and Water heating from Boilers	325.5102	0.2100	12.9626 (368)
Electrical energy for heat distribution (space & water)	10.4936	0.0000	7.9923 (372)
Overall CO2 factor for heat network			0.0280 (386)
Total CO2 associated with community systems			155.2043 (373)
Space and water heating			155.2043 (376)
Space cooling	199.2514	0.1143	22.7742 (377)
Pumps, fans and electric keep-hot	433.3925	0.1387	60.1169 (378)
Energy for lighting	270.1496	0.1443	38.9909 (379)
Total CO2, kg/year			277.0863 (383)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Waste Heat			100.0000 (467a)
Space and Water heating from Waste Heat	5256.9892	0.0630	62.8040 (467)
Efficiency of heat source Boilers			85.0000 (467b)
Space and Water heating from Boilers	325.5102	1.1300	69.7514 (468)
Electrical energy for heat distribution (space & water)	10.4936	0.0000	84.8956 (472)
Overall CO2 factor for heat network			0.1417 (486)
Total CO2 associated with community systems			783.9124 (473)
Space and water heating			783.9124 (476)
Space cooling	199.2514	1.4212	283.1800 (477)
Pumps, fans and electric keep-hot	433.3925	1.5128	655.6362 (478)
Energy for lighting	270.1496	1.5338	414.3645 (479)
Total Primary energy kWh/year			2137.0931 (483)

Summary for Input Data

Property Reference	THFC-L20-03	Issued on Date	24/07/2023
Assessment Reference	V1 THFC-L20-03 DHN PlanA	Prop Type Ref	
Property			

SAP Rating		DER		TER	
Environmental		% DER < TER			
CO ₂ Emissions (t/year)	0	DFEE		TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER		TPER	

Assessor Details	Miss Laura Plazas	Assessor ID	T491-0001
Client			

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

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Urban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	20	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Enter TMP value	
Thermal Mass	100.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
		63.95 m	139.68 m ²	2.93 m

8.0 Living Area	68.91	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
	Curtain Wall	Curtain Walling	Other	0.64		84.00	45.36	0.00	None	38.64	Enter Gross Area

10.1 Party Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Ceiling 1	Concrete floor slab, carpeted	100.00	139.68

11.1 Party Floors	Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Floor 1	Lowest occupied	Concrete floor slab, carpeted	100.00	139.68

12.0 Opening Types	Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
	Glazed	Manufacturer	Window	Triple Low-E Soft 0.05			0.50		1.00	0.64

13.0 Openings	Name	Opening Type	Location	Orientation	Area (m ²)	Pitch
	Glazed W	Glazed	Curtain Wall	West	1.93	
	Glazed W	Glazed	Curtain Wall	West	3.60	
	Glazed S	Glazed	Curtain Wall	South	9.49	
	Glazed S	Glazed	Curtain Wall	South	5.36	
	Glazed W	Glazed	Curtain Wall	West	3.60	

Summary for Input Data

Glazed W	Glazed	Curtain Wall	West	3.60
Glazed W	Glazed	Curtain Wall	West	3.60
Glazed W	Glazed	Curtain Wall	West	3.60
Glazed W	Glazed	Curtain Wall	West	1.93
Glazed W	Glazed	Curtain Wall	West	1.93

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)	Independently assessed	0.00	0.05	0.05	No
E4 Jamb	Independently assessed	0.00	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	51.61	0.00	0.00	No
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Independently assessed	5.15	0.00	0.00	No
E16 Corner (normal)	Independently assessed	5.86	0.09	0.09	No
E18 Party wall between dwellings	Independently assessed	5.86	0.00	0.00	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m²/(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

Manufacturer SFP

Duct Type

MVHR Efficiency

Wet Rooms

SFP from Installer Commissioning Certificate

MVHR System Location

Duct Installation Specification

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

Cooled Area m²

Data Source

Energy Class

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
low energy lighting	75.00	20	1500	10

24.0 Main Heating 1

25.0 Main Heating 2

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

Summary for Input Data

SAP Code

2312

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	Community Heating
SAP Code	901
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	No
Cold Water Source	From mains
Bath Count	3

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

	None
In Airing Cupboard	No

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Thermal Bridging



Property Reference	THFC-L20-03	Issued on Date	24/07/2023
Assessment Reference	V1 THFC-L20-03 DHN PlanA	Prop Type Ref	End-Terrace Flat
Property			

SAP Rating		DER		TER	
Environmental		% DER < TER			
CO ₂ Emissions (t/year)	0	DFEE		TFEE	
Compliance Check	See BREL	% DFEE < TFEE			
% DPER < TPER		DPER		TPER	

Assessor Details	Miss Laura Plazas	Assessor ID	T491-0001
Client			

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.050	0.00	0.00	
External wall	E4 Jamb	Independently assessed	0.050	0.00	0.00	
External wall	E7 Party floor between dwellings (in blocks of flats)	Independently assessed	0.000	51.61	0.00	
External wall	E23 Balcony within or between dwellings, balcony support penetrates wall insulation	Independently assessed	0.000	5.15	0.00	
External wall	E16 Corner (normal)	Independently assessed	0.090	5.86	0.53	
External wall	E18 Party wall between dwellings	Independently assessed	0.000	5.86	0.00	

Total: 68.48 W/mK:
Y-Value: 0.00 W/m²K:

Overview Report

Dwelling Address	
Report Date	24/07/2023
Property Type	Flat, End-Terrace
Floor Area [m ²]	140

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Rating

The current energy rating represents the overall energy efficiency of the dwelling. The potential energy rating is the overall energy rating of the dwelling after all of the recommend measures provided on the next page have been installed. A higher score represents a more energy efficient dwelling with lower fuel bills.

Most energy efficient - lower running costs

CURRENT

POTENTIAL

(92 plus)

A

(81-91)

B

(69-80)

C

(55-68)

D

(39-54)

E

(21-38)

F

(1-20)

G

86

86

Least energy efficient - higher running costs

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
-----------	------	---------	------	-----------

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.64 W/m ² K	Good
Windows	High performance glazing	Very Good
Main heating	Community scheme	Good
Main heating controls	Charging system linked to use of community heating, programmer and at least two room thermostats	Good
Secondary heating	None	
Hot water	Community scheme	Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m ³ /h.m ² (assumed)	Good

Primary Energy use

The primary energy use for this property per year is 15 kilowatt hour (kWh) per square metre

Estimated CO₂ emissions of the dwelling

The estimated CO rating provides an indication of the dwelling's impact on the environment in terms of carbon dioxide emissions; the higher the rating the less impact it has on the environment.

The estimated CO emissions for this dwellings is: **0.3** per year

With the recommended measures the potential CO emissions could be: **0** per year

Recommendations

Overview Report

The recommended measures provided below will help to improve the energy efficiency of the dwelling. To reach the dwelling's potential energy rating all of the recommended measures shown below would need to be installed. Having these measures installed individually or in any other order may give a different result when compared with the cumulative potential rating.

Recommended measure	Typical Yearly Saving	Potential Rating after measure installed	Cumulative savings (per year)	Cumulative Potential Rating
---------------------	-----------------------	--	-------------------------------	-----------------------------

Estimated energy use and potential savings

Estimated energy cost for this property over a year

£521

Over a year you could save

£0

The estimated cost and savings show how much the average household would spend in this property for heating, lighting and hot water. It is not based on how energy is used by the people living at the property.

Contacting the assessor and the accreditation scheme

Assessor contact details	
Assessor name	Miss Laura Plazas
Assessor's accreditation number	
Email Address	

Accreditation scheme contact details	
Accreditation scheme	
Telephone	
Email Address	

Assessment details	
Related party disclosure	
Date of assessment	20/07/2023
Date of certificate	20/07/2023
Type of assessment	SAP, new dwelling