

Summary for Input Data

Property Reference	Flat B - 3 New Close			Issued on Date	30/05/2024
Assessment Reference	New Build	Prop Type Ref	New Build		
Property	Flat A, 3, New Close				

SAP Rating	77 C	DER	5.65	TER	12.17
Environmental	95 A	% DER < TER			53.57
CO ₂ Emissions (t/year)	0.35	DFEE	35.19	TFEE	36.57
Compliance Check	See BREL	% DFEE < TFEE			3.78
% DPER < TPER	0.84	DPER	63.36	TPER	63.90

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

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

Orientation	South
Property Tenture	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Ground-floor flat
Which Floor	1
2.0 Number of Storeys	1
3.0 Date Built	2024
3.0 Property Age Band	L
4.0 Sheltered Sides	1
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	N/A
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements			
	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	26.39 m	80.10 m ²	2.40 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	28.21	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
External Wall 1	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	63.34	46.22	0.00	None	17.12 Enter Gross Area

9.1 Party Walls									
Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter		
Party Wall 1	Filled Cavity with Edge Sealing	Dense plaster both sides, dense blocks, cavity or cavity fill	0.00	180.00	33.98	0.00	None		

9.2 Internal Walls									
Description	Construction	Kappa (kJ/m ² K)	Area (m ²)						
Internal Wall 1	Plasterboard on timber frame	9.00	160.08						

10.0 External Roofs

Summary for Input Data



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Flat Roof	External Flat Roof	Plasterboard, insulated flat roof	0.14	9.00	20.25	17.75	None	0.00	Enter Gross Area	2.50

10.1 Party Ceilings		Description	Construction	Kappa (kJ/m²K)	Area (m²)
		Party Ceiling 1	Timber I-joists, carpeted	20.00	59.85

11.0 Heat Loss Floors		Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
		Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.15	None	0.00	110.00	80.10

12.0 Opening Types		Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
		Windows	Manufacturer	Window	Double glazed		Air Filled	0.76	Wood	0.70	1.40
		Door	Manufacturer	Solid Door			Air Filled	0.00	Wood	0.70	1.00
		Rooflight	Manufacturer	Roof Light	Double glazed		Air Filled	0.76	Wood	0.70	1.30

13.0 Openings		Name	Opening Type	Location	Orientation	Area (m²)	Pitch
		Windows S	Windows	External Wall 1	South	5.44	0
		Door S	Door	External Wall 1	South	1.75	0
		Windows N	Windows	External Wall 1	North	6.41	0
		Rooflight	Rooflight	Flat Roof	South	2.50	0
		Windows E	Windows	External Wall 1	East	3.52	0

14.0 Conservatory	None
15.0 Draught Proofing	100 %
16.0 Draught Lobby	No
17.0 Thermal Bridging	User Input

17.1 List of Bridges		Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
		E2 Other lintels (including other steel lintels)		11.05	0.00	0.00	No
		E3 Sill		7.66	0.00	0.00	No
		E4 Jamb		20.94	0.00	0.00	No
		E5 Ground floor (normal)		26.39	0.00	0.00	No
		E7 Party floor between dwellings (in blocks of flats)		16.40	0.00	0.00	No
		E14 Flat roof		9.99	0.00	0.00	No
		E16 Corner (normal)		9.60	0.00	0.00	No
		E18 Party wall between dwellings		7.20	0.00	0.00	No
		E17 Corner (inverted – internal area greater than external area)		2.40	0.00	0.00	No

Y-value	0.04 W/m²K
Description	Thermal Bridging

18.0 Pressure Testing	Yes
Designed AP ₅₀	5.00 m³/(h.m²) @ 50 Pa
Property Tested?	Yes
Test Method	Blower Door

19.0 Mechanical Ventilation	
Mechanical Ventilation	
Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues	
21.0 Fixed Cooling System	No

22.0 Lighting		No Fixed Lighting	Name	Efficacy	Power	Capacity	Count
		No	Lighting 1	95.00	12	1140	20

24.0 Main Heating 1	SAP table
Percentage of Heat	100.00 %
Database Ref. No.	0
Fuel Type	Electricity

Summary for Input Data

SAP Code	191				
In Winter	100.00				
In Summer	100.00				
Controls SAP Code	2110				
Delayed Start Stat	Yes				
HETAS approved System	No				
Oil Pump Inside	No				
Fan Assisted Flue	No				
Is MHS Pumped	Pump in heated space				
Heating Pump Age	2013 or later				
Heat Emitter	Radiators				
Boiler Interlock	Yes				
Combi boiler type	No Combi				

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

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

28.0 Water Heating	Main Heating 1				
Water Heating	Main Heating 1				
SAP Code	901				
Flue Gas Heat Recovery System	No				
Waste Water Heat Recovery Instantaneous System 1	Yes				
Waste Water Heat Recovery Instantaneous System 2	No				
Waste Water Heat Recovery Storage System	No				
Solar Panel	No				
Water use <= 125 litres/person/day	Yes				
Immersion Heater	Single				
Summer Immersion	No				
Cold Water Source	From mains				
Bath Count	1				
Supplementary Immersion	No				
Immersion Only Heating Hot Water	No				

28.1 Showers					
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Vented hot water system	7.00		Yes	Instantaneous System 1

28.3 Waste Water Heat Recovery System Instantaneous System 1					
Database ID	80146				
Brand Model	Recoup, Pipe HEX				
Details	Year: 2019 + current Efficiency: 70.7 Utilisation factor: 0.972				

29.0 Hot Water Cylinder	Hot Water Cylinder				
Cylinder Stat	No				
Cylinder In Heated Space	Yes				
Independent Time Control	No				
Insulation Type	Measured Loss				
Cylinder Volume	120.00				
Loss	1.00				
In Airing Cupboard	No				

31.0 Thermal Store	None				
---------------------------	------	--	--	--	--

Summary for Input Data

32.0 Photovoltaic Unit

Export Capable Meter?	One Dwelling
Connected To Dwelling	Yes
Diverter	Yes
Battery Capacity [kWh]	0.00

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

34.0 Small-scale Hydro

Electricity Generated	None	kWh/Year
Apportioned	0.00	
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures	None
Further measures to achieve even higher standards	None

Full SAP Calculation Printout



Property Reference	Flat B - 3 New Close				Issued on Date	30/05/2024		
Assessment Reference	New Build			Prop Type Ref	New Build			
Property	Flat A, 3, New Close							
SAP Rating	77 C		DER	5.65		TER	12.17	
Environmental	95 A		% DER < TER				53.57	
CO ₂ Emissions (t/year)	0.35		DFEE	35.19		TFEE	36.57	
Compliance Check	See BREL		% DFEE < TFEE				3.78	
% DPER < TPER	0.84		DPER	63.36		TPER	63.90	
Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	80.1000 (1b)	2.4000 (2b)	192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		192.2400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.2400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (21)

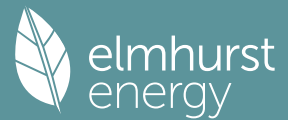
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (U _w = 1.40)			15.3700	1.3258	20.3769		(27)
Door			1.7500	1.0000	1.7500		(26)
Rooflight			2.5000	1.2357	3.0894		(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	8811.0000 (28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000 (29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500 (30)
Total net area of external elements A _{um} (A, m ²)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358		(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000 (32)
Party Ceiling 1			59.8500			20.0000	1197.0000 (32b)
Internal Wall 1			160.0800			9.0000	1440.7200 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20498.0700 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							255.9060 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.5834 (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
---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(38)m	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977 (38)
Heat transfer coeff	93.5775	93.2950	93.0182	91.7176	91.4743	90.3416	90.3416	90.1319	90.7779	91.4743	91.9666	92.4812 (39)
Average = Sum(39)m / 12 =												91.7165

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1683	1.1647	1.1613	1.1450	1.1420	1.1279	1.1279	1.1252	1.1333	1.1420	1.1481	1.1546 (40)
HLP (average)												1.1450
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4648 (42)
Hot water usage for mixer showers													
65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944	(42a)	
Hot water usage for baths													
28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143	(42b)	
Hot water usage for other uses													
39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716	(42c)	
Average daily hot water use (litres/day)													122.9255 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802	(44)	
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412	(45)
Energy content (annual)										Total = Sum(45)m =		2041.7666	
Distribution loss (46)m = 0.15 x (45)m													
31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262	(46)	
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.6000 (49)
Enter (49) or (54) in (55)													0.6000 (55)
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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													
230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412	(62)	
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861	(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													
172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1718.4454	(64)
Electric shower(s)													1718 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197	(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	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329 (72)
Total internal gains	508.0599	519.7673	497.4492	478.6039	453.1603	432.7451	415.3061	416.3767	429.7407	448.6002	477.6122	497.0501 (73)

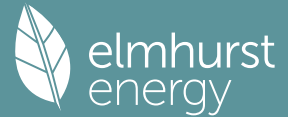
6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				6.4100	10.6334		0.7600		0.7000		0.7700		25.1290 (74)
East				3.5200	19.6403		0.7600		0.7000		0.7700		25.4879 (76)
South				5.4400	46.7521		0.7600		0.7000		0.7700		93.7658 (78)
South				2.5000	26.0000		0.7600		0.7000		1.0000		31.1220 (82)
Solar gains	175.5047	316.0848	474.2401	651.4657	783.5432	800.3769	762.3727	661.1815	535.6087	360.9632	213.4258	148.0681	(83)
Total gains	683.5646	835.8521	971.6892	1130.0696	1236.7035	1233.1219	1177.6788	1077.5582	965.3495	809.5634	691.0380	645.1182	(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	60.8470	61.0312	61.2129	62.0808	62.2460	63.0264	63.0264	63.1731	62.7235	62.2460	61.9128	61.5683
alpha	5.0565	5.0687	5.0809	5.1387	5.1497	5.2018	5.2018	5.2115	5.1816	5.1497	5.1275	5.1046
util living area												
	0.9913	0.9766	0.9388	0.8294	0.6531	0.4640	0.3367	0.3831	0.6228	0.8968	0.9799	0.9934 (86)

Full SAP Calculation Printout



MIT	19.8410	20.1015	20.4277	20.7732	20.9435	20.9920	20.9988	20.9977	20.9669	20.7036	20.2100	19.8017 (87)
Th 2	19.9455	19.9483	19.9511	19.9642	19.9667	19.9781	19.9781	19.9803	19.9737	19.9667	19.9617	19.9565 (88)
util rest of house	0.9886	0.9695	0.9212	0.7890	0.5916	0.3921	0.2590	0.2991	0.5406	0.8602	0.9726	0.9912 (89)
MIT 2	18.6209	18.9503	19.3521	19.7564	19.9253	19.9742	19.9778	19.9796	19.9546	19.6958	19.1004	18.5791 (90)
Living area fraction									fLA = Living area / (4) =			0.3522 (91)
MIT	19.0506	19.3557	19.7309	20.1145	20.2839	20.3327	20.3374	20.3381	20.3111	20.0508	19.4911	19.0097 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.9006	19.2057	19.5809	19.9645	20.1339	20.1827	20.1874	20.1881	20.1611	19.9008	19.3411	18.8597 (93)

8. Space heating requirement

Utilisation	Jan 0.9847	Feb 0.9630	Mar 0.9138	Apr 0.7890	May 0.6020	Jun 0.4067	Jul 0.2750	Aug 0.3163	Sep 0.5562	Oct 0.8574	Nov 0.9667	Dec 0.9880 (94)
Useful gains	673.1104	804.9015	887.9368	891.6090	744.4515	501.4886	323.8034	340.8459	536.9542	694.1589	668.0290	637.4025 (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	1366.2845	1334.6510	1216.7623	1014.8083	771.4827	504.3482	324.0893	341.4306	550.2162	850.7798	1125.7760	1355.7482 (97)
Space heating kWh	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (98a)
Space heating requirement - total per year (kWh/year)												2205.7270
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	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2205.7270
Space heating per m2										(98c) / (4) =		27.5372 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan 515.7215	Feb 355.9917	Mar 244.6461	Apr 88.7035	May 20.1112	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 116.5260	Nov 329.5779	Dec 534.4492 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-30.9226	-47.1047	-71.6886	-82.2785	-89.4452	-83.4787	-82.3610	-75.9817	-64.7256	-53.5084	-34.8518	-26.3351 (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	-6.6422	-15.5802	-35.0711	-60.8005	-87.3168	-90.3066	-89.1277	-73.8488	-52.6218	-26.6260	-9.7056	-5.1002 (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												2205.7270 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1718.4454 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												175.5882 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1295.4295 (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												2845.3311 (238)

Full SAP Calculation Printout



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	2205.7270	0.1571	346.5204 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1718.4454	0.1410	242.3036 (264)
Space and water heating			588.8240 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	175.5882	0.1443	25.3428 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-742.6819	0.1340	-99.5165
PV Unit electricity exported	-552.7476	0.1225	-67.7139
Total			-167.2303 (269)
Total CO2, kg/year			452.6237 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6500 (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	2205.7270	1.5816	3488.5013 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1718.4454	1.5214	2614.4038 (278)
Space and water heating			6102.9051 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	175.5882	1.5338	269.3230 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-742.6819	1.4952	-1110.4633
PV Unit electricity exported	-552.7476	0.4495	-248.4749
Total			-1358.9382 (283)
Total Primary energy kWh/year			5075.3148 (286)
Dwelling Primary energy Rate (DPER)			63.3600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.1000 (1b)	2.4000 (2b)	192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.2400 (5)

2. Ventilation rate

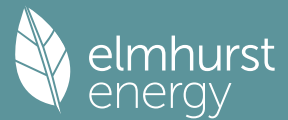
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			15.3700	1.1450	17.5992		(27)
Rooflight			2.5000	2.0221	5.0551		(27a)
Ground Floor			80.1000	0.1300	10.4130		(28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196		(29a)

Full SAP Calculation Printout



Flat Roof	20.2500	2.5000	17.7500	0.1100	1.9525	(30)
Total net area of external elements Aum(A, m2)			163.6900			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		45.0895	(33)
Party Wall 1			33.9800	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 263.3779 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)			11.0500	0.0500	0.5525	
E3 Sill			7.6600	0.0500	0.3830	
E4 Jamb			20.9400	0.0500	1.0470	
E5 Ground floor (normal)			26.3900	0.1600	4.2224	
E7 Party floor between dwellings (in blocks of flats)			16.4000	0.0700	1.1480	
E14 Flat roof			9.9900	0.0800	0.7992	
E16 Corner (normal)			9.6000	0.0900	0.8640	
E18 Party wall between dwellings			7.2000	0.0600	0.4320	
E17 Corner (inverted - internal area greater than external area)			2.4000	-0.0900	-0.2160	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						9.2321 (36)
Point Thermal bridges					(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =	54.3216 (37)

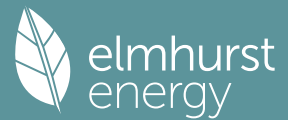
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977	(39)
Average = Sum(39)m / 12 =	93.3156	93.0332	92.7563	91.4558	91.2125	90.0798	90.0798	89.8700	90.5161	91.2125	91.7047	92.2193	(39)
												91.4546	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.1650	1.1615	1.1580	1.1418	1.1387	1.1246	1.1246	1.1220	1.1300	1.1387	1.1449	1.1513	(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												2.4648 (42)
Hot water usage for mixer showers	65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944 (42a)
Hot water usage for baths	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143 (42b)
Hot water usage for other uses	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716 (42c)
Average daily hot water use (litres/day)												122.9255 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802 (44)
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412 (45)
Distribution loss (46)m = 0.15 x (45)m	31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262 (46)
Water storage loss:												
Store volume												120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2247 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6613 (55)
Total storage loss	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007 (56)
If cylinder contains dedicated solar storage	20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007 (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	255.5541	225.8876	239.5636	209.5092	202.3614	181.5392	178.5181	186.0136	188.5177	211.1915	225.7815	252.6043 (62)
WWHRS	-29.9647	-26.5010	-27.7503	-22.9784	-21.4150	-18.3250	-17.1768	-18.2658	-18.9597	-22.3514	-25.3215	-29.4098 (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	225.5894	199.3866	211.8133	186.5308	180.9464	163.2142	161.3414	167.7479	169.5580	188.8401	200.4600	223.1945 (64)
	Total per year (kWh/year) = Sum(64)m =											2278.6225 (64)
12Total per year (kWh/year)												2279 (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	105.4310	93.5869	100.1141	89.4611	87.7444	80.1611	79.8165	82.3088	82.4814	90.6804	94.8716	104.4502 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	(71)
Water heating gains (Table 5)												
141.7083	139.2663	134.5620	124.2515	117.9361	111.3348	107.2803	110.6301	114.5575	121.8823	131.7661	140.3900	(72)
Total internal gains												
535.1170	546.8244	524.5063	505.6610	480.2174	459.8022	442.3632	443.4338	456.7978	475.6573	504.6693	524.1072	(73)

6. Solar gains												
[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					

Full SAP Calculation Printout



		W/m2	or Table 6b	or Table 6c	Table 6d	
North	6.4100	10.6334	0.6300	0.7000	0.7700	20.8306 (74)
East	3.5200	19.6403	0.6300	0.7000	0.7700	21.1282 (76)
South	5.4400	46.7521	0.6300	0.7000	0.7700	77.7269 (78)
South	2.5000	26.0000	0.6300	0.7000	1.0000	25.7985 (82)

Solar gains	145.4842	262.0177	393.1200	540.0308	649.5161	663.4703	631.9668	548.0847	443.9915	299.2195	176.9187	122.7407 (83)
Total gains	680.6012	808.8420	917.6263	1045.6918	1129.7335	1123.2725	1074.3300	991.5184	900.7893	774.8768	681.5880	646.8479 (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	62.7993	62.9900	63.1780	64.0764	64.2473	65.0552	65.0552	65.2071	64.7416	64.2473	63.9025	63.5459
alpha	5.1866	5.1993	5.2119	5.2718	5.2832	5.3370	5.3370	5.3471	5.3161	5.2832	5.2602	5.2364
util living area	0.9923	0.9809	0.9522	0.8634	0.7015	0.5060	0.3678	0.4147	0.6597	0.9126	0.9824	0.9940 (86)
MIT	19.8692	20.0973	20.3959	20.7379	20.9283	20.9896	20.9984	20.9971	20.9609	20.6893	20.2223	19.8365 (87)
Th 2	19.9481	19.9510	19.9537	19.9669	19.9693	19.9808	19.9808	19.9829	19.9764	19.9693	19.9644	19.9592 (88)
util rest of house	0.9897	0.9748	0.9374	0.8265	0.6391	0.4287	0.2832	0.3242	0.5752	0.8790	0.9756	0.9919 (89)
MIT 2	18.6555	18.9450	19.3158	19.7230	19.9162	19.9756	19.9804	19.9820	19.9537	19.6829	19.1155	18.6222 (90)
Living area fraction									FLA = Living area / (4) =			0.3522 (91)
MIT	19.0829	19.3509	19.6962	20.0804	20.2726	20.3327	20.3389	20.3395	20.3084	20.0374	19.5053	19.0499 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0829	19.3509	19.6962	20.0804	20.2726	20.3327	20.3389	20.3395	20.3084	20.0374	19.5053	19.0499 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9869	0.9704	0.9331	0.8310	0.6583	0.4558	0.3131	0.3561	0.6037	0.8816	0.9718	0.9895 (94)
Useful gains	671.6531	784.8623	856.1960	868.9560	743.6886	511.9606	336.3263	353.1203	543.8333	683.0994	662.3483	640.0637 (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	1379.4799	1344.4086	1224.0318	1022.5139	781.9306	516.4022	336.8002	354.0458	561.9607	860.8056	1137.6272	1369.4441 (97)
Space heating kWh	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (98a)
Space heating requirement - total per year (kWh/year)												2332.3951
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	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2332.3951
Space heating per m2										(98c) / (4) =		29.1185 (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	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (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)	570.5559	407.3836	296.5003	119.7852	30.8256	0.0000	0.0000	0.0000	0.0000	143.2431	370.7485	587.9296 (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	225.5894	199.3866	211.8133	186.5308	180.9464	163.2142	161.3414	167.7479	169.5580	188.8401	200.4600	223.1945 (64)
Efficiency of water heater (217)m	85.8947	85.4601	84.6354	82.9278	80.9143	79.8000	79.8000	79.8000	79.8000	83.2757	85.2484	79.8000 (216)
Fuel for water heating, kWh/month	262.6347	233.3094	250.2655	224.9315	223.6273	204.5291	202.1822	210.2104	212.4787	226.7649	235.1482	259.6065 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.0195	18.4671	16.6276	12.1821	9.4098	7.6879	8.5839	11.1577	14.4928	19.0153	21.4777	23.6593 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-27.0646	-39.2914	-58.1401	-67.3576	-74.3443	-70.0067	-69.1373	-64.4179	-56.3876	-45.8022	-30.1512	-23.2673 (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	-12.0295	-25.6175	-51.5005	-78.2116	-104.2612	-105.0741	-103.8490	-87.5526	-63.6712	-36.9325	-16.1561	-9.4904 (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												2526.9719 (211)
Space heating fuel - main system 2												0.0000 (213)

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2745.6882 (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)	185.7809 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1319.7144 (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	4224.7265 (238)

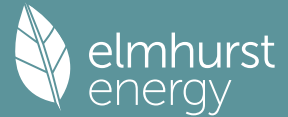
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2526.9719	0.2100	530.6641 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2745.6882	0.2100	576.5945 (264)
Space and water heating			1107.2586 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	185.7809	0.1443	26.8139 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3681	0.1340	-83.7828
PV Unit electricity exported	-694.3463	0.1256	-87.1886
Total			-170.9714 (269)
Total CO2, kg/year			975.0304 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.1700 (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	2526.9719	1.1300	2855.4782 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2745.6882	1.1300	3102.6276 (278)
Space and water heating			5958.1058 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	185.7809	1.5338	284.9569 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3681	1.4951	-934.9935
PV Unit electricity exported	-694.3463	0.4609	-320.0315
Total			-1255.0249 (283)
Total Primary energy kWh/year			5118.1386 (286)
Target Primary Energy Rate (TPER)			63.9000 (287)

Full SAP Calculation Printout



Property Reference	Flat B - 3 New Close				Issued on Date	30/05/2024		
Assessment Reference	New Build			Prop Type Ref	New Build			
Property	Flat A, 3, New Close							
SAP Rating	77 C		DER	5.65		TER	12.17	
Environmental	95 A		% DER < TER				53.57	
CO ₂ Emissions (t/year)	0.35		DFEE	35.19		TFEE	36.57	
Compliance Check	See BREL		% DFEE < TFEE				3.78	
% DPER < TPER	0.84		DPER	63.36		TPER	63.90	
Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	80.1000 (1b)	2.4000 (2b)	192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		192.2400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.2400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (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	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			15.3700	1.3258	20.3769		(27)
Door			1.7500	1.0000	1.7500		(26)
Rooflight			2.5000	1.2357	3.0894		(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	9811.0000 (28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000 (29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500 (30)
Total net area of external elements Aum(A, m ²)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358		(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000 (32)
Party Ceiling 1			59.8500			30.0000	1795.5000 (32b)
Internal Wall 1			160.0800			9.0000	1440.7200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21096.5700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.3779 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.5834 (37)

Full SAP Calculation Printout



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	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977 (38)
Average = Sum(39)m / 12 =	93.5775	93.2950	93.0182	91.7176	91.4743	90.3416	90.3416	90.1319	90.7779	91.4743	91.9666	92.4812 (39)
												91.7165
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1683	1.1647	1.1613	1.1450	1.1420	1.1279	1.1279	1.1252	1.1333	1.1420	1.1481	1.1546 (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												2.4648 (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												
	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143 (42b)
Hot water usage for other uses												
	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716 (42c)
Average daily hot water use (litres/day)												62.4947 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	68.1815	66.3112	64.2693	61.7277	59.4604	57.1041	56.6145	58.6523	60.7424	63.1621	65.7261	68.0858 (44)
Energy conte	107.9829	94.4263	98.7795	84.5022	80.0451	70.2162	68.4704	72.6238	74.9014	85.7104	93.6389	106.6059 (45)
Energy content (annual)												Total = Sum(45)m = 1037.9030
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												
	91.7854	80.2623	83.9625	71.8268	68.0384	59.6838	58.1998	61.7303	63.6662	72.8538	79.5931	90.6150 (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												
	91.7854	80.2623	83.9625	71.8268	68.0384	59.6838	58.1998	61.7303	63.6662	72.8538	79.5931	90.6150 (64)
12Total per year (kWh/year)												882.2175 (64)
Electric shower(s)												882 (64)
	52.4911	46.7700	51.0710	48.7364	49.6510	47.3622	48.9409	49.6510	48.7364	51.0710	50.1107	52.4911 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												597.0828 (64a)
Heat gains from water heating, kWh/month												
	36.0691	31.7581	33.7584	30.1408	29.4223	26.7615	26.7852	27.8453	28.1007	30.9812	32.4259	35.7765 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579 (68)
Pumps, fans	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238 (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)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Total internal gains	48.4800	47.2590	45.3742	41.8622	39.5461	37.1687	36.0016	37.4265	39.0287	41.6414	45.0360	48.0867 (72)
	438.8887	451.8171	432.3184	420.2718	398.8275	385.6361	371.0845	370.2302	381.2690	392.4164	414.9392	428.8039 (73)

6. Solar gains												
[Jan]												
		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
North		6.4100	10.6334	0.7600	0.7000	0.7700	25.1290 (74)					
East		3.5200	19.6403	0.7600	0.7000	0.7700	25.4879 (76)					
South		5.4400	46.7521	0.7600	0.7000	0.7700	93.7658 (78)					
South		2.5000	26.0000	0.7600	0.7000	1.0000	31.1220 (82)					
Solar gains	175.5047	316.0848	474.2401	651.4657	783.5432	800.3769	762.3727	661.1815	535.6087	360.9632	213.4258	148.0681 (83)
Total gains	614.3934	767.9019	906.5585	1071.7375	1182.3707	1186.0130	1133.4572	1031.4117	916.8777	753.3796	628.3650	576.8720 (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	62.6236	62.8132	63.0002	63.8935	64.0634	64.8667	64.8667	65.0176	64.5549	64.0634	63.7205	63.3660
alpha	5.1749	5.1875	5.2000	5.2596	5.2709	5.3244	5.3244	5.3345	5.3037	5.2709	5.2480	5.2244
util living area	0.9951	0.9847	0.9546	0.8545	0.6787	0.4820	0.3498	0.4001	0.6516	0.9208	0.9876	0.9964 (86)
MIT	19.7824	20.0448	20.3806	20.7508	20.9380	20.9916	20.9987	20.9975	20.9628	20.6688	20.1552	19.7442 (87)

Full SAP Calculation Printout



Th 2	19.9455	19.9483	19.9511	19.9642	19.9667	19.9781	19.9781	19.9803	19.9737	19.9667	19.9617	19.9565 (88)
util rest of house	0.9935	0.9797	0.9403	0.8164	0.6163	0.4076	0.2691	0.3124	0.5673	0.8893	0.9827	0.9952 (89)
MIT 2	18.8529	19.1138	19.4402	19.7846	19.9313	19.9749	19.9779	19.9797	19.9570	19.7265	19.2356	18.8236 (90)
Living area fraction									fLA = Living area / (4) =			0.3522 (91)
MIT	19.1802	19.4417	19.7714	20.1249	20.2859	20.3330	20.3374	20.3382	20.3112	20.0584	19.5595	19.1478 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1802	19.4417	19.7714	20.1249	20.2859	20.3330	20.3374	20.3382	20.3112	20.0584	19.5595	19.1478 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9918	0.9766	0.9374	0.8229	0.6363	0.4337	0.2976	0.3434	0.5961	0.8926	0.9802	0.9939	(94)
Useful gains	609.3857	749.9706	849.8424	881.9228	752.3211	514.3670	337.2683	354.1657	546.5599	672.4523	615.9491	573.3605	(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	1392.4550	1356.6662	1234.4775	1029.5185	785.3858	517.9272	337.6438	354.9532	563.8388	865.1965	1145.8534	1382.3897	(97)
Space heating kWh	582.6036	407.6994	286.1685	106.2689	24.6001	0.0000	0.0000	0.0000	0.0000	143.4016	381.5311	601.9177	(98a)
Space heating requirement - total per year (kWh/year)												2534.1910	
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	582.6036	407.6994	286.1685	106.2689	24.6001	0.0000	0.0000	0.0000	0.0000	143.4016	381.5311	601.9177	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2534.1910	
Space heating per m2												(98c) / (4) =	31.6378 (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	849.2112	668.5280	685.0021	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9618	0.9828	0.9721	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	816.8037	657.0543	665.8904	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1303.2221	1246.1732	1135.5283	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	350.2213	438.3044	349.4106	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	87.5553	109.5761	87.3526	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												284.4841	(107)
Energy for space heating												31.6378	(99)
Energy for space cooling												3.5516	(108)
Total												35.1895	(109)
Fabric Energy Efficiency (DFEE)												35.2	(109)

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

1. Overall dwelling characteristics

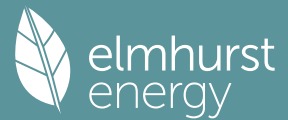
	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	80.1000	2.4000	192.2400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000			(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	192.2400 (5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1561 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4061	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3756 (21)

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

Full SAP Calculation Printout



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												
	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			15.3700	1.1450	17.5992		(27)
Rooflight			2.5000	2.0221	5.0551		(27a)
Ground Floor			80.1000	0.1300	10.4130		(28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196		(29a)
Flat Roof	20.2500	2.5000	17.7500	0.1100	1.9525		(30)
Total net area of external elements Aum(A, m2)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.0895		(33)
Party Wall 1			33.9800	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.3779 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				11.0500	0.0500	0.5525	
E3 Sill				7.6600	0.0500	0.3830	
E4 Jamb				20.9400	0.0500	1.0470	
E5 Ground floor (normal)				26.3900	0.1600	4.2224	
E7 Party floor between dwellings (in blocks of flats)				16.4000	0.0700	1.1480	
E14 Flat roof				9.9900	0.0800	0.7992	
E16 Corner (normal)				9.6000	0.0900	0.8640	
E18 Party wall between dwellings				7.2000	0.0600	0.4320	
E17 Corner (inverted - internal area greater than external area)				2.4000	-0.0900	-0.2160	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.2321 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.3216 (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	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977 (38)
Average = Sum(39)m / 12 =	93.3156	93.0332	92.7563	91.4558	91.2125	90.0798	90.0798	89.8700	90.5161	91.2125	91.7047	92.2193 (39)
												91.4546
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1650	1.1615	1.1580	1.1418	1.1387	1.1246	1.1246	1.1220	1.1300	1.1387	1.1449	1.1513 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

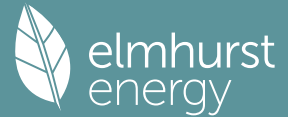
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4648 (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												
	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143 (42b)
Hot water usage for other uses												
	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716 (42c)
Average daily hot water use (litres/day)												62.4947 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	68.1815	66.3112	64.2693	61.7277	59.4604	57.1041	56.6145	58.6523	60.7424	63.1621	65.7261	68.0858 (44)
Energy content (annual)	107.9829	94.4263	98.7795	84.5022	80.0451	70.2162	68.4704	72.6238	74.9014	85.7104	93.6389	106.6059 (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												
WWHRS	91.7854	80.2623	83.9625	71.8268	68.0384	59.6838	58.1998	61.7303	63.6662	72.8538	79.5931	90.6150 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	91.7854	80.2623	83.9625	71.8268	68.0384	59.6838	58.1998	61.7303	63.6662	72.8538	79.5931	90.6150 (64)
12Total per year (kWh/year)												882.2175 (64)
Electric shower(s)	52.4911	46.7700	51.0710	48.7364	49.6510	47.3622	48.9409	49.6510	48.7364	51.0710	50.1107	52.4911 (64a)
Heat gains from water heating, kWh/month	36.0691	31.7581	33.7584	30.1408	29.4223	26.7615	26.7852	27.8453	28.1007	30.9812	32.4259	35.7765 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579 (68)

Full SAP Calculation Printout



Pumps, fans	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238 (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	0.0000 (70)
	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)	48.4800	47.2590	45.3742	41.8622	39.5461	37.1687	36.0016	37.4265	39.0287	41.6414	45.0360	48.0867	48.0867 (72)
Total internal gains	438.8887	451.8171	432.3184	420.2718	398.8275	385.6361	371.0845	370.2302	381.2690	392.4164	414.9392	428.8039	428.8039 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				6.4100	10.6334		0.6300		0.7000		0.7700		20.8306 (74)
East				3.5200	19.6403		0.6300		0.7000		0.7700		21.1282 (76)
South				5.4400	46.7521		0.6300		0.7000		0.7700		77.7269 (78)
South				2.5000	26.0000		0.6300		0.7000		1.0000		25.7985 (82)
Solar gains	145.4842	262.0177	393.1200	540.0308	649.5161	663.4703	631.9668	548.0847	443.9915	299.2195	176.9187	122.7407	(83)
Total gains	584.3729	713.8348	825.4385	960.3026	1048.3436	1049.1064	1003.0514	918.3148	825.2604	691.6359	591.8579	551.5445	(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	62.7993	62.9900	63.1780	64.0764	64.2473	65.0552	65.0552	65.2071	64.7416	64.2473	63.9025	63.5459
alpha	5.1866	5.1993	5.2119	5.2718	5.2832	5.3370	5.3370	5.3471	5.3161	5.2832	5.2602	5.2364
util living area	0.9961	0.9888	0.9681	0.8937	0.7406	0.5392	0.3935	0.4467	0.7063	0.9408	0.9905	0.9971 (86)
MIT	19.7498	19.9851	20.3001	20.6806	20.9075	20.9860	20.9978	20.9959	20.9463	20.6168	20.1152	19.7172 (87)
Th 2	19.9481	19.9510	19.9537	19.9669	19.9693	19.9808	19.9808	19.9829	19.9764	19.9693	19.9644	19.9592 (88)
util rest of house	0.9948	0.9850	0.9575	0.8618	0.6789	0.4579	0.3033	0.3498	0.6209	0.9152	0.9866	0.9961 (89)
MIT 2	18.8226	19.0577	19.3670	19.7296	19.9146	19.9753	19.9803	19.9819	19.9512	19.6842	19.1987	18.7988 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	19.1491	19.3843	19.6957	20.0645	20.2643	20.3312	20.3387	20.3390	20.3017	20.0126	19.5215	19.1223 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1491	19.3843	19.6957	20.0645	20.2643	20.3312	20.3387	20.3390	20.3017	20.0126	19.5215	19.1223 (93)

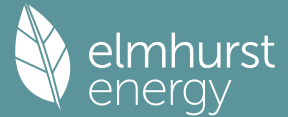
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9824	0.9543	0.8652	0.6975	0.4864	0.3351	0.3840	0.6495	0.9165	0.9844	0.9950 (94)
Useful gains	580.5172	701.2519	787.6815	830.8287	731.2243	510.2429	336.1172	352.6669	535.9831	633.8738	582.6238	548.7817 (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	1385.6568	1347.5214	1223.9803	1021.0606	781.1700	516.2690	336.7787	354.0001	561.3499	858.5505	1139.1062	1376.1203 (97)
Space heating kWh	599.0239	434.2931	324.6064	136.9670	37.1597	0.0000	0.0000	0.0000	0.0000	167.1595	400.6673	615.5400 (98a)
Space heating requirement - total per year (kWh/year)	2715.4167											
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	599.0239	434.2931	324.6064	136.9670	37.1597	0.0000	0.0000	0.0000	0.0000	167.1595	400.6673	615.5400 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2715.4167											
Space heating per m ²	(98c) / (4) = 33.9003 (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	846.7497	666.5902	683.0120	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9399	0.9716	0.9562	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	795.8668	647.6892	653.0823	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1150.1151	1100.2842	1008.7644	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	255.0587	336.7306	264.6274	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
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	63.7647	84.1827	66.1569	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	214.1042 (107)											
Energy for space heating	33.9003 (99)											
Energy for space cooling	2.6730 (108)											
Total	36.5733 (109)											
Fabric Energy Efficiency (TFEE)	36.6 (109)											

Full SAP Calculation Printout



Property Reference	Flat B - 3 New Close				Issued on Date	30/05/2024		
Assessment Reference	New Build			Prop Type Ref	New Build			
Property	Flat A, 3, New Close							
SAP Rating	77 C		DER	5.65		TER	12.17	
Environmental	95 A		% DER < TER				53.57	
CO ₂ Emissions (t/year)	0.35		DFEE	35.19		TFEE	36.57	
Compliance Check	See BREL		% DFEE < TFEE				3.78	
% DPER < TPER	0.84		DPER	63.36		TPER	63.90	
Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	80.1000 (1b)	2.4000 (2b)	192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		192.2400 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.2400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (21)

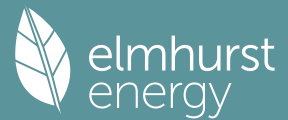
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (U _w = 1.40)			15.3700	1.3258	20.3769		(27)
Door			1.7500	1.0000	1.7500		(26)
Rooflight			2.5000	1.2357	3.0894		(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	8811.0000 (28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000 (29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500 (30)
Total net area of external elements A _{um} (A, m ²)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358		(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000 (32)
Party Ceiling 1			59.8500			20.0000	1197.0000 (32b)
Internal Wall 1			160.0800			9.0000	1440.7200 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	20498.0700 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							255.9060 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.5834 (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
---	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(38)m	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977 (38)
Heat transfer coeff	93.5775	93.2950	93.0182	91.7176	91.4743	90.3416	90.3416	90.1319	90.7779	91.4743	91.9666	92.4812 (39)
Average = Sum(39)m / 12 =												91.7165

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1683	1.1647	1.1613	1.1450	1.1420	1.1279	1.1279	1.1252	1.1333	1.1420	1.1481	1.1546 (40)
HLP (average)												1.1450
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4648 (42)
Hot water usage for mixer showers													
65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944	(42a)	
Hot water usage for baths													
28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143	(42b)	
Hot water usage for other uses													
39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716	(42c)	
Average daily hot water use (litres/day)													122.9255 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802	(44)	
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412	(45)
Energy content (annual)										Total = Sum(45)m =		2041.7666	
Distribution loss (46)m = 0.15 x (45)m													
31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262	(46)	
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.0000 (48)
Temperature factor from Table 2b													0.6000 (49)
Enter (49) or (54) in (55)													0.6000 (55)
Total storage loss													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage													
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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													
230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412	(62)	
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861	(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													
172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1718.4454	(64)
Electric shower(s)													1718 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													
85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197	(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	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329 (72)
Total internal gains	508.0599	519.7673	497.4492	478.6039	453.1603	432.7451	415.3061	416.3767	429.7407	448.6002	477.6122	497.0501 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				6.4100	10.6334		0.7600		0.7000		0.7700		25.1290 (74)
East				3.5200	19.6403		0.7600		0.7000		0.7700		25.4879 (76)
South				5.4400	46.7521		0.7600		0.7000		0.7700		93.7658 (78)
South				2.5000	26.0000		0.7600		0.7000		1.0000		31.1220 (82)
Solar gains	175.5047	316.0848	474.2401	651.4657	783.5432	800.3769	762.3727	661.1815	535.6087	360.9632	213.4258	148.0681	(83)
Total gains	683.5646	835.8521	971.6892	1130.0696	1236.7035	1233.1219	1177.6788	1077.5582	965.3495	809.5634	691.0380	645.1182	(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	60.8470	61.0312	61.2129	62.0808	62.2460	63.0264	63.0264	63.1731	62.7235	62.2460	61.9128	61.5683
alpha	5.0565	5.0687	5.0809	5.1387	5.1497	5.2018	5.2018	5.2115	5.1816	5.1497	5.1275	5.1046
util living area												
	0.9913	0.9766	0.9388	0.8294	0.6531	0.4640	0.3367	0.3831	0.6228	0.8968	0.9799	0.9934 (86)

Full SAP Calculation Printout



MIT	19.8410	20.1015	20.4277	20.7732	20.9435	20.9920	20.9988	20.9977	20.9669	20.7036	20.2100	19.8017 (87)
Th 2	19.9455	19.9483	19.9511	19.9642	19.9667	19.9781	19.9781	19.9803	19.9737	19.9667	19.9617	19.9565 (88)
util rest of house	0.9886	0.9695	0.9212	0.7890	0.5916	0.3921	0.2590	0.2991	0.5406	0.8602	0.9726	0.9912 (89)
MIT 2	18.6209	18.9503	19.3521	19.7564	19.9253	19.9742	19.9778	19.9796	19.9546	19.6958	19.1004	18.5791 (90)
Living area fraction									fLA = Living area / (4) =			0.3522 (91)
MIT	19.0506	19.3557	19.7309	20.1145	20.2839	20.3327	20.3374	20.3381	20.3111	20.0508	19.4911	19.0097 (92)
Temperature adjustment												-0.1500
adjusted MIT	18.9006	19.2057	19.5809	19.9645	20.1339	20.1827	20.1874	20.1881	20.1611	19.9008	19.3411	18.8597 (93)

8. Space heating requirement

Utilisation	Jan 0.9847	Feb 0.9630	Mar 0.9138	Apr 0.7890	May 0.6020	Jun 0.4067	Jul 0.2750	Aug 0.3163	Sep 0.5562	Oct 0.8574	Nov 0.9667	Dec 0.9880 (94)
Useful gains	673.1104	804.9015	887.9368	891.6090	744.4515	501.4886	323.8034	340.8459	536.9542	694.1589	668.0290	637.4025 (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	1366.2845	1334.6510	1216.7623	1014.8083	771.4827	504.3482	324.0893	341.4306	550.2162	850.7798	1125.7760	1355.7482 (97)
Space heating kWh	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (98a)
Space heating requirement - total per year (kWh/year)												2205.7270
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	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2205.7270
Space heating per m2										(98c) / (4) =		27.5372 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan 515.7215	Feb 355.9917	Mar 244.6461	Apr 88.7035	May 20.1112	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 116.5260	Nov 329.5779	Dec 534.4492 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	515.7215	355.9917	244.6461	88.7035	20.1112	0.0000	0.0000	0.0000	0.0000	116.5260	329.5779	534.4492 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-30.9226	-47.1047	-71.6886	-82.2785	-89.4452	-83.4787	-82.3610	-75.9817	-64.7256	-53.5084	-34.8518	-26.3351 (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	-6.6422	-15.5802	-35.0711	-60.8005	-87.3168	-90.3066	-89.1277	-73.8488	-52.6218	-26.6260	-9.7056	-5.1002 (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												2205.7270 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1718.4454 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												175.5882 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1295.4295 (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												2845.3311 (238)

Full SAP Calculation Printout



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	2205.7270	0.1571	346.5204 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1718.4454	0.1410	242.3036 (264)
Space and water heating			588.8240 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	175.5882	0.1443	25.3428 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-742.6819	0.1340	-99.5165
PV Unit electricity exported	-552.7476	0.1225	-67.7139
Total			-167.2303 (269)
Total CO2, kg/year			452.6237 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6500 (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	2205.7270	1.5816	3488.5013 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1718.4454	1.5214	2614.4038 (278)
Space and water heating			6102.9051 (279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248 (281)
Energy for lighting	175.5882	1.5338	269.3230 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-742.6819	1.4952	-1110.4633
PV Unit electricity exported	-552.7476	0.4495	-248.4749
Total			-1358.9382 (283)
Total Primary energy kWh/year			5075.3148 (286)
Dwelling Primary energy Rate (DPER)			63.3600 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.1000 (1b)	2.4000 (2b)	192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	192.2400 (5)

2. Ventilation rate

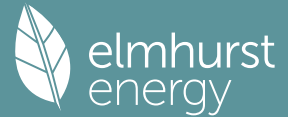
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.7500	1.0000	1.7500		(26)
TER Opening Type (Uw = 1.20)			15.3700	1.1450	17.5992		(27)
Rooflight			2.5000	2.0221	5.0551		(27a)
Ground Floor			80.1000	0.1300	10.4130		(28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196		(29a)

Full SAP Calculation Printout



Flat Roof	20.2500	2.5000	17.7500	0.1100	1.9525	(30)
Total net area of external elements Aum(A, m2)			163.6900			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		45.0895	(33)
Party Wall 1			33.9800	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 263.3779 (35)

List of Thermal Bridges						
K1 Element			Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)			11.0500	0.0500	0.5525	
E3 Sill			7.6600	0.0500	0.3830	
E4 Jamb			20.9400	0.0500	1.0470	
E5 Ground floor (normal)			26.3900	0.1600	4.2224	
E7 Party floor between dwellings (in blocks of flats)			16.4000	0.0700	1.1480	
E14 Flat roof			9.9900	0.0800	0.7992	
E16 Corner (normal)			9.6000	0.0900	0.8640	
E18 Party wall between dwellings			7.2000	0.0600	0.4320	
E17 Corner (inverted - internal area greater than external area)			2.4000	-0.0900	-0.2160	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)						9.2321 (36)
Point Thermal bridges					(36a) =	0.0000
Total fabric heat loss					(33) + (36) + (36a) =	54.3216 (37)

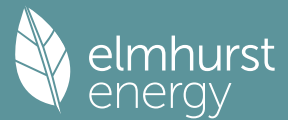
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977	(39)
Average = Sum(39)m / 12 =	93.3156	93.0332	92.7563	91.4558	91.2125	90.0798	90.0798	89.8700	90.5161	91.2125	91.7047	92.2193	(39)
												91.4546	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.1650	1.1615	1.1580	1.1418	1.1387	1.1246	1.1246	1.1220	1.1300	1.1387	1.1449	1.1513	(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													
Hot water usage for mixer showers												2.4648 (42)	
65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944	(42a)	
Hot water usage for baths													
28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143	(42b)	
Hot water usage for other uses													
39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716	(42c)	
Average daily hot water use (litres/day)												122.9255 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802	(44)
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 2041.7666
31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262	(46)	
Water storage loss:													
Store volume													120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.2247 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6613 (55)
Total storage loss													
20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(56)	
If cylinder contains dedicated solar storage													
20.5007	18.5168	20.5007	19.8394	20.5007	19.8394	20.5007	20.5007	19.8394	20.5007	19.8394	20.5007	(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													
255.5541	225.8876	239.5636	209.5092	202.3614	181.5392	178.5181	186.0136	188.5177	211.1915	225.7815	252.6043	(62)	
WWHRS	-29.9647	-26.5010	-27.7503	-22.9784	-21.4150	-18.3250	-17.1768	-18.2658	-18.9597	-22.3514	-25.3215	-29.4098	(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													
225.5894	199.3866	211.8133	186.5308	180.9464	163.2142	161.3414	167.7479	169.5580	188.8401	200.4600	223.1945	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2278.6225 (64)
Electric shower(s)													2279 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
105.4310	93.5869	100.1141	89.4611	87.7444	80.1611	79.8165	82.3088	82.4814	90.6804	94.8716	104.4502	(65)	

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	123.2378	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	110.7879	122.6580	110.7879	114.4808	110.7879	114.4808	110.7879	110.7879	114.4808	110.7879	114.4808	110.7879	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	219.6494	221.9287	216.1850	203.9573	188.5221	174.0152	164.3237	162.0444	167.7881	180.0158	195.4510	209.9579	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	35.3238	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	(71)
Water heating gains (Table 5)	141.7083	139.2663	134.5620	124.2515	117.9361	111.3348	107.2803	110.6301	114.5575	121.8823	131.7661	140.3900	(72)
Total internal gains	535.1170	546.8244	524.5063	505.6610	480.2174	459.8022	442.3632	443.4338	456.7978	475.6573	504.6693	524.1072	(73)

6. Solar gains													
[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m2	Table 6a	Specific data	Specific data	factor	W						

Full SAP Calculation Printout



		W/m2	or Table 6b	or Table 6c	Table 6d	
North	6.4100	10.6334	0.6300	0.7000	0.7700	20.8306 (74)
East	3.5200	19.6403	0.6300	0.7000	0.7700	21.1282 (76)
South	5.4400	46.7521	0.6300	0.7000	0.7700	77.7269 (78)
South	2.5000	26.0000	0.6300	0.7000	1.0000	25.7985 (82)

Solar gains	145.4842	262.0177	393.1200	540.0308	649.5161	663.4703	631.9668	548.0847	443.9915	299.2195	176.9187	122.7407 (83)
Total gains	680.6012	808.8420	917.6263	1045.6918	1129.7335	1123.2725	1074.3300	991.5184	900.7893	774.8768	681.5880	646.8479 (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	62.7993	62.9900	63.1780	64.0764	64.2473	65.0552	65.0552	65.2071	64.7416	64.2473	63.9025	63.5459
alpha	5.1866	5.1993	5.2119	5.2718	5.2832	5.3370	5.3370	5.3471	5.3161	5.2832	5.2602	5.2364
util living area	0.9923	0.9809	0.9522	0.8634	0.7015	0.5060	0.3678	0.4147	0.6597	0.9126	0.9824	0.9940 (86)
MIT	19.8692	20.0973	20.3959	20.7379	20.9283	20.9896	20.9984	20.9971	20.9609	20.6893	20.2223	19.8365 (87)
Th 2	19.9481	19.9510	19.9537	19.9669	19.9693	19.9808	19.9808	19.9829	19.9764	19.9693	19.9644	19.9592 (88)
util rest of house	0.9897	0.9748	0.9374	0.8265	0.6391	0.4287	0.2832	0.3242	0.5752	0.8790	0.9756	0.9919 (89)
MIT 2	18.6555	18.9450	19.3158	19.7230	19.9162	19.9756	19.9804	19.9820	19.9537	19.6829	19.1155	18.6222 (90)
Living area fraction									FLA = Living area / (4) =			0.3522 (91)
MIT	19.0829	19.3509	19.6962	20.0804	20.2726	20.3327	20.3389	20.3395	20.3084	20.0374	19.5053	19.0499 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0829	19.3509	19.6962	20.0804	20.2726	20.3327	20.3389	20.3395	20.3084	20.0374	19.5053	19.0499 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9869	0.9704	0.9331	0.8310	0.6583	0.4558	0.3131	0.3561	0.6037	0.8816	0.9718	0.9895 (94)
Useful gains	671.6531	784.8623	856.1960	868.9560	743.6886	511.9606	336.3263	353.1203	543.8333	683.0994	662.3483	640.0637 (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	1379.4799	1344.4086	1224.0318	1022.5139	781.9306	516.4022	336.8002	354.0458	561.9607	860.8056	1137.6272	1369.4441 (97)
Space heating kWh	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (98a)
Space heating requirement - total per year (kWh/year)												2332.3951
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	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2332.3951
Space heating per m2										(98c) / (4) =		29.1185 (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	526.6231	376.0151	273.6698	110.5617	28.4520	0.0000	0.0000	0.0000	0.0000	132.2133	342.2008	542.6590 (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)	570.5559	407.3836	296.5003	119.7852	30.8256	0.0000	0.0000	0.0000	0.0000	143.2431	370.7485	587.9296 (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	225.5894	199.3866	211.8133	186.5308	180.9464	163.2142	161.3414	167.7479	169.5580	188.8401	200.4600	223.1945 (64)
Efficiency of water heater (217)m	85.8947	85.4601	84.6354	82.9278	80.9143	79.8000	79.8000	79.8000	79.8000	83.2757	85.2484	79.8000 (216)
Fuel for water heating, kWh/month	262.6347	233.3094	250.2655	224.9315	223.6273	204.5291	202.1822	210.2104	212.4787	226.7649	235.1482	259.6065 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.0195	18.4671	16.6276	12.1821	9.4098	7.6879	8.5839	11.1577	14.4928	19.0153	21.4777	23.6593 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-27.0646	-39.2914	-58.1401	-67.3576	-74.3443	-70.0067	-69.1373	-64.4179	-56.3876	-45.8022	-30.1512	-23.2673 (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	-12.0295	-25.6175	-51.5005	-78.2116	-104.2612	-105.0741	-103.8490	-87.5526	-63.6712	-36.9325	-16.1561	-9.4904 (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												2526.9719 (211)
Space heating fuel - main system 2												0.0000 (213)

Full SAP Calculation Printout



Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2745.6882 (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)	185.7809 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1319.7144 (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	4224.7265 (238)

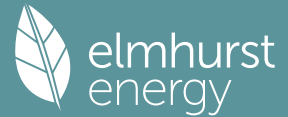
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2526.9719	0.2100	530.6641 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2745.6882	0.2100	576.5945 (264)
Space and water heating			1107.2586 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	185.7809	0.1443	26.8139 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3681	0.1340	-83.7828
PV Unit electricity exported	-694.3463	0.1256	-87.1886
Total			-170.9714 (269)
Total CO2, kg/year			975.0304 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.1700 (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	2526.9719	1.1300	2855.4782 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2745.6882	1.1300	3102.6276 (278)
Space and water heating			5958.1058 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	185.7809	1.5338	284.9569 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-625.3681	1.4951	-934.9935
PV Unit electricity exported	-694.3463	0.4609	-320.0315
Total			-1255.0249 (283)
Total Primary energy kWh/year			5118.1386 (286)
Target Primary Energy Rate (TPER)			63.9000 (287)

Full SAP Calculation Printout



Property Reference	Flat B - 3 New Close				Issued on Date	30/05/2024		
Assessment Reference	New Build			Prop Type Ref	New Build			
Property	Flat A, 3, New Close							
SAP Rating	77 C		DER	5.65		TER	12.17	
Environmental	95 A		% DER < TER				53.57	
CO ₂ Emissions (t/year)	0.35		DFEE	35.19		TFEE	36.57	
Compliance Check	See BREL		% DFEE < TFEE				3.78	
% DPER < TPER	0.84		DPER	63.36		TPER	63.90	
Assessor Details	Mr. Alexander Cotterill					Assessor ID	AV67-0001	
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	80.1000 (1b)	x 2.4000 (2b)	= 192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.2400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (U _w = 1.40)			15.3700	1.3258	20.3769		(27)
Door			1.7500	1.0000	1.7500		(26)
Rooflight			2.5000	1.2357	3.0894		(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	8811.0000 (28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000 (29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500 (30)
Total net area of external elements A _{um} (A, m ²)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358		(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000 (32)
Party Ceiling 1			59.8500			30.0000	1795.5000 (32b)
Internal Wall 1			160.0800			9.0000	1440.7200 (32c)
Heat capacity C _m = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 21096.5700 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							263.3779 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.5834 (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
--	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

Full SAP Calculation Printout



(38)m	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977 (38)
Heat transfer coeff	93.5775	93.2950	93.0182	91.7176	91.4743	90.3416	90.3416	90.1319	90.7779	91.4743	91.9666	92.4812 (39)
Average = Sum(39)m / 12 =												91.7165
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1683	1.1647	1.1613	1.1450	1.1420	1.1279	1.1279	1.1252	1.1333	1.1420	1.1481	1.1546 (40)
HLP (average)												1.1450
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.4648 (42)
Hot water usage for mixer showers	65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944 (42a)
Hot water usage for baths	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143 (42b)
Hot water usage for other uses	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716 (42c)
Average daily hot water use (litres/day)												122.9255 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802 (44)
Energy conte	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412 (45)
Energy content (annual)										Total = Sum(45)m =		2041.7666
Distribution loss (46)m = 0.15 x (45)m												
	31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262 (46)
Water storage loss:												
Store volume												120.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)
Temperature factor from Table 2b												0.6000 (49)
Enter (49) or (54) in (55)												0.6000 (55)
Total storage loss												
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (56)
If cylinder contains dedicated solar storage												
	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412 (62)
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861 (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												
	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
										Total per year (kWh/year) = Sum(64)m =		1718.4454 (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												
	85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	24.8563	22.0772	17.9544	13.5926	10.1606	8.5780	9.2689	12.0480	16.1708	20.5326	23.9646	25.5472 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	327.8349	331.2369	322.6642	304.4139	281.3763	259.7242	245.2593	241.8574	250.4300	268.6803	291.7179	313.3700 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)												
	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)												
	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329 (72)
Total internal gains												
	571.8909	570.0716	552.6719	519.7493	486.9643	454.1283	436.2997	439.0268	455.6497	488.5865	524.9399	556.7985 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
North				6.4100	10.6334		0.7600		0.7000		0.7700		25.1290 (74)
East				3.5200	19.6403		0.7600		0.7000		0.7700		25.4879 (76)
South				5.4400	46.7521		0.7600		0.7000		0.7700		93.7658 (78)
South				2.5000	26.0000		0.7600		0.7000		1.0000		31.1220 (82)
Solar gains	175.5047	316.0848	474.2401	651.4657	783.5432	800.3769	762.3727	661.1815	535.6087	360.9632	213.4258		148.0681 (83)
Total gains	747.3956	886.1564	1026.9119	1171.2151	1270.5075	1254.5052	1198.6724	1100.2083	991.2584	849.5496	738.3657		704.8666 (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	62.6236	62.8132	63.0002	63.8935	64.0634	64.8667	64.8667	65.0176	64.5549	64.0634	63.7205	63.3660
alpha	5.1749	5.1875	5.2000	5.2596	5.2709	5.3244	5.3244	5.3345	5.3037	5.2709	5.2480	5.2244
util living area												
	0.9884	0.9724	0.9291	0.8168	0.6405	0.4568	0.3310	0.3756	0.6103	0.8840	0.9755	0.9911 (86)

Full SAP Calculation Printout



MIT	19.9453	20.1799	20.4943	20.8032	20.9525	20.9935	20.9990	20.9982	20.9725	20.7425	20.2832	19.9030 (87)
Th 2	19.9455	19.9483	19.9511	19.9642	19.9667	19.9781	19.9781	19.9803	19.9737	19.9667	19.9617	19.9565 (88)
util rest of house												
	0.9847	0.9640	0.9091	0.7745	0.5789	0.3858	0.2545	0.2930	0.5284	0.8441	0.9666	0.9883 (89)
MIT 2	18.7496	19.0450	19.4289	19.7867	19.9326	19.9750	19.9779	19.9797	19.9582	19.7362	19.1884	18.7044 (90)
Living area fraction									fLA =	Living area / (4) =		0.3522 (91)
MIT	19.1708	19.4447	19.8041	20.1447	20.2918	20.3337	20.3375	20.3384	20.3154	20.0906	19.5740	19.1265 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0208	19.2947	19.6541	19.9947	20.1418	20.1837	20.1875	20.1884	20.1654	19.9406	19.4240	18.9765 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9802	0.9574	0.9025	0.7759	0.5897	0.4002	0.2702	0.3099	0.5443	0.8429	0.9605	0.9845	(94)
Useful gains	732.6130	848.3949	926.7507	908.7226	749.2449	502.0715	323.8789	340.9975	539.5073	716.1081	709.2094	693.9490	(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													
	1377.5317	1342.9560	1223.5683	1017.5793	772.2073	504.4380	324.1025	341.4563	550.6064	854.4220	1133.3976	1366.5494	(97)
Space heating kWh	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147	(98a)
Space heating requirement - total per year (kWh/year)												2037.1936	
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	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2037.1936	
Space heating per m2										(98c) / (4) =		25.4331	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147	(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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(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)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822	(231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-30.8063	-46.8880	-71.1671	-81.7715	-89.2055	-83.4787	-82.3610	-75.9817	-64.7256	-53.2009	-34.7040	-26.2504	(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	-6.7585	-15.7970	-35.5926	-61.3075	-87.5566	-90.3066	-89.1277	-73.8488	-52.6218	-26.9335	-9.8533	-5.1850	(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												2037.1936	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1718.4454	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												175.5882	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1295.4295	(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 energav for all uses												2676.7977	(238)

10a. Fuel costs - using Table 12 prices

Full SAP Calculation Printout



	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2037.1936	16.4900	335.9332 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1718.4454	16.4900	283.3716 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	175.5882	16.4900	28.9545 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-740.5407	16.4900	-122.1152
PV Unit electricity exported	-554.8889	5.5900	-31.0183
Total			-153.1334 (252)
Total energy cost			501.8868 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.4443 (257)
SAP value		76.5882
SAP rating (Section 12)		77 (258)
SAP band		C

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	2037.1936	0.1572	320.3166 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1718.4454	0.1410	242.3036 (264)
Space and water heating			562.6202 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	175.5882	0.1443	25.3428 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-740.5407	0.1340	-99.2010
PV Unit electricity exported	-554.8889	0.1227	-68.0617
Total			-167.2627 (269)
Total CO2, kg/year			426.3876 (272)
CO2 emissions per m2			5.3200 (273)
EI value			95.4328
EI rating			95 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.1000 (1b)	x 2.4000 (2b)	= 192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	192.2400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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	0.3944	0.3756	0.3756	0.3474	0.3474	0.3099	0.3193	0.3005	0.3099	0.3287	0.3287	0.3568 (22b)
Effective ac	0.5778	0.5705	0.5705	0.5604	0.5604	0.5480	0.5510	0.5451	0.5480	0.5540	0.5540	0.5637 (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						
Windows (Uw = 1.40)			15.3700	1.3258	20.3769			(27)					
Door			1.7500	1.0000	1.7500			(26)					
Rooflight			2.5000	1.2357	3.0894			(27a)					
Ground Floor			80.1000	0.1500	12.0150	110.0000	8811.0000	(28a)					
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000	(29a)					
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500	(30)					
Total net area of external elements Aum(A, m2)			163.6900					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358			(33)					
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000	(32)					
Party Ceiling 1			59.8500			30.0000	1795.5000	(32b)					
Internal Wall 1			160.0800			9.0000	1440.7200	(32c)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	21096.5700 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								263.3779 (35)					
Thermal bridges (User defined value 0.040 * total exposed area)								6.5476 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	54.5834 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 36.6531	Feb 36.1945	Mar 36.1945	Apr 35.5484	May 35.5484	Jun 34.7653	Jul 34.9527	Aug 34.5835	Sep 34.7653	Oct 35.1457	Nov 35.1457	Dec 35.7582	(38)
Heat transfer coeff	91.2366	90.7779	90.7779	90.1319	90.1319	89.3488	89.5361	89.1670	89.3488	89.7291	89.7291	90.3416	(39)
Average = Sum(39)m / 12 =												90.0214	
HLP	Jan 1.1390	Feb 1.1333	Mar 1.1333	Apr 1.1252	May 1.1252	Jun 1.1155	Jul 1.1178	Aug 1.1132	Sep 1.1155	Oct 1.1202	Nov 1.1202	Dec 1.1279	(40)
HLP (average)												1.1239	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

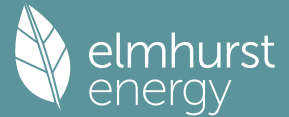
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4648 (42)
Hot water usage for mixer showers	65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944 (42a)	
Hot water usage for baths	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143 (42b)	
Hot water usage for other uses	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716 (42c)	
Average daily hot water use (litres/day)												122.9255 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802 (44)	
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412 (45)	
Distribution loss (46)m = 0.15 x (45)m	31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262 (46)	
Water storage loss:													
Store volume												120.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000 (48)	
Temperature factor from Table 2b												0.6000 (49)	
Enter (49) or (54) in (55)												0.6000 (55)	
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (56)	
If cylinder contains dedicated solar storage	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000 (57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412 (62)	
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)	
Electric shower(s)												1718.4454 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month	85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197 (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	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.8563	22.0772	17.9544	13.5926	10.1606	8.5780	9.2689	12.0480	16.1708	20.5326	23.9646	25.5472 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	327.8349	331.2369	322.6642	304.4139	281.3763	259.7242	245.2593	241.8574	250.4300	268.6803	291.7179	313.3700 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329 (72)
Total internal gains	571.8909	570.0716	552.6719	519.7493	486.9643	454.1283	436.2997	439.0268	455.6497	488.5865	524.9399	556.7985 (73)

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
North	6.4100				11.9814	0.7600	0.7000	0.7700	0.7700	28.3147 (74)
East	3.5200				22.3313	0.7600	0.7000	0.7700	0.7700	28.9802 (76)
South	5.4400				50.9848	0.7600	0.7000	0.7700	0.7700	102.2550 (78)
South	2.5000				30.0000	0.7600	0.7000	0.7000	1.0000	35.9100 (82)
Solar gains	195.4600	317.4428	472.2223	671.1972	788.3630	862.4632	812.3825	719.2677	579.0726	163.2284 (83)
Total gains	767.3509	887.5144	1024.8942	1190.9466	1275.3273	1316.5915	1248.6822	1158.2944	1034.7223	720.0269 (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	64.2303	64.5549	64.5549	65.0176	65.0176	65.5875	65.4502	65.7212	65.5875	65.3094	65.3094	64.8667
alpha	5.2820	5.3037	5.3037	5.3345	5.3345	5.3725	5.3633	5.3814	5.3725	5.3540	5.3540	5.3244
util living area												
	0.9834	0.9652	0.9084	0.7607	0.5533	0.3386	0.2222	0.2462	0.4947	0.8262	0.9607	0.9872 (86)
MIT	20.1046	20.3029	20.6091	20.8782	20.9802	20.9989	20.9999	20.9999	20.9918	20.8456	20.4474	20.0647 (87)
Th 2	19.9691	19.9737	19.9737	19.9803	19.9803	19.9882	19.9863	19.9901	19.9882	19.9844	19.9844	19.9781 (88)
util rest of house												
	0.9780	0.9546	0.8830	0.7108	0.4875	0.2705	0.1496	0.1686	0.4113	0.7721	0.9464	0.9829 (89)
MIT 2	18.9685	19.2176	19.5830	19.8777	19.9680	19.9878	19.9863	19.9901	19.9846	19.8588	19.4081	18.9256 (90)
Living area fraction												
	19.3686	19.5998	19.9444	20.2300	20.3244	20.3439	20.3433	20.3457	20.3393	20.2063	19.7741	19.3268 (91)
MIT	19.3686	19.5998	19.9444	20.2300	20.3244	20.3439	20.3433	20.3457	20.3393	20.2063	19.7741	19.3268 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.2186	19.4498	19.7944	20.0800	20.1744	20.1939	20.1933	20.1957	20.1893	20.0563	19.6241	19.1768 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9727	0.9478	0.8779	0.7160	0.5003	0.2844	0.1644	0.1844	0.4282	0.7764	0.9401	0.9784	(94)
Useful gains	746.4332	841.1979	899.7141	852.7216	638.0175	374.4064	205.3212	213.5968	443.0229	680.2155	722.5325	704.4905	(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	1288.1318	1257.2563	1125.1336	917.5441	646.6464	374.7200	205.3319	213.6163	445.7880	758.7792	1043.0234	1271.7196	(97)
Space heating kWh	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184	(98a)
Space heating requirement - total per year (kWh/year)												1614.6426	
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	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1614.6426	
Space heating per m2											(98c) / (4) =	20.1578	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
Water heating requirement	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (216)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (217)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (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)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-33.8061	-46.7477	-69.8230	-81.7924	-88.5645	-87.2783	-85.5311	-80.1554	-68.3682	-55.2598	-38.5314	-28.6016 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-8.3040	-16.5436	-36.7675	-65.5484	-88.8833	-99.4779	-96.7407	-82.6145	-58.6742	-31.1648	-12.6545	-6.2869 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)

Full SAP Calculation Printout



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	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1614.6426	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												1718.4454	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												41.0000	(231)
Electricity for lighting (calculated in Appendix L)												175.5882	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1368.1197	(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												2181.5565	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1614.6426	25.1600	406.2441	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1718.4454	25.1600	432.3609	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	25.1600	10.3156	(249)
Energy for lighting	175.5882	25.1600	44.1780	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	25.1600	-192.3380	
PV Unit electricity exported	-603.6603	5.8100	-35.0727	
Total			-227.4107	(252)
Total energy cost			665.6879	(255)

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	1614.6426	0.1580	255.1912	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1718.4454	0.1410	242.3036	(264)
Space and water heating			497.4948	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	175.5882	0.1443	25.3428	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	0.1339	-102.3411	
PV Unit electricity exported	-603.6603	0.1225	-73.9600	
Total			-176.3011	(269)
Total CO2, kg/year			352.2237	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1614.6426	1.5851	2559.3029	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1718.4454	1.5214	2614.4038	(278)
Space and water heating			5173.7067	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	175.5882	1.5338	269.3230	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	1.4947	-1142.6582	
PV Unit electricity exported	-603.6603	0.4495	-271.3636	
Total			-1414.0218	(283)
Total Primary energy kWh/year			4091.0328	(286)

SAP 10 EPC IMPROVEMENTS

New Build

Current energy efficiency rating:	C 77
Current environmental impact rating:	A 95

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

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

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
----------------------	------------------------	-------------------	----------------------

Full SAP Calculation Printout



(none)

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 77
Potential environmental impact rating: A 95

Fuel prices for cost data on this page from database revision number 542 TEST (30 Apr 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £893	Potential £893	Saving £0
Electricity			
Space heating	£417	£417	£0
Water heating	£432	£432	£0
Lighting	£44	£44	£0
Generated (PV)	-£227	-£227	£0
Total cost of fuels	£666	£666	£0
Total cost of uses	£666	£666	£0
Delivered energy	27 kWh/m ²	27 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m ²	4 kg/m ²	4 kg/m ²	0 kg/m ²
Primary energy	51 kWh/m ²	51 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	80.1000 (1b)	x 2.4000 (2b)	= 192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 192.2400 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	30.0000 / (5) = 0.1561 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (21)

Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4789	0.4695	0.4601	0.4132	0.4038	0.3568	0.3568	0.3474	0.3756	0.4038	0.4226	0.4413 (22b)
Effective ac	0.6147	0.6102	0.6059	0.5854	0.5815	0.5637	0.5637	0.5604	0.5705	0.5815	0.5893	0.5974 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Windows (Uw = 1.40)			15.3700	1.3258	20.3769		(27)
Door			1.7500	1.0000	1.7500		(26)
Rooflight			2.5000	1.2357	3.0894		(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	9811.0000 (28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000 (29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500 (30)
Total net area of external elements Aum(A, m ²)			163.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358		(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000 (32)
Party Ceiling 1			59.8500			30.0000	1795.5000 (32b)
Internal Wall 1			160.0800			9.0000	1440.7200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21096.5700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.3779 (35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	54.5834 (37)

Full SAP Calculation Printout



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	38.9941	38.7116	38.4347	37.1342	36.8909	35.7582	35.7582	35.5484	36.1945	36.8909	37.3831	37.8977	(38)
Heat transfer coeff	93.5775	93.2950	93.0182	91.7176	91.4743	90.3416	90.3416	90.1319	90.7779	91.4743	91.9666	92.4812	(39)
Average = Sum(39)m / 12 =												91.7165	
HLP	1.1683	1.1647	1.1613	1.1450	1.1420	1.1279	1.1279	1.1252	1.1333	1.1420	1.1481	1.1546	(40)
HLP (average)												1.1450	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4648 (42)
Hot water usage for mixer showers	65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944	(42a)
Hot water usage for baths	28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143	(42b)
Hot water usage for other uses	39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716	(42c)
Average daily hot water use (litres/day)												122.9255	(43)
Daily hot water use	133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802	(44)
Energy conte	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412	(45)
Energy content (annual)										Total = Sum(45)m =		2041.7666	
Distribution loss (46)m = 0.15 x (45)m	31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262	(46)
Water storage loss:													
Store volume												120.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.6000	(55)
Total storage loss	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)
If cylinder contains dedicated solar storage	18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412	(62)
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861	(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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(64)
								Total per year (kWh/year) = Sum(64)m =				1718.4454	(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	85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.8563	22.0772	17.9544	13.5926	10.1606	8.5780	9.2689	12.0480	16.1708	20.5326	23.9646	25.5472	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	327.8349	331.2369	322.6642	304.4139	281.3763	259.7242	245.2593	241.8574	250.4300	268.6803	291.7179	313.3700	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	(71)
Water heating gains (Table 5)	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329	(72)
Total internal gains	571.8909	570.0716	552.6719	519.7493	486.9643	454.1283	436.2997	439.0268	455.6497	488.5865	524.9399	556.7985	(73)

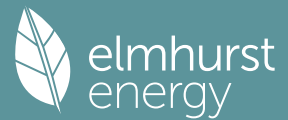
6. Solar gains

[Jan]																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																																													
-------	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

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	62.6236	62.8132	63.0002	63.8935	64.0634	64.8667	64.8667	65.0176	64.5549	64.0634	63.7205	63.3660	
alpha	5.1749	5.1875	5.2000	5.2596	5.2709	5.3244	5.3244	5.3345	5.3037	5.2709	5.2480	5.2244	
util living area													

Full SAP Calculation Printout



	0.9884	0.9724	0.9291	0.8168	0.6405	0.4568	0.3310	0.3756	0.6103	0.8840	0.9755	0.9911 (86)
MIT	19.9453	20.1799	20.4943	20.8032	20.9525	20.9935	20.9990	20.9982	20.9725	20.7425	20.2832	19.9030 (87)
Th 2	19.9455	19.9483	19.9511	19.9642	19.9667	19.9781	19.9781	19.9803	19.9737	19.9667	19.9617	19.9565 (88)
util rest of house												
	0.9847	0.9640	0.9091	0.7745	0.5789	0.3858	0.2545	0.2930	0.5284	0.8441	0.9666	0.9883 (89)
MIT 2	18.7496	19.0450	19.4289	19.7867	19.9326	19.9750	19.9779	19.9797	19.9582	19.7362	19.1884	18.7044 (90)
Living area fraction									FLA = Living area / (4) =			0.3522 (91)
MIT	19.1708	19.4447	19.8041	20.1447	20.2918	20.3337	20.3375	20.3384	20.3154	20.0906	19.5740	19.1265 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.0208	19.2947	19.6541	19.9947	20.1418	20.1837	20.1875	20.1884	20.1654	19.9406	19.4240	18.9765 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9802	0.9574	0.9025	0.7759	0.5897	0.4002	0.2702	0.3099	0.5443	0.8429	0.9605	0.9845 (94)
Useful gains	732.6130	848.3949	926.7507	908.7226	749.2449	502.0715	323.8789	340.9975	539.5073	716.1081	709.2094	693.9490 (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	1377.5317	1342.9560	1223.5683	1017.5793	772.2073	504.4380	324.1025	341.4563	550.6064	854.4220	1133.3976	1366.5494 (97)
Space heating kWh	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147 (98a)
Space heating requirement - total per year (kWh/year)												2037.1936
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	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2037.1936
Space heating per m2										(98c) / (4) =		25.4331 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	479.8195	332.3451	220.8324	78.3769	17.0840	0.0000	0.0000	0.0000	0.0000	102.9056	305.4155	500.4147 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-30.8063	-46.8880	-71.1671	-81.7715	-89.2055	-83.4787	-82.3610	-75.9817	-64.7256	-53.2009	-34.7040	-26.2504 (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	-6.7585	-15.7970	-35.5926	-61.3075	-87.5566	-90.3066	-89.1277	-73.8488	-52.6218	-26.9335	-9.8533	-5.1850 (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												2037.1936 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1718.4454 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												41.0000 (231)
Electricity for lighting (calculated in Appendix L)												175.5882 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1295.4295 (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												2676.7977 (238)

Full SAP Calculation Printout



10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	2037.1936	16.4900	335.9332 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1718.4454	16.4900	283.3716 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.0000	16.4900	6.7609 (249)
Energy for lighting	175.5882	16.4900	28.9545 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-740.5407	16.4900	-122.1152
PV Unit electricity exported	-554.8889	5.5900	-31.0183
Total			-153.1334 (252)
Total energy cost			501.8868 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.4443 (257)
SAP value		76.5882
SAP rating (Section 12)		77 (258)
SAP band		C

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	2037.1936	0.1572	320.3166 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1718.4454	0.1410	242.3036 (264)
Space and water heating			562.6202 (265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872 (267)
Energy for lighting	175.5882	0.1443	25.3428 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-740.5407	0.1340	-99.2010
PV Unit electricity exported	-554.8889	0.1227	-68.0617
Total			-167.2627 (269)
Total CO2, kg/year			426.3876 (272)
CO2 emissions per m2			5.3200 (273)
EI value			95.4328
EI rating			95 (274)
EI band			A

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

1. Overall dwelling characteristics

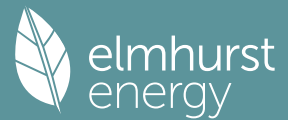
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	80.1000 (1b)	x 2.4000 (2b)	= 192.2400 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	80.1000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	192.2400 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1561 (8)
Pressure Test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4061 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3756 (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												

Full SAP Calculation Printout



Effective ac	0.3944	0.3756	0.3756	0.3474	0.3474	0.3099	0.3193	0.3005	0.3099	0.3287	0.3287	0.3568 (22b)
	0.5778	0.5705	0.5705	0.5604	0.5604	0.5480	0.5510	0.5451	0.5480	0.5540	0.5540	0.5637 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Windows (Uw = 1.40)			15.3700	1.3258	20.3769			(27)
Door			1.7500	1.0000	1.7500			(26)
Rooflight			2.5000	1.2357	3.0894			(27a)
Ground Floor			80.1000	0.1500	12.0150	110.0000	8811.0000	(28a)
External Wall 1	63.3400	17.1200	46.2200	0.1800	8.3196	60.0000	2773.2000	(29a)
Flat Roof	20.2500	2.5000	17.7500	0.1400	2.4850	9.0000	159.7500	(30)
Total net area of external elements Aum(A, m2)			163.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.0358			(33)
Party Wall 1			33.9800	0.0000	0.0000	180.0000	6116.4000	(32)
Party Ceiling 1			59.8500			30.0000	1795.5000	(32b)
Internal Wall 1			160.0800			9.0000	1440.7200	(32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21096.5700	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.3779	(35)
Thermal bridges (User defined value 0.040 * total exposed area)							6.5476	(36)
Point Thermal bridges							0.0000	(36a)
Total fabric heat loss						(33) + (36) + (36a) =	54.5834	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.4648	(42)
Hot water usage for mixer showers														
65.5456	64.5605	63.1252	60.3788	58.3521	56.0920	54.8073	56.2318	57.7933	60.2200	63.0254	65.2944	65.2944	(42a)	
Hot water usage for baths														
28.3100	27.8895	27.2974	26.2058	25.3883	24.4819	23.9923	24.5803	25.2204	26.1903	27.3045	28.2143	28.2143	(42b)	
Hot water usage for other uses														
39.8716	38.4217	36.9718	35.5219	34.0721	32.6222	32.6222	34.0721	35.5219	36.9718	38.4217	39.8716	39.8716	(42c)	
Average daily hot water use (litres/day)													122.9255	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
133.7271	130.8717	127.3944	122.1066	117.8125	113.1961	111.4218	114.8841	118.5357	123.3822	128.7515	133.3802	133.3802	(44)	
Energy content (annual)	211.7910	186.3596	195.8005	167.1578	158.5983	139.1878	134.7550	142.2505	146.1663	167.4284	183.4301	208.8412	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2041.7666		
31.7687	27.9539	29.3701	25.0737	23.7897	20.8782	20.2133	21.3376	21.9249	25.1143	27.5145	31.3262	(46)		
Water storage loss:														
Store volume												120.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.0000	(48)	
Temperature factor from Table 2b												0.6000	(49)	
Enter (49) or (54) in (55)												0.6000	(55)	
Total storage loss														
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(56)	
If cylinder contains dedicated solar storage														
18.6000	16.8000	18.6000	18.0000	18.6000	18.0000	18.0000	18.6000	18.6000	18.0000	18.6000	18.0000	18.6000	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
230.3910	203.1596	214.4005	185.1578	177.1983	157.1878	153.3550	160.8505	164.1663	186.0284	201.4301	227.4412	(62)		
WWHRS	-58.3669	-51.6202	-54.0537	-44.7586	-41.7134	-35.6945	-33.4579	-35.5791	-36.9309	-43.5374	-49.3226	-57.2861	(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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552	(64)	
Total per year (kWh/year) = Sum(64)m =												1718.4454	(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														
85.3005	75.4046	79.9837	69.9800	67.6139	60.6799	59.6860	62.1783	63.0003	70.5500	75.3905	84.3197	(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	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853	147.8853 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	24.8563	22.0772	17.9544	13.5926	10.1606	8.5780	9.2689	12.0480	16.1708	20.5326	23.9646	25.5472 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	327.8349	331.2369	322.6642	304.4139	281.3763	259.7242	245.2593	241.8574	250.4300	268.6803	291.7179	313.3700 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533	52.2533 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902	-98.5902 (71)
Water heating gains (Table 5)	114.6512	112.2092	107.5049	97.1944	90.8789	84.2777	80.2232	83.5730	87.5004	94.8252	104.7090	113.3329 (72)
Total internal gains	571.8909	570.0716	552.6719	519.7493	486.9643	454.1283	436.2997	439.0268	455.6497	488.5865	524.9399	556.7985 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North	6.4100				11.9814		0.7600		0.7000	0.7700	28.3147	(74)
East	3.5200				22.3313		0.7600		0.7000	0.7700	28.9802	(76)
South	5.4400				50.9848		0.7600		0.7000	0.7700	102.2550	(78)
South	2.5000				30.0000		0.7600		0.7000	1.0000	35.9100	(82)
Solar gains	195.4600	317.4428	472.2223	671.1972	788.3630	862.4632	812.3825	719.2677	579.0726	387.5646	243.6474	163.2284 (83)
Total gains	767.3509	887.5144	1024.8942	1190.9466	1275.3273	1316.5915	1248.6822	1158.2944	1034.7223	876.1510	768.5873	720.0269 (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	64.2303	64.5549	64.5549	65.0176	65.0176	65.5875	65.4502	65.7212	65.5875	65.3094	65.3094	64.8667
alpha	5.2820	5.3037	5.3037	5.3345	5.3345	5.3725	5.3633	5.3814	5.3725	5.3540	5.3540	5.3244
util living area	0.9834	0.9652	0.9084	0.7607	0.5533	0.3386	0.2222	0.2462	0.4947	0.8262	0.9607	0.9872 (86)
MIT	20.1046	20.3029	20.6091	20.8782	20.9802	20.9989	20.9999	20.9999	20.9918	20.8456	20.4474	20.0647 (87)
Th 2	19.9691	19.9737	19.9737	19.9803	19.9803	19.9882	19.9863	19.9901	19.9882	19.9844	19.9844	19.9781 (88)
util rest of house	0.9780	0.9546	0.8830	0.7108	0.4875	0.2705	0.1496	0.1686	0.4113	0.7721	0.9464	0.9829 (89)
MIT 2	18.9685	19.2176	19.5830	19.8777	19.9680	19.9878	19.9863	19.9901	19.9846	19.8588	19.4081	18.9256 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.3686	19.5998	19.9444	20.2300	20.3244	20.3439	20.3433	20.3457	20.3393	20.2063	19.7741	19.3268 (92)
Temperature adjustment	-0.1500											
adjusted MIT	19.2186	19.4498	19.7944	20.0800	20.1744	20.1939	20.1933	20.1957	20.1893	20.0563	19.6241	19.1768 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9727	0.9478	0.8779	0.7160	0.5003	0.2844	0.1644	0.1844	0.4282	0.7764	0.9401	0.9784 (94)
Useful gains	746.4332	841.1979	899.7141	852.7216	638.0175	374.4064	205.3212	213.5968	443.0229	680.2155	722.5325	704.4905 (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	1288.1318	1257.2563	1125.1336	917.5441	646.6464	374.7200	205.3319	213.6163	445.7880	758.7792	1043.0234	1271.7196 (97)
Space heating kWh	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (98a)
Space heating requirement - total per year (kWh/year)	1614.6426											
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	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1614.6426											
Space heating per m2	(98c) / (4) = 20.1578 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	100.0000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	403.0238	279.5912	167.7121	46.6722	6.4199	0.0000	0.0000	0.0000	0.0000	58.4514	230.7534	422.0184 (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	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	172.0241	151.5394	160.3468	140.3992	135.4849	121.4933	119.8971	125.2714	127.2355	142.4910	152.1075	170.1552 (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)
Pumps and Fa	3.4822	3.1452	3.4822	3.3699	3.4822	3.3699	3.4822	3.4822	3.3699	3.4822	3.3699	3.4822 (231)
Lighting	21.7566	17.4539	15.7153	11.5137	8.8935	7.2661	8.1130	10.5456	13.6976	17.9721	20.2994	22.3613 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-33.8061	-46.7477	-69.8230	-81.7924	-88.5645	-87.2783	-85.5311	-80.1554	-68.3682	-55.2598	-38.5314	-28.6016 (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	-8.3040	-16.5436	-36.7675	-65.5484	-88.8833	-99.4779	-96.7407	-82.6145	-58.6742	-31.1648	-12.6545	-6.2869 (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)

Full SAP Calculation Printout



Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													1614.6426	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													100.0000	
Water heating fuel used													1718.4454	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
central heating pump													41.0000	(230c)
Total electricity for the above, kWh/year													41.0000	(231)
Electricity for lighting (calculated in Appendix L)													175.5882	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1368.1197	(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													2181.5565	(238)

10a. Fuel costs - using BEDF prices (542)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1614.6426	25.1600	406.2441	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1718.4454	25.1600	432.3609	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.0000	25.1600	10.3156	(249)
Energy for lighting	175.5882	25.1600	44.1780	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	25.1600	-192.3380	
PV Unit electricity exported	-603.6603	5.8100	-35.0727	
Total			-227.4107	(252)
Total energy cost			665.6879	(255)

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	1614.6426	0.1580	255.1912	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1718.4454	0.1410	242.3036	(264)
Space and water heating			497.4948	(265)
Pumps, fans and electric keep-hot	41.0000	0.1387	5.6872	(267)
Energy for lighting	175.5882	0.1443	25.3428	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	0.1339	-102.3411	
PV Unit electricity exported	-603.6603	0.1225	-73.9600	
Total			-176.3011	(269)
Total CO2, kg/year			352.2237	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	1614.6426	1.5851	2559.3029	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1718.4454	1.5214	2614.4038	(278)
Space and water heating			5173.7067	(279)
Pumps, fans and electric keep-hot	41.0000	1.5128	62.0248	(281)
Energy for lighting	175.5882	1.5338	269.3230	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-764.4594	1.4947	-1142.6582	
PV Unit electricity exported	-603.6603	0.4495	-271.3636	
Total			-1414.0218	(283)
Total Primary energy kWh/year			4091.0328	(286)