

Summary for Input Data



Property Reference	SAP 0898 Plot 10	Issued on Date	06/01/2025
Assessment Reference	Rev C	Prop Type Ref	3BC-H
Property	Plot 10, Wharton's Lane, Southampton		

SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER			6.22
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE			11.35
% DPER < TPER	3.85	DPER	63.95	TPER	66.51

Assessor Details	Mr. Tobias Whiting	Assessor ID	E477-0001
Client			

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

Orientation	Northwest
Property Tenure	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, Detached
Which Floor	0
2.0 Number of Storeys	2
3.0 Date Built	2023
3.0 Property Age Band	L
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	169.85 kJ/m ² K
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	26.88 m	43.06 m ²	2.61 m
1st Storey:	34.89 m	53.40 m ²	2.38 m

8.0 Living Area	14.95 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 Code	Openings	Area Calculation Type
	Brick and Block	Cavity Wall	Other	0.18	42.22	102.14	84.81	0.00	None	17.33	Calculate Wall Area
	Tile Hung	Cavity Wall	Other	0.18	42.22	51.06	44.52	0.00	None	6.54	Enter Gross Area

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Ground Floor Stud	Plasterboard on timber frame	9.00	30.30
	First Floor Stud	Plasterboard on timber frame	9.00	105.51
	Ground Floor Block	Dense block, plasterboard on dabs	75.00	49.78

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
	Pitched Roof	External Plane Roof	Other	0.09	0.00	53.40	53.40	None	0.00	Calculate Wall Area	0.00

10.2 Internal Ceilings	Description	Storey	Construction	Area (m ²)
	Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	43.06

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Ground Floor	Ground Floor - Solid	Lowest occupied	Other	0.12	None	0.00	90.00	53.40

Summary for Input Data



11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
First Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	43.06

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Front Door	Manufacturer	Solid Door				0.00			1.10
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.45		0.70	1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front Door	Front Door	Brick and Block	North West	2.15	0
Front Elevation	Windows	Brick and Block	North West	6.09	0
Rear Elevation	Windows	Brick and Block	South East	2.49	0
Side Elevation	Windows	Brick and Block	North East	2.68	0
Front Elevation	Windows	Tile Hung	North West	3.81	0
Side Elevation	Windows	Tile Hung	North East	1.50	0
Side Elevation	Windows	Brick and Block	South West	3.93	0
Side Elevation	Windows	Tile Hung	South West	1.23	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Non Gov Approved Schemes	16.06	0.03	0.03 Catnic WT-5077	No
E3 Sill	Non Gov Approved Schemes	13.68	0.03	0.03 Knauf P5	No
E4 Jamb	Non Gov Approved Schemes	36.75	0.02	0.02 Knauf P6	No
E5 Ground floor (normal)	Independently assessed	34.89	0.06	0.06 SEES-2242-E5	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	26.88	0.00	0.00 Knauf P14	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	28.06	0.07	0.07 Knauf P16	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	10.40	0.04	0.04 Knauf P21	No
E16 Corner (normal)	Non Gov Approved Schemes	27.11	0.04	0.04 Knauf P23	No
E24 Eaves (insulation at ceiling level - inverted)	Non Gov Approved Schemes	4.32	0.16	0.16 Knauf P19	No
E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	7.16	-0.08	-0.08 Knauf P24	No

Y-value

 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	<input type="text" value="Yes"/>
Approved Installation	<input type="text" value="No"/>
Mechanical Ventilation data Type	<input type="text" value="Database"/>
Type	<input type="text" value="Mechanical extract ventilation - centralised"/>
MV Reference Number	<input type="text" value="500260"/>
Configuration	<input type="text" value="2"/>
MVHR Duct Insulated	<input type="text" value="Uninsulated Ducts"/>
Manufacturer SFP	<input type="text" value="0.26"/>
Duct Type	<input type="text" value="Rigid"/>
Wet Rooms	<input type="text" value="2"/>
SFP from Installer Commissioning Certificate	<input type="text" value="No"/>

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	<input type="text" value="0"/>
Number of open flues	<input type="text" value="0"/>
Number of chimneys/flues attached to closed fire	<input type="text" value="0"/>
Number of flues attached to solid fuel boiler	<input type="text" value="0"/>
Number of flues attached to other heater	<input type="text" value="0"/>
Number of blocked chimneys	<input type="text" value="0"/>
Number of intermittent extract fans	<input type="text" value="0"/>
Number of passive vents	<input type="text" value="0"/>
Number of flueless gas fires	<input type="text" value="0"/>

Summary for Input Data



21.0 Fixed Cooling System

No

22.0 Pressure Testing

Yes

Designed AP₅₀

4.00

m³/(h.m²) @ 50 Pa

Property Tested?

Yes

Test Method

Blower Door

22.0 Lighting

No Fixed Lighting

No

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	78.00	10.00	780.00	19

24.0 Main Heating 1

Database

Description

Gas Combi

Percentage of Heat

100.00

%

Database Ref. No.

17959

Fuel Type

Mains gas

SAP Code

104

In Winter

88.70

In Summer

76.20

Model Name

ecoFIT sustain 830

Manufacturer

Vaillant

System Type

Combi boiler

Controls SAP Code

2106

PCDF Controls

0

Delayed Start Stat

No

Burner Control

Modulating

Boiler Compensator

0

HETAS approved System

No

Flue Type

Balanced

Fan Assisted Flue

Yes

Is MHS Pumped

Pump in heated space

Heating Pump Age

2013 or later

Heat Emitter

Radiators

Flow Temperature

Enter value

Flow Temperature Value

55.00

Boiler Interlock

Yes

Combi boiler type

Standard Combi

25.0 Main Heating 2

None

26.0 Heat Networks

None

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None								
Heat source 2	None								
Heat source 3	None								
Heat source 4	None								
Heat source 5	None								

27.0 Secondary Heating

None

28.0 Water Heating

Water Heating

Main Heating 1

SAP Code

901

Flue Gas Heat Recovery System

No

Summary for Input Data



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
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Baths connected to WWHRS	0
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
Over Bath	Combi boiler or unvented hot water system	8.00		Yes	Instantaneous System 1

28.3 Waste Water Heat Recovery System Instantaneous System 1

Database ID	80194
Brand Model	Zypho, Slim DW50
Details	Year: 2022 + current Efficiency: 54.9 Utilisation factor: 0.987

29.0 Hot Water Cylinder

Cylinder Stat	None	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	None	
Insulation Thickness	0	
Cylinder Volume	0.00	L
Loss	0.00	kWh/day
In Airing Cupboard	No	

31.0 Thermal Store

Thermal Store Pipework	within a single casing
------------------------	------------------------

32.0 Photovoltaic Unit

Export Capable Meter?	Yes
Connected To Dwelling	Yes
Diverter	No
Battery Capacity [kWh]	0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
1.22	South East	45°	None Or Little	No	No	1.00		

34.0 Small-scale Hydro

Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
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

Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
--------------	--------------------------	---	----------------------

Summary for Input Data



Solar water heating

B 90
0
0

B 91
0
0

Full SAP Calculation Printout



Property Reference	SAP 0898 Plot 10		Issued on Date	06/01/2025	
Assessment Reference	Rev C	Prop Type Ref	3BC-H		
Property	Plot 10, Wharton's Lane, Southampton				
SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER		6.22	
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE		11.35	
% DPER < TPER	3.85	DPER	63.95	TPER	66.51
Assessor Details	Mr. Tobias Whiting			Assessor ID	E477-0001
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	43.0600 (1b)	2.6100 (2b)	112.3866 (1b) - (3b)
First floor	53.4000 (1c)	2.3800 (2c)	127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.4786 (5)

2. Ventilation rate

	m3 per hour											
Number of open chimneys	0 * 80 =											0.0000 (6a)
Number of open flues	0 * 20 =											0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)
Number of blocked chimneys	0 * 20 =											0.0000 (6f)
Number of intermittent extract fans	0 * 10 =											0.0000 (7a)
Number of passive vents	0 * 10 =											0.0000 (7b)
Number of flueless gas fires	0 * 40 =											0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =											0.0000 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												4.0000 (17)
Infiltration rate												0.2000 (18)
Number of sides sheltered												2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	57.7499			(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32a)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				16384.0893 (34)

Full SAP Calculation Printout



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

169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.9237 (36)
Point Thermal bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 64.6736 (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	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140 (38)
Average = Sum(39)m / 12 =	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876 (39)
HLP	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801 (40)
HLP (average)												1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	69.5612	68.5158	66.9925	64.0779	61.9270	59.5284	58.1650	59.6768	61.3340	63.9094	66.8865	69.2946 (42)
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352 (42b)
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242 (42c)
Average daily hot water use (litres/day)	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy content (annual)	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406 (61)
Total heat required for water heating calculated for each month	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801 (62)
WWHRS	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376 (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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Total per year (kWh/year)												1730.4852 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	75.1244	66.1200	69.4906	59.3525	56.3344	49.4596	47.8919	50.5406	51.9154	59.4422	65.0927	74.0803 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703 (72)
Total internal gains	544.3281	557.8803	532.8052	512.1048	483.5771	461.2205	441.6353	442.5963	457.5304	478.0541	510.3772	531.8732 (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
Northeast	4.1800	11.2829	0.4500	0.7000	0.7700	10.2954 (75)
Southeast	2.4900	36.7938	0.4500	0.7000	0.7700	19.9995 (77)
Southwest	5.1600	36.7938	0.4500	0.7000	0.7700	41.4447 (79)
Northwest	9.9000	11.2829	0.4500	0.7000	0.7700	24.3838 (81)

Full SAP Calculation Printout



Solar gains	96.1233	175.2525	270.3847	386.3044	479.5032	496.6259	470.2317	397.5533	310.0315	201.9410	117.2313	80.9041 (83)
Total gains	640.4514	733.1329	803.1900	898.4092	963.0804	957.8465	911.8670	840.1496	767.5619	679.9951	627.6085	612.7773 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9872	0.9775	0.9586	0.9058	0.7988	0.6344	0.4852	0.5413	0.7695	0.9330	0.9781	0.9892 (86)
MIT	19.3226	19.5450	19.8782	20.3232	20.6977	20.9105	20.9757	20.9630	20.8058	20.3199	19.7365	19.2673 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9844	0.9725	0.9490	0.8835	0.7524	0.5562	0.3844	0.4376	0.7015	0.9124	0.9724	0.9868 (89)
MIT 2	18.4920	18.7117	19.0387	19.4651	19.8021	19.9692	20.0087	20.0032	19.8989	19.4708	18.9032	18.4372 (90)
Living area fraction												fLA = Living area / (4) = 0.1550 (91)
MIT	18.6207	18.8408	19.1688	19.5981	19.9409	20.1151	20.1586	20.1519	20.0394	19.6024	19.0324	18.5659 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6207	18.8408	19.1688	19.5981	19.9409	20.1151	20.1586	20.1519	20.0394	19.6024	19.0324	18.5659 (93)

8. Space heating requirement

Utilisation	0.9788	0.9646	0.9386	0.8723	0.7484	0.5645	0.3994	0.4525	0.7032	0.9016	0.9646	0.9818 (94)
Useful gains	626.8714	707.2039	753.8539	783.6614	720.7342	540.7091	364.1754	380.1764	539.7363	613.0615	605.4010	601.6414 (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	1492.0416	1452.4609	1319.9315	1114.6103	858.6045	574.6047	370.7625	390.9037	618.8148	937.9416	1243.2041	1496.7443 (97)
Space heating kWh	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98a)
Space heating requirement - total per year (kWh/year)												3273.4053
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	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3273.4053
Space heating per m2												(98c) / (4) = 33.9354 (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 %)												88.7000 (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	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98)
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	0.0000	0.0000	0.0000	0.0000	88.7000	88.7000	88.7000 (210)
Space heating fuel (main heating system)	725.6895	564.6140	474.8159	268.6395	115.6432	0.0000	0.0000	0.0000	0.0000	272.5037	517.7207	750.7966 (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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Efficiency of water heater	85.6628	85.3734	84.7987	83.5929	81.1393	76.2000	76.2000	76.2000	76.2000	83.6087	85.1764	76.2000 (216)
Fuel for water heating, kWh/month	207.1858	182.7456	193.5831	169.1691	166.2409	156.4598	152.7238	160.8533	164.7857	170.6746	181.8059	85.7689 (217)
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	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	16.3364	15.8094	16.3364	15.8094	16.3364 (231)
Lighting	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.5903	-32.2235	-49.0082	-58.4189	-65.9430	-62.6537	-61.9074	-56.9798	-48.8060	-38.2945	-24.3670	-18.4649 (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)	-7.3184	-15.7745	-32.0674	-49.2246	-66.1297	-66.8126	-66.0101	-55.3973	-39.9734	-22.8850	-9.8757	-5.7583 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3690.4231 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												76.2000
Water heating fuel used												2110.5468 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.3640)												
mechanical ventilation fans (SFP = 0.3640)												106.3477 (230a)

Full SAP Calculation Printout



central heating pump	41.0000 (230c)
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	192.3477 (231)
Electricity for lighting (calculated in Appendix L)	213.7076 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-975.8843 (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	5231.1408 (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	3690.4231	0.2100	774.9889 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2110.5468	0.2100	443.2148 (264)
Space and water heating			1218.2037 (265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810 (267)
Energy for lighting	213.7076	0.1443	30.8446 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	0.1334	-71.8551
PV Unit electricity exported	-437.2269	0.1253	-54.7710
Total			-126.6262 (269)
Total CO2, kg/year			1149.1031 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.9100 (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	3690.4231	1.1300	4170.1781 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2110.5468	1.1300	2384.9179 (278)
Space and water heating			6555.0960 (279)
Pumps, fans and electric keep-hot	192.3477	1.5128	290.9835 (281)
Energy for lighting	213.7076	1.5338	327.7918 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	1.4929	-804.1852
PV Unit electricity exported	-437.2269	0.4598	-201.0344
Total			-1005.2196 (283)
Total Primary energy kWh/year			6168.6517 (286)
Dwelling Primary energy Rate (DPER)			63.9500 (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	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4786 (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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1253 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3753	(18)
Number of sides sheltered	2	(19)
Shelter factor		
Infiltration rate adjusted to include shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
	(21) = (18) x (20) =	0.3190 (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												
Effective ac	0.4067	0.3987	0.3908	0.3509	0.3429	0.3030	0.3030	0.2951	0.3190	0.3429	0.3589	0.3748 (22b)
	0.5827	0.5795	0.5763	0.5616	0.5588	0.5459	0.5459	0.5435	0.5509	0.5588	0.5644	0.5702 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.20)			21.7300	1.1450	24.8817		(27)
Ground Floor			53.4000	0.1300	6.9420		(28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631		(29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136		(29a)
Pitched Roof	53.4000		53.4000	0.1100	5.8740		(30)
Total net area of external elements Aum(A, m2)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 63.1244		(33)

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

169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0500	0.8030
E3 Sill	13.6800	0.0500	0.6840
E4 Jamb	36.7500	0.0500	1.8375
E5 Ground floor (normal)	34.8900	0.1600	5.5824
E6 Intermediate floor within a dwelling	26.8800	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	28.0600	0.0600	1.6836
E12 Gable (insulation at ceiling level)	10.4000	0.0600	0.6240
E16 Corner (normal)	27.1100	0.0900	2.4399
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.2400	1.0368
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0900	-0.6444
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.0468 (36)
Point Thermal bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 77.1712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	46.0498	45.7960	45.5472	44.3788	44.1602	43.1425	43.1425	42.9540	43.5345	44.1602	44.6024	45.0648 (38)
Heat transfer coeff	123.2210	122.9672	122.7184	121.5500	121.3314	120.3137	120.3137	120.1252	120.7057	121.3314	121.7736	122.2360 (39)
Average = Sum(39)m / 12 =												121.5489

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2774	1.2748	1.2722	1.2601	1.2578	1.2473	1.2473	1.2453	1.2514	1.2578	1.2624	1.2672 (40)
HLP (average)												1.2601
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.7042 (42)
Hot water usage for mixer showers												
69.5612	68.5158	66.9925	64.0779	61.9270	59.5284	58.1650	59.6768	61.3340	63.9094	66.8865	69.2946	69.2946 (42a)
Hot water usage for baths												
30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352	29.9352 (42b)
Hot water usage for other uses												
42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242	42.3242 (42c)
Average daily hot water use (litres/day)												130.4585 (43)
Daily hot water use	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy conte	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Energy content (annual)												Total = Sum(45)m = 2166.8878
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	275.7289	243.8072	258.7579	226.7162	219.2759	197.0321	193.9717	201.9267	204.4388	228.6477	243.9862	272.5984 (62)
WWHRS	-31.8005	-28.1246	-29.4504	-24.3861	-22.7270	-19.4477	-18.2291	-19.3848	-20.1213	-23.7208	-26.8728	-31.2116 (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	243.9285	215.6827	229.3075	202.3301	196.5489	177.5844	175.7426	182.5419	184.3175	204.9270	217.1134	241.3869 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2471.4113 (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	87.4758	77.2686	81.8329	71.3146	68.7051	61.4447	60.2915	62.9365	63.9074	71.8213	77.0569	86.4349 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	(71)
Water heating gains (Table 5)	117.5749	114.9831	109.9905	99.0481	92.3456	85.3398	81.0369	84.5921	88.7603	96.5340	107.0235	116.1759	(72)
Total internal gains	560.9294	574.4706	549.3943	528.7189	500.2045	477.8664	458.3014	459.2574	474.1859	494.6927	526.9941	548.4788	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	4.1800	11.2829	0.6300	0.7000	0.7700	14.4135 (75)
Southeast	2.4900	36.7938	0.6300	0.7000	0.7700	27.9992 (77)
Southwest	5.1600	36.7938	0.6300	0.7000	0.7700	58.0225 (79)
Northwest	9.9000	11.2829	0.6300	0.7000	0.7700	34.1373 (81)

Solar gains	134.5726	245.3535	378.5386	540.8261	671.3045	695.2763	658.3244	556.5746	434.0441	282.7174	164.1238	113.2658	(83)
Total gains	695.5020	819.8241	927.9330	1069.5450	1171.5090	1173.1427	1116.6258	1015.8320	908.2300	777.4101	691.1179	661.7445	(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	36.9347	37.0110	37.0860	37.4425	37.5100	37.8273	37.8273	37.8866	37.7044	37.5100	37.3737	37.2324	37.2324
alpha	3.4623	3.4674	3.4724	3.4962	3.5007	3.5218	3.5218	3.5258	3.5136	3.5007	3.4916	3.4822	3.4822
util living area	0.9844	0.9719	0.9472	0.8823	0.7630	0.5962	0.4555	0.5130	0.7436	0.9206	0.9736	0.9868	(86)
MIT	19.0176	19.2911	19.6984	20.2360	20.6599	20.8974	20.9697	20.9543	20.7712	20.2078	19.5225	18.9731	(87)
Th 2	19.8586	19.8606	19.8627	19.8722	19.8740	19.8824	19.8824	19.8839	19.8791	19.8740	19.8704	19.8666	(88)
util rest of house	0.9808	0.9654	0.9348	0.8545	0.7091	0.5112	0.3477	0.4012	0.6668	0.8955	0.9664	0.9837	(89)
MIT 2	17.5707	17.9177	18.4300	19.0915	19.5743	19.8154	19.8700	19.8634	19.7077	19.0755	18.2210	17.5192	(90)
Living area fraction	FLA = Living area / (4) =												0.1550 (91)
MIT	17.7949	18.1305	18.6266	19.2688	19.7426	19.9831	20.0404	20.0324	19.8725	19.2510	18.4227	17.7446	(92)
Temperature adjustment													0.0000
adjusted MIT	17.7949	18.1305	18.6266	19.2688	19.7426	19.9831	20.0404	20.0324	19.8725	19.2510	18.4227	17.7446	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9710	0.9517	0.9169	0.8366	0.7021	0.5193	0.3635	0.4168	0.6663	0.8777	0.9532	0.9750	(94)
Useful gains	675.3034	780.1924	850.8579	894.7946	822.5012	609.2411	405.9359	423.4151	605.1489	682.2992	658.7501	645.1718	(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	1662.8568	1626.9200	1488.1513	1260.3329	975.8144	647.6616	413.9319	436.3487	696.7782	1049.6345	1378.8042	1655.6312	(97)
Space heating kWh	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98a)
Space heating requirement - total per year (kWh/year)													3698.6577
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	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													3698.6577
Space heating per m ²													(98c) / (4) = 38.3440 (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 %)													92.4000 (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	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	795.1729	615.8019	513.1453	284.8350	123.4470	0.0000	0.0000	0.0000	0.0000	295.7765	561.0811	813.6167	(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	243.9285	215.6827	229.3075	202.3301	196.5489	177.5844	175.7426	182.5419	184.3175	204.9270	217.1134	241.3869	(64)
Efficiency of water heater (217)m	86.5886	86.3578	85.9011	84.9459	83.2577	80.3000	80.3000	80.3000	80.3000	84.9991	86.1758	86.6446	(216)
Fuel for water heating, kWh/month	281.7096	249.7546	266.9437	238.1870	236.0730	221.1512	218.8575	227.3249	229.5361	241.0931	251.9425	278.5941	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	26.2460	21.0555	18.9582	13.8896	10.7287	8.7654	9.7871	12.7216	16.5241	21.6805	24.4881	26.9755	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.5653	-57.3375	-82.6254	-93.1321	-100.5979	-93.9256	-92.7225	-87.4212	-78.1374	-65.6185	-44.6320	-35.0501	(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)

Full SAP Calculation Printout



Property Reference	SAP 0898 Plot 10		Issued on Date	06/01/2025	
Assessment Reference	Rev C	Prop Type Ref	3BC-H		
Property	Plot 10, Wharton's Lane, Southampton				
SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER			6.22
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE			11.35
% DPER < TPER	3.85	DPER	63.95	TPER	66.51
Assessor Details	Mr. Tobias Whiting			Assessor ID	E477-0001
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	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4786 (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) =											0.1253 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												4.0000 (17)
Infiltration rate												0.3253 (18)
Number of sides sheltered												2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.2765 (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	0.3525	0.3456	0.3387	0.3041	0.2972	0.2627	0.2627	0.2557	0.2765	0.2972	0.3110	0.3249 (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	0.5621	0.5597	0.5574	0.5462	0.5442	0.5345	0.5345	0.5327	0.5382	0.5442	0.5484	0.5528 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	57.7499	(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32c)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 16384.0893 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							169.8537 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.9237 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			64.6736 (37) (33) + (36) + (36a) =

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.4242	44.2335	44.0466	43.1688	43.0046	42.2400	42.2400	42.0984	42.5345	43.0046	43.3368	43.6842 (38)
Average = Sum(39)m / 12 =	109.0978	108.9072	108.7203	107.8424	107.6782	106.9136	106.9136	106.7720	107.2081	107.6782	108.0104	108.3578 (39)
HLP	1.1310	1.1290	1.1271	1.1180	1.1163	1.1084	1.1084	1.1069	1.1114	1.1163	1.1197	1.1233 (40)
HLP (average)												1.1180
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7042 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352 (42b)
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242 (42c)
Average daily hot water use (litres/day)												66.3254 (43)
Daily hot water use	72.3610	70.3759	68.2086	65.5113	63.1049	60.6042	60.0847	62.2476	64.4658	67.0339	69.7551	72.2595 (44)
Energy content (annual)	114.6022	100.2143	104.8341	89.6817	84.9514	74.5199	72.6673	77.0755	79.4928	90.9644	99.3790	113.1409 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	97.4118	85.1821	89.1090	76.2294	72.2087	63.3419	61.7672	65.5142	67.5689	77.3198	84.4721	96.1697 (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	97.4118	85.1821	89.1090	76.2294	72.2087	63.3419	61.7672	65.5142	67.5689	77.3198	84.4721	96.1697 (64)
Total per year (kWh/year)												936.2948 (64)
Electric shower(s)	55.7069	49.6353	54.1998	51.7222	52.6928	50.2638	51.9393	52.6928	51.7222	54.1998	53.1807	55.7069 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												633.6626 (64a)
Heat gains from water heating, kWh/month	38.2797	33.7044	35.8272	31.9879	31.2254	28.4014	28.4266	29.5517	29.8228	32.8799	34.4132	37.9692 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Pumps, fans	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Total internal gains	51.4512	50.1553	48.1548	44.4277	41.9696	39.4464	38.2078	39.7201	41.4205	44.1934	47.7961	51.0338 (72)
	491.8057	506.6428	484.5587	471.0984	446.8285	431.9731	415.4723	414.3854	426.8462	439.3522	464.7667	480.3367 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	g	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
Northeast	4.1800	11.2829	0.4500	0.7000	0.7700	10.2954 (75)						
Southeast	2.4900	36.7938	0.4500	0.7000	0.7700	19.9995 (77)						
Southwest	5.1600	36.7938	0.4500	0.7000	0.7700	41.4447 (79)						
Northwest	9.9000	11.2829	0.4500	0.7000	0.7700	24.3838 (81)						
Solar gains	96.1233	175.2525	270.3847	386.3044	479.5032	496.6259	470.2317	397.5533	310.0315	201.9410	117.2313	80.9041 (83)
Total gains	587.9290	681.8953	754.9435	857.4028	926.3317	928.5990	885.7040	811.9387	736.8777	641.2932	581.9980	561.2408 (84)

Full SAP Calculation Printout



7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	41.7161	41.7891	41.8610	42.2017	42.2661	42.5683	42.5683	42.6248	42.4514	42.2661	42.1361	42.0010
alpha	3.7811	3.7859	3.7907	3.8134	3.8177	3.8379	3.8379	3.8417	3.8301	3.8177	3.8091	3.8001
util living area	0.9905	0.9827	0.9671	0.9203	0.8221	0.6590	0.5081	0.5669	0.7945	0.9454	0.9833	0.9921 (86)
MIT	19.1462	19.3791	19.7330	20.2261	20.6400	20.8913	20.9693	20.9536	20.7681	20.2292	19.6067	19.1067 (87)
Th 2	19.9756	19.9772	19.9788	19.9862	19.9875	19.9940	19.9940	19.9952	19.9915	19.9875	19.9847	19.9818 (88)
util rest of house	0.9883	0.9787	0.9591	0.9003	0.7774	0.5790	0.4017	0.4584	0.7279	0.9276	0.9787	0.9902 (89)
MIT 2	18.2870	18.5189	18.8690	19.3505	19.7290	19.9353	19.9834	19.9776	19.8484	19.3632	18.7519	18.2523 (90)
Living area fraction	FLA = Living area / (4) =											0.1550 (91)
MIT	18.4202	18.6522	19.0029	19.4862	19.8702	20.0835	20.1362	20.1289	19.9910	19.4974	18.8844	18.3847 (92)
Temperature adjustment												0.0000
adjusted MIT	18.4202	18.6522	19.0029	19.4862	19.8702	20.0835	20.1362	20.1289	19.9910	19.4974	18.8844	18.3847 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9836	0.9716	0.9491	0.8883	0.7715	0.5867	0.4174	0.4737	0.7279	0.9165	0.9718	0.9861 (94)
Useful gains	578.3089	662.5599	716.5300	761.6230	714.6780	544.7828	369.6711	384.5759	536.3628	587.7558	565.5842	553.4311 (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	1540.4832	1497.7161	1359.3173	1141.6463	879.7506	586.2605	378.0658	398.1391	631.5592	958.0558	1272.8344	1537.0219 (97)
Space heating kWh	715.8577	561.2250	478.2338	273.6168	122.8140	0.0000	0.0000	0.0000	0.0000	275.5032	509.2201	731.7916 (98a)
Space heating requirement - total per year (kWh/year)												3668.2621
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	715.8577	561.2250	478.2338	273.6168	122.8140	0.0000	0.0000	0.0000	0.0000	275.5032	509.2201	731.7916 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3668.2621
Space heating per m2												(98c) / (4) = 38.0288 (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	1004.9880	791.1607	811.4674	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8049	0.8709	0.8339	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	808.8781	689.0254	676.6496	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1035.1586	987.4647	903.7296	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	162.9219	222.0388	168.9475	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	40.7305	55.5097	42.2369	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												138.4771 (107)
Energy for space heating												38.0288 (99)
Energy for space cooling												1.4356 (108)
Total												39.4644 (109)
Fabric Energy Efficiency (DFEE)												39.5 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4786 (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)

Full SAP Calculation Printout



Number of passive vents		0 * 10 =	0.0000 (7b)
Number of flueless gas fires		0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour	30.0000 / (5) = 0.1253 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50			5.0000 (17)
Infiltration rate			0.3753 (18)
Number of sides sheltered			2 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3190 (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 infiltr rate	0.4067	0.3987	0.3908	0.3509	0.3429	0.3030	0.3030	0.2951	0.3190	0.3429	0.3589	0.3748 (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	0.5827	0.5795	0.5763	0.5616	0.5588	0.5459	0.5459	0.5435	0.5509	0.5588	0.5644	0.5702 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.20)			21.7300	1.1450	24.8817		(27)
Ground Floor			53.4000	0.1300	6.9420		(28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631		(29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136		(29a)
Pitched Roof	53.4000		53.4000	0.1100	5.8740		(30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)					(26) ... (30) + (32) = 63.1244		(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0500	0.8030
E3 Sill	13.6800	0.0500	0.6840
E4 Jamb	36.7500	0.0500	1.8375
E5 Ground floor (normal)	34.8900	0.1600	5.5824
E6 Intermediate floor within a dwelling	26.8800	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	28.0600	0.0600	1.6836
E12 Gable (insulation at ceiling level)	10.4000	0.0600	0.6240
E16 Corner (normal)	27.1100	0.0900	2.4399
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.2400	1.0368
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0900	-0.6444

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 14.0468 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 77.1712 (37)

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

(39)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	46.0498	45.7960	45.5472	44.3788	44.1602	43.1425	43.1425	42.9540	43.5345	44.1602	44.6024	45.0648 (38)
Average = Sum(39)m / 12 =	123.2210	122.9672	122.7184	121.5500	121.3314	120.3137	120.3137	120.1252	120.7057	121.3314	121.7736	122.2360 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2774	1.2748	1.2722	1.2601	1.2578	1.2473	1.2473	1.2453	1.2514	1.2578	1.2624	1.2672 (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													2.7042 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352	29.9352 (42b)
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242	42.3242 (42c)
Average daily hot water use (litres/day)													66.3254 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	72.3610	70.3759	68.2086	65.5113	63.1049	60.6042	60.0847	62.2476	64.4658	67.0339	69.7551	72.2595 (44)	
Energy content (annual)	114.6022	100.2143	104.8341	89.6817	84.9514	74.5199	72.6673	77.0755	79.4928	90.9644	99.3790	113.1409 (45)	
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1101.5233

Water storage loss: 0.0000 (46)

Total storage loss 0.0000 (56)

If cylinder contains dedicated solar storage 0.0000 (57)

Primary loss 0.0000 (59)

Combi loss 0.0000 (61)

Total heat required for water heating calculated for each month

WWHRS	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 (62)	
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 (63a)	
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 (63b)	
Output from w/h	97.4118	85.1821	89.1090	76.2294	72.2087	63.3419	61.7672	65.5142	67.5689	77.3198	84.4721	96.1697 (62)	
													0.0000 (63a)
													0.0000 (63b)
													0.0000 (63c)
													0.0000 (63d)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 936.2948 (64)

Electric shower(s) 936 (64)

55.7069 49.6353 54.1998 51.7222 52.6928 50.2638 51.9393 52.6928 51.7222 54.1998 53.1807 55.7069 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 633.6626 (64a)

Full SAP Calculation Printout



Heat gains from water heating, kWh/month
 38.2797 33.7044 35.8272 31.9879 31.2254 28.4014 28.4266 29.5517 29.8228 32.8799 34.4132 37.9692 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	51.4512	50.1553	48.1548	44.4277	41.9696	39.4464	38.2078	39.7201	41.4205	44.1934	47.7961	51.0338 (72)
Total internal gains	491.8057	506.6428	484.5587	471.0984	446.8285	431.9731	415.4723	414.3854	426.8462	439.3522	464.7667	480.3367 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W						
Northeast	4.1800	11.2829	0.6300	0.7000	0.7700	14.4135 (75)						
Southeast	2.4900	36.7938	0.6300	0.7000	0.7700	27.9992 (77)						
Southwest	5.1600	36.7938	0.6300	0.7000	0.7700	58.0225 (79)						
Northwest	9.9000	11.2829	0.6300	0.7000	0.7700	34.1373 (81)						
Solar gains	134.5726	245.3535	378.5386	540.8261	671.3045	695.2763	658.3244	556.5746	434.0441	282.7174	164.1238	113.2658 (83)
Total gains	626.3783	751.9963	863.0974	1011.9245	1118.1330	1127.2494	1073.7967	970.9600	860.8903	722.0696	628.8905	593.6025 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	36.9347	37.0110	37.0860	37.4425	37.5100	37.8273	37.8273	37.8866	37.7044	37.5100	37.3737	37.2324
alpha	3.4623	3.4674	3.4724	3.4962	3.5007	3.5218	3.5218	3.5258	3.5136	3.5007	3.4916	3.4822
util living area	0.9886	0.9781	0.9565	0.8963	0.7813	0.6142	0.4714	0.5327	0.7654	0.9340	0.9800	0.9905 (86)
MIT	18.9232	19.2026	19.6213	20.1827	20.6305	20.8872	20.9663	20.9485	20.7473	20.1480	19.4405	18.8790 (87)
Th 2	19.8586	19.8606	19.8627	19.8722	19.8740	19.8824	19.8824	19.8839	19.8791	19.8740	19.8704	19.8666 (88)
util rest of house	0.9859	0.9729	0.9459	0.8708	0.7290	0.5285	0.3608	0.4181	0.6906	0.9123	0.9743	0.9883 (89)
MIT 2	17.9824	18.2600	18.6724	19.2162	19.6179	19.8244	19.8715	19.8657	19.7294	19.1974	18.5051	17.9442 (90)
Living area fraction	18.1282	18.4061	18.8195	19.3660	19.7748	19.9892	20.0412	20.0335	19.8872	19.3447	18.6501	18.0891 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1282	18.4061	18.8195	19.3660	19.7748	19.9892	20.0412	20.0335	19.8872	19.3447	18.6501	18.0891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9800	0.9639	0.9333	0.8570	0.7239	0.5372	0.3772	0.4344	0.6912	0.8991	0.9658	0.9831 (94)
Useful gains	613.8446	724.8307	805.5246	867.2066	809.3894	605.6024	405.0341	421.7452	595.0199	649.2185	607.3867	583.5702 (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	1703.9216	1660.8036	1511.8301	1272.1434	979.7297	648.3888	414.0229	436.4753	698.5430	1061.0082	1406.4920	1697.7439 (97)
Space heating kWh	811.0172	628.9738	525.4913	291.5545	126.7332	0.0000	0.0000	0.0000	0.0000	306.3715	575.3558	828.9453 (98a)
Space heating requirement - total per year (kWh/year)												4094.4427
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	811.0172	628.9738	525.4913	291.5545	126.7332	0.0000	0.0000	0.0000	0.0000	306.3715	575.3558	828.9453 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4094.4427
Space heating per m2												42.4471 (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	1130.9484	890.3211	912.9515	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8209	0.8799	0.8423	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	928.4155	783.3678	768.9514	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1267.3473	1207.3133	1089.5986	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	244.0309	315.4155	238.5615	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	61.0077	78.8539	59.6404	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												199.5020 (107)
Energy for space heating												42.4471 (99)

Energy for space cooling	2.0682 (108)
Total	44.5153 (109)
Fabric Energy Efficiency (TFEE)	44.5 (109)

Full SAP Calculation Printout



Property Reference	SAP 0898 Plot 10		Issued on Date	06/01/2025	
Assessment Reference	Rev C	Prop Type Ref	3BC-H		
Property	Plot 10, Wharton's Lane, Southampton				
SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER			6.22
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE			11.35
% DPER < TPER	3.85	DPER	63.95	TPER	66.51
Assessor Details	Mr. Tobias Whiting			Assessor ID	E477-0001
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	43.0600 (1b)	2.6100 (2b)	112.3866 (1b) - (3b)
First floor	53.4000 (1c)	2.3800 (2c)	127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	239.4786 (5)

2. Ventilation rate

	m3 per hour											
Number of open chimneys	0 * 80 =											0.0000 (6a)
Number of open flues	0 * 20 =											0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)
Number of blocked chimneys	0 * 20 =											0.0000 (6f)
Number of intermittent extract fans	0 * 10 =											0.0000 (7a)
Number of passive vents	0 * 10 =											0.0000 (7b)
Number of flueless gas fires	0 * 40 =											0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =											0.0000 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												4.0000 (17)
Infiltration rate												0.2000 (18)
Number of sides sheltered												2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	57.7499			(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32a)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				16384.0893 (34)

Full SAP Calculation Printout



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

169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.9237 (36)
Point Thermal bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 64.6736 (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	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140 (38)
Average = Sum(39)m / 12 =	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876 (39)
HLP	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801 (40)
HLP (average)												1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	69.5612	68.5158	66.9925	64.0779	61.9270	59.5284	58.1650	59.6768	61.3340	63.9094	66.8865	69.2946 (42a)
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352 (42b)
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242 (42c)
Average daily hot water use (litres/day)	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876 (39)
Daily hot water use	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy content (annual)	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406 (61)
Total heat required for water heating calculated for each month	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801 (62)
WWHRS	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376 (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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Total per year (kWh/year)												1730.4852 (64)
Electric shower(s)												1730 (64)
Heat gains from water heating, kWh/month	75.1244	66.1200	69.4906	59.3525	56.3344	49.4596	47.8919	50.5406	51.9154	59.4422	65.0927	74.0803 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703 (72)
Total internal gains	544.3281	557.8803	532.8052	512.1048	483.5771	461.2205	441.6353	442.5963	457.5304	478.0541	510.3772	531.8732 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b g	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	4.1800	11.2829	0.4500	0.7000	0.7700	10.2954 (75)
Southeast	2.4900	36.7938	0.4500	0.7000	0.7700	19.9995 (77)
Southwest	5.1600	36.7938	0.4500	0.7000	0.7700	41.4447 (79)
Northwest	9.9000	11.2829	0.4500	0.7000	0.7700	24.3838 (81)

Full SAP Calculation Printout



Solar gains	96.1233	175.2525	270.3847	386.3044	479.5032	496.6259	470.2317	397.5533	310.0315	201.9410	117.2313	80.9041 (83)
Total gains	640.4514	733.1329	803.1900	898.4092	963.0804	957.8465	911.8670	840.1496	767.5619	679.9951	627.6085	612.7773 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9872	0.9775	0.9586	0.9058	0.7988	0.6344	0.4852	0.5413	0.7695	0.9330	0.9781	0.9892 (86)
MIT	19.3226	19.5450	19.8782	20.3232	20.6977	20.9105	20.9757	20.9630	20.8058	20.3199	19.7365	19.2673 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9844	0.9725	0.9490	0.8835	0.7524	0.5562	0.3844	0.4376	0.7015	0.9124	0.9724	0.9868 (89)
MIT 2	18.4920	18.7117	19.0387	19.4651	19.8021	19.9692	20.0087	20.0032	19.8989	19.4708	18.9032	18.4372 (90)
Living area fraction												fLA = Living area / (4) = 0.1550 (91)
MIT	18.6207	18.8408	19.1688	19.5981	19.9409	20.1151	20.1586	20.1519	20.0394	19.6024	19.0324	18.5659 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6207	18.8408	19.1688	19.5981	19.9409	20.1151	20.1586	20.1519	20.0394	19.6024	19.0324	18.5659 (93)

8. Space heating requirement

Utilisation	0.9788	0.9646	0.9386	0.8723	0.7484	0.5645	0.3994	0.4525	0.7032	0.9016	0.9646	0.9818 (94)
Useful gains	626.8714	707.2039	753.8539	783.6614	720.7342	540.7091	364.1754	380.1764	539.7363	613.0615	605.4010	601.6414 (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	1492.0416	1452.4609	1319.9315	1114.6103	858.6045	574.6047	370.7625	390.9037	618.8148	937.9416	1243.2041	1496.7443 (97)
Space heating kWh	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98a)
Space heating requirement - total per year (kWh/year)												3273.4053
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	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3273.4053
Space heating per m2												(98c) / (4) = 33.9354 (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 %)												88.7000 (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	643.6866	500.8127	421.1617	238.2832	102.5755	0.0000	0.0000	0.0000	0.0000	241.7108	459.2183	665.9566 (98)
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	0.0000	0.0000	0.0000	0.0000	88.7000	88.7000	88.7000 (210)
Space heating fuel (main heating system)	725.6895	564.6140	474.8159	268.6395	115.6432	0.0000	0.0000	0.0000	0.0000	272.5037	517.7207	750.7966 (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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Efficiency of water heater	85.6628	85.3734	84.7987	83.5929	81.1393	76.2000	76.2000	76.2000	76.2000	83.6087	85.1764	85.7689 (217)
Fuel for water heating, kWh/month	207.1858	182.7456	193.5831	169.1691	166.2409	156.4598	152.7238	160.8533	164.7857	170.6746	181.8059	204.3194 (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	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	16.3364	15.8094	16.3364	15.8094	16.3364 (231)
Lighting	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-21.5903	-32.2235	-49.0082	-58.4189	-65.9430	-62.6537	-61.9074	-56.9798	-48.8060	-38.2945	-24.3670	-18.4649 (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)	-7.3184	-15.7745	-32.0674	-49.2246	-66.1297	-66.8126	-66.0101	-55.3973	-39.9734	-22.8850	-9.8757	-5.7583 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												3690.4231 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												76.2000
Water heating fuel used												2110.5468 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.3640)												
mechanical ventilation fans (SFP = 0.3640)												106.3477 (230a)

Full SAP Calculation Printout



central heating pump	41.0000 (230c)
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	192.3477 (231)
Electricity for lighting (calculated in Appendix L)	213.7076 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-975.8843 (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	5231.1408 (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	3690.4231	0.2100	774.9889 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2110.5468	0.2100	443.2148 (264)
Space and water heating			1218.2037 (265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810 (267)
Energy for lighting	213.7076	0.1443	30.8446 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	0.1334	-71.8551
PV Unit electricity exported	-437.2269	0.1253	-54.7710
Total			-126.6262 (269)
Total CO2, kg/year			1149.1031 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.9100 (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	3690.4231	1.1300	4170.1781 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2110.5468	1.1300	2384.9179 (278)
Space and water heating			6555.0960 (279)
Pumps, fans and electric keep-hot	192.3477	1.5128	290.9835 (281)
Energy for lighting	213.7076	1.5338	327.7918 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	1.4929	-804.1852
PV Unit electricity exported	-437.2269	0.4598	-201.0344
Total			-1005.2196 (283)
Total Primary energy kWh/year			6168.6517 (286)
Dwelling Primary energy Rate (DPER)			63.9500 (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	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4786 (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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1253 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3753	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3190 (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												
Effective ac	0.4067	0.3987	0.3908	0.3509	0.3429	0.3030	0.3030	0.2951	0.3190	0.3429	0.3589	0.3748 (22b)
	0.5827	0.5795	0.5763	0.5616	0.5588	0.5459	0.5459	0.5435	0.5509	0.5588	0.5644	0.5702 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			2.1500	1.0000	2.1500		(26)
TER Opening Type (Uw = 1.20)			21.7300	1.1450	24.8817		(27)
Ground Floor			53.4000	0.1300	6.9420		(28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631		(29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136		(29a)
Pitched Roof	53.4000		53.4000	0.1100	5.8740		(30)
Total net area of external elements Aum(A, m2)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	63.1244	(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							169.8537 (35)

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

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0500	0.8030
E3 Sill	13.6800	0.0500	0.6840
E4 Jamb	36.7500	0.0500	1.8375
E5 Ground floor (normal)	34.8900	0.1600	5.5824
E6 Intermediate floor within a dwelling	26.8800	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	28.0600	0.0600	1.6836
E12 Gable (insulation at ceiling level)	10.4000	0.0600	0.6240
E16 Corner (normal)	27.1100	0.0900	2.4399
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.2400	1.0368
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0900	-0.6444
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			14.0468 (36)
Point Thermal bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 77.1712 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	46.0498	45.7960	45.5472	44.3788	44.1602	43.1425	43.1425	42.9540	43.5345	44.1602	44.6024	45.0648 (38)
Heat transfer coeff	123.2210	122.9672	122.7184	121.5500	121.3314	120.3137	120.3137	120.1252	120.7057	121.3314	121.7736	122.2360 (39)
Average = Sum(39)m / 12 =												121.5489

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2774	1.2748	1.2722	1.2601	1.2578	1.2473	1.2473	1.2453	1.2514	1.2578	1.2624	1.2672 (40)
HLP (average)												1.2601
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7042 (42)
Hot water usage for mixer showers												69.2946 (42a)
Hot water usage for baths												29.9352 (42b)
Hot water usage for other uses												42.3242 (42c)
Average daily hot water use (litres/day)												130.4585 (43)
Daily hot water use	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy conte	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Energy content (annual)												Total = Sum(45)m = 2166.8878
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	275.7289	243.8072	258.7579	226.7162	219.2759	197.0321	193.9717	201.9267	204.4388	228.6477	243.9862	272.5984 (62)
WWHRS	-31.8005	-28.1246	-29.4504	-24.3861	-22.7270	-19.4477	-18.2291	-19.3848	-20.1213	-23.7208	-26.8728	-31.2116 (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	243.9285	215.6827	229.3075	202.3301	196.5489	177.5844	175.7426	182.5419	184.3175	204.9270	217.1134	241.3869 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2471.4113 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	87.4758	77.2686	81.8329	71.3146	68.7051	61.4447	60.2915	62.9365	63.9074	71.8213	77.0569	86.4349 (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	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125	135.2125 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	126.3162	139.8501	126.3162	130.5267	126.3162	130.5267	126.3162	126.3162	130.5267	126.3162	130.5267	126.3162 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	250.4746	253.0737	246.5239	232.5803	214.9789	198.4361	187.3845	184.7854	191.3352	205.2788	222.8802	239.4230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212	36.5212 (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)

Full SAP Calculation Printout



Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	(71)
Water heating gains (Table 5)	117.5749	114.9831	109.9905	99.0481	92.3456	85.3398	81.0369	84.5921	88.7603	96.5340	107.0235	116.1759	(72)
Total internal gains	560.9294	574.4706	549.3943	528.7189	500.2045	477.8664	458.3014	459.2574	474.1859	494.6927	526.9941	548.4788	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	4.1800	11.2829	0.6300	0.7000	0.7700	14.4135 (75)
Southeast	2.4900	36.7938	0.6300	0.7000	0.7700	27.9992 (77)
Southwest	5.1600	36.7938	0.6300	0.7000	0.7700	58.0225 (79)
Northwest	9.9000	11.2829	0.6300	0.7000	0.7700	34.1373 (81)

Solar gains	134.5726	245.3535	378.5386	540.8261	671.3045	695.2763	658.3244	556.5746	434.0441	282.7174	164.1238	113.2658	(83)
Total gains	695.5020	819.8241	927.9330	1069.5450	1171.5090	1173.1427	1116.6258	1015.8320	908.2300	777.4101	691.1179	661.7445	(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	36.9347	37.0110	37.0860	37.4425	37.5100	37.8273	37.8273	37.8866	37.7044	37.5100	37.3737	37.2324	37.2324
alpha	3.4623	3.4674	3.4724	3.4962	3.5007	3.5218	3.5218	3.5258	3.5136	3.5007	3.4916	3.4822	3.4822
util living area	0.9844	0.9719	0.9472	0.8823	0.7630	0.5962	0.4555	0.5130	0.7436	0.9206	0.9736	0.9868	(86)
MIT	19.0176	19.2911	19.6984	20.2360	20.6599	20.8974	20.9697	20.9543	20.7712	20.2078	19.5225	18.9731	(87)
Th 2	19.8586	19.8606	19.8627	19.8722	19.8740	19.8824	19.8824	19.8839	19.8791	19.8740	19.8704	19.8666	(88)
util rest of house	0.9808	0.9654	0.9348	0.8545	0.7091	0.5112	0.3477	0.4012	0.6668	0.8955	0.9664	0.9837	(89)
MIT 2	17.5707	17.9177	18.4300	19.0915	19.5743	19.8154	19.8700	19.8634	19.7077	19.0755	18.2210	17.5192	(90)
Living area fraction													FLA = Living area / (4) = 0.1550 (91)
MIT	17.7949	18.1305	18.6266	19.2688	19.7426	19.9831	20.0404	20.0324	19.8725	19.2510	18.4227	17.7446	(92)
Temperature adjustment													0.0000
adjusted MIT	17.7949	18.1305	18.6266	19.2688	19.7426	19.9831	20.0404	20.0324	19.8725	19.2510	18.4227	17.7446	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9710	0.9517	0.9169	0.8366	0.7021	0.5193	0.3635	0.4168	0.6663	0.8777	0.9532	0.9750	(94)
Useful gains	675.3034	780.1924	850.8579	894.7946	822.5012	609.2411	405.9359	423.4151	605.1489	682.2992	658.7501	645.1718	(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	1662.8568	1626.9200	1488.1513	1260.3329	975.8144	647.6616	413.9319	436.3487	696.7782	1049.6345	1378.8042	1655.6312	(97)
Space heating kWh	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98a)
Space heating requirement - total per year (kWh/year)													3698.6577
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	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													3698.6577
Space heating per m ²													(98c) / (4) = 38.3440 (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 %)													92.4000 (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	734.7397	569.0009	474.1463	263.1876	114.0650	0.0000	0.0000	0.0000	0.0000	273.2974	518.4389	751.7818	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	795.1729	615.8019	513.1453	284.8350	123.4470	0.0000	0.0000	0.0000	0.0000	295.7765	561.0811	813.6167	(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	243.9285	215.6827	229.3075	202.3301	196.5489	177.5844	175.7426	182.5419	184.3175	204.9270	217.1134	241.3869	(64)
Efficiency of water heater (217)m	86.5886	86.3578	85.9011	84.9459	83.2577	80.3000	80.3000	80.3000	80.3000	84.9991	86.1758	86.6446	(216)
Fuel for water heating, kWh/month	281.7096	249.7546	266.9437	238.1870	236.0730	221.1512	218.8575	227.3249	229.5361	241.0931	251.9425	278.5941	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	26.2460	21.0555	18.9582	13.8896	10.7287	8.7654	9.7871	12.7216	16.5241	21.6805	24.4881	26.9755	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-40.5653	-57.3375	-82.6254	-93.1321	-100.5979	-93.9256	-92.7225	-87.4212	-78.1374	-65.6185	-44.6320	-35.0501	(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)

Full SAP Calculation Printout



Property Reference	SAP 0898 Plot 10		Issued on Date	06/01/2025	
Assessment Reference	Rev C	Prop Type Ref	3BC-H		
Property	Plot 10, Wharton's Lane, Southampton				
SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER			6.22
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE			11.35
% DPER < TPER	3.85	DPER	63.95	TPER	66.51
Assessor Details	Mr. Tobias Whiting			Assessor ID	E477-0001
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	43.0600 (1b)	2.6100 (2b)	112.3866 (1b) - (3b)
First floor	53.4000 (1c)	2.3800 (2c)	127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 239.4786 (5)

2. Ventilation rate

	m3 per hour											
Number of open chimneys	0 * 80 =											0.0000 (6a)
Number of open flues	0 * 20 =											0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)
Number of blocked chimneys	0 * 20 =											0.0000 (6f)
Number of intermittent extract fans	0 * 10 =											0.0000 (7a)
Number of passive vents	0 * 10 =											0.0000 (7b)
Number of flueless gas fires	0 * 40 =											0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =											0.0000 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												4.0000 (17)
Infiltration rate												0.2000 (18)
Number of sides sheltered												2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998 (22b)
Mechanical extract ventilation - centralised												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	57.7499			(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32c)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				16384.0893 (34)

Full SAP Calculation Printout



Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871

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

Point Thermal bridges (36a) = 6.9237 (36)

Total fabric heat loss (33) + (36) + (36a) = 64.6736 (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	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140
Average = Sum(39)m / 12 =	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7042 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	69.5612	68.5158	66.9925	64.0779	61.9270	59.5284	58.1650	59.6768	61.3340	63.9094	66.8865	69.2946
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242
Average daily hot water use (litres/day)	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541
Energy content (annual)	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459
Water storage loss:	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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
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
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
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406
Total heat required for water heating calculated for each month	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801
WWHRS	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	1730.4852 (64)											
Heat gains from water heating, kWh/month	75.1244	66.1200	69.4906	59.3525	56.3344	49.4596	47.8919	50.5406	51.9154	59.4422	65.0927	74.0803

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	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2525	26.8700	21.8522	16.5435	12.3665	10.4403	11.2811	14.6636	19.6814	24.9901	29.1672	31.0933
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	373.8426	377.7219	367.9462	347.1348	320.8641	296.1733	279.6784	275.7991	285.5749	306.3863	332.6570	357.3477
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703
Total internal gains	616.0835	613.9995	594.2144	557.1271	519.9635	483.3223	463.3451	466.4084	485.3758	522.2865	563.2454	599.0260

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						
Northeast	4.1800	11.2829	0.4500	0.7000	0.7700	10.2954 (75)						
Southeast	2.4900	36.7938	0.4500	0.7000	0.7700	19.9995 (77)						
Southwest	5.1600	36.7938	0.4500	0.7000	0.7700	41.4447 (79)						
Northwest	9.9000	11.2829	0.4500	0.7000	0.7700	24.3838 (81)						
Solar gains	96.1233	175.2525	270.3847	386.3044	479.5032	496.6259	470.2317	397.5533	310.0315	201.9410	117.2313	80.9041 (83)

Full SAP Calculation Printout



Total gains 712.2067 789.2520 864.5992 943.4314 999.4668 979.9482 933.5768 863.9617 795.4073 724.2275 680.4767 679.9302 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9818	0.9716	0.9485	0.8934	0.7839	0.6237	0.4751	0.5287	0.7543	0.9204	0.9717	0.9847 (86)
MIT	19.4240	19.6210	19.9541	20.3672	20.7191	20.9157	20.9774	20.9659	20.8199	20.3686	19.8082	19.3632 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9779	0.9654	0.9370	0.8691	0.7361	0.5457	0.3759	0.4265	0.6849	0.8970	0.9644	0.9814 (89)
MIT 2	18.5920	18.7858	19.1113	19.5047	19.8189	19.9723	20.0094	20.0044	19.9086	19.5150	18.9729	18.5320 (90)
Living area fraction	fLA = Living area / (4) = 0.1550 (91)											
MIT	18.7209	18.9153	19.2419	19.6384	19.9585	20.1185	20.1594	20.1534	20.0498	19.6473	19.1024	18.6608 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.7209	18.9153	19.2419	19.6384	19.9585	20.1185	20.1594	20.1534	20.0498	19.6473	19.1024	18.6608 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9709	0.9565	0.9258	0.8582	0.7329	0.5542	0.3907	0.4413	0.6875	0.8862	0.9556	0.9751 (94)
Useful gains	691.4820	754.9083	800.4689	809.6153	732.5355	543.1299	364.7442	381.2233	546.8531	641.8044	650.2639	662.9947 (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	1502.4802	1460.2160	1327.5455	1118.8084	860.4289	574.9580	370.8456	391.0562	619.8967	942.6194	1250.4974	1506.6359 (97)
Space heating kWh	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98a)
Space heating requirement - total per year (kWh/year)	3070.9096											
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	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3070.9096											
Space heating per m2	(98c) / (4) = 31.8361 (99)											

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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 %)	88.7000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98)
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	0.0000	0.0000	0.0000	0.0000	88.7000	88.7000	88.7000 (210)
Space heating fuel (main heating system)	680.2511	534.3481	442.1026	250.9797	107.2747	0.0000	0.0000	0.0000	0.0000	252.3183	487.2245	707.6314 (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 requirement	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Efficiency of water heater (217)m	85.5117	85.2372	84.6046	83.3863	80.9168	76.2000	76.2000	76.2000	76.2000	83.3749	85.0208	76.2000 (216)
Fuel for water heating, kWh/month	207.5519	183.0377	194.0272	169.5882	166.6981	156.4598	152.7238	160.8533	164.7857	171.1532	182.1387	204.6413 (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	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	16.3364	15.8094	16.3364	15.8094	16.3364 (231)
Lighting	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.5903	-32.2235	-49.0082	-58.4189	-65.9430	-62.6537	-61.9074	-56.9798	-48.8060	-38.2945	-24.3670	-18.4649 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-7.3184	-15.7745	-32.0674	-49.2246	-66.1297	-66.8126	-66.0101	-55.3973	-39.9734	-22.8850	-9.8757	-5.7583 (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												3462.1304 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												76.2000
Water heating fuel used												2113.6588 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.3640)												106.3477 (230a)
mechanical ventilation fans (SFP = 0.3640)												41.0000 (230c)
central heating pump												

Full SAP Calculation Printout



main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	192.3477 (231)
Electricity for lighting (calculated in Appendix L)	213.7076 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-975.8843 (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	5005.9601 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	3462.1304	3.6400	126.0215 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2113.6588	3.6400	76.9372 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	192.3477	16.4900	31.7181 (249)
Energy for lighting	213.7076	16.4900	35.2404 (250)
Additional standing charges			92.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	16.4900	-88.8246
PV Unit electricity exported	-437.2269	5.5900	-24.4410
Total			-113.2656
Total energy cost			248.6516 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 0.6328 (257)
SAP value	89.7425
SAP rating (Section 12)	90 (258)
SAP band	B

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	3462.1304	0.2100	727.0474 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2113.6588	0.2100	443.8684 (264)
Space and water heating			1170.9157 (265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810 (267)
Energy for lighting	213.7076	0.1443	30.8446 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-538.6574	0.1334	-71.8551
PV Unit electricity exported	-437.2269	0.1253	-54.7710
Total			-126.6262 (269)
Total CO2, kg/year			1101.8152 (272)
CO2 emissions per m2			11.4200 (273)
EI value			89.5629
EI rating			90 (274)
EI band			B

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	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	239.4786 (5)

2. Ventilation rate

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

Full SAP Calculation Printout



Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	0.0000 / (5) =	0.0000 (8)
Pressure Test												Yes		
Pressure Test Method												Blower Door		
Measured/design AP50												4.0000	(17)	
Infiltration rate												0.2000	(18)	
Number of sides sheltered												2	(19)	
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)	
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.1700 (21)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000 (22)	
Wind factor	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750 (22a)	
Adj infilt rate	0.2167	0.1998	0.1955	0.1827	0.1827	0.1700	0.1700	0.1658	0.1700	0.1913	0.1870	0.1998 (22b)	
Mechanical extract ventilation - centralised													
If mechanical ventilation												0.5000 (23a)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m2)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	57.7499		(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32c)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16384.0893 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.9237 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 64.6736 (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	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140 (38)
Average = Sum(39)m / 12 =	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801 (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												2.7042 (42)
Hot water usage for mixer showers												69.2946 (42a)
Hot water usage for baths												29.9352 (42b)
Hot water usage for other uses												42.3242 (42c)
Average daily hot water use (litres/day)												130.4585 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy conte	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Energy content (annual)												Total = Sum(45)m = 2166.8878
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406 (61)
Total heat required for water heating calculated for each month	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801 (62)
WWHRS	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376 (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												

Full SAP Calculation Printout



177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Total per year (kWh/year) = Sum(64)m =											1730.4852 (64)
Electric shower(s)											
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month											
75.1244	66.1200	69.4906	59.3525	56.3344	49.4596	47.8919	50.5406	51.9154	59.4422	65.0927	74.0803 (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	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2525	26.8700	21.8522	16.5435	12.3665	10.4403	11.2811	14.6636	19.6814	24.9901	29.1672	31.0933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	373.8426	377.7219	367.9462	347.1348	320.8641	296.1733	279.6784	275.7991	285.5749	306.3863	332.6570	357.3477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703 (72)
Total internal gains	616.0835	613.9995	594.2144	557.1271	519.9635	483.3223	463.3451	466.4084	485.3758	522.2865	563.2454	599.0260 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
Northeast	4.1800	15.0428	0.4500	0.7000	0.7700	13.7262 (75)						
Southeast	2.4900	46.3896	0.4500	0.7000	0.7700	25.2153 (77)						
Southwest	5.1600	46.3896	0.4500	0.7000	0.7700	52.2533 (79)						
Northwest	9.9000	15.0428	0.4500	0.7000	0.7700	32.5094 (81)						
Solar gains	123.7042	193.6840	299.2716	437.7084	519.8634	582.7034	538.5606	464.6662	364.7599	236.6587	149.6906	99.2944 (83)
Total gains	739.7876	807.6835	893.4860	994.8355	1039.8269	1066.0257	1001.9057	931.0746	850.1356	758.9452	712.9361	698.3205 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9744	0.9642	0.9335	0.8603	0.7228	0.5226	0.3791	0.4062	0.6603	0.8776	0.9559	0.9783 (86)
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9744	0.9642	0.9335	0.8603	0.7228	0.5226	0.3791	0.4062	0.6603	0.8776	0.9559	0.9783 (86)
MIT	19.6303	19.7653	20.1015	20.4974	20.8128	20.9601	20.9914	20.9890	20.9034	20.5571	20.0440	19.5890 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9686	0.9563	0.9185	0.8295	0.6653	0.4400	0.2811	0.3020	0.5760	0.8414	0.9440	0.9732 (89)
MIT 2	18.7959	18.9278	19.2534	19.6233	19.8945	19.9990	20.0149	20.0143	19.9670	19.6877	19.2034	18.7558 (90)
Living area fraction	18.9253	19.0576	19.3849	19.7588	20.0368	20.1479	20.1662	20.1653	20.1122	19.8224	19.3337	18.8849 (92)
MIT	18.9253	19.0576	19.3849	19.7588	20.0368	20.1479	20.1662	20.1653	20.1122	19.8224	19.3337	18.8849 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
adjusted MIT	18.9253	19.0576	19.3849	19.7588	20.0368	20.1479	20.1662	20.1653	20.1122	19.8224	19.3337	18.8849 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	710.2952	764.3576	810.2452	816.0850	693.0809	481.2144	296.7827	296.1550	497.1181	632.1594	665.5512	674.2197 (95)
Ext temp.	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000 (96)
Heat loss rate W	1409.1639	1391.6959	1259.0943	1058.4157	774.8221	494.6753	298.6276	298.5327	532.6239	835.8346	1139.1512	1394.5436 (97)
Space heating kWh	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210 (98a)
Space heating requirement - total per year (kWh/year)	2539.2142											
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	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2539.2142											
Space heating per m ²	(98c) / (4) = 26.3240 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fraction of space heat from main system(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 (201)
Efficiency of main space heating system 1 (in %)	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000 (202)
Efficiency of main space heating system 2 (in %)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (206)
Efficiency of secondary/supplementary heating system, %	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (208)
Space heating requirement	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210 (98)
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000	88.7000 (210)
Space heating fuel (main heating system)	589.8700	474.8700	374.8700	197.4700	69.8154	0.0000	0.0000	0.0000	0.0000	167.4700	384.8700	599.8700 (209)

Full SAP Calculation Printout



Space heating efficiency (main heating system 2)	586.1988	475.2777	376.4867	196.7059	68.5630	0.0000	0.0000	0.0000	0.0000	170.8392	384.4329	604.1951	(211)
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	(212)
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	(213)
Water heating requirement	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425	(64)
Efficiency of water heater (217)m	85.1456	84.9364	84.1506	82.6319	79.6899	76.2000	76.2000	76.2000	76.2000	82.1633	84.3773	85.2538	(217)
Fuel for water heating, kWh/month	208.4443	183.6859	195.0740	171.1365	169.2646	156.4598	152.7238	160.8533	164.7857	173.6771	183.5279	205.5539	(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	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	16.3364	15.8094	16.3364	15.8094	16.3364	(231)
Lighting	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-26.7804	-34.8731	-52.5504	-63.0657	-68.8420	-68.5683	-66.7629	-62.4376	-54.1834	-43.0554	-29.8065	-22.0865	(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	-10.5725	-18.1668	-36.5838	-57.4315	-72.4307	-81.3563	-77.7981	-67.2063	-49.3005	-28.4583	-14.0450	-7.7915	(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												2862.6992	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.2000	(217)
Water heating fuel used												2125.1866	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.3640)													
mechanical ventilation fans (SFP = 0.3640)												106.3477	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												192.3477	(231)
Electricity for lighting (calculated in Appendix L)												213.7076	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1114.1536	(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												4279.7875	(238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2862.6992	5.6000	160.3112	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2125.1866	5.6000	119.0105	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	192.3477	26.0600	50.1258	(249)
Energy for lighting	213.7076	26.0600	55.6922	(250)
Additional standing charges			99.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-593.0122	26.0600	-154.5390	
PV Unit electricity exported	-521.1414	5.8100	-30.2783	
Total			-184.8173	(252)
Total energy cost			299.3223	(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	2862.6992	0.2100	601.1668	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2125.1866	0.2100	446.2892	(264)
Space and water heating			1047.4560	(265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810	(267)
Energy for lighting	213.7076	0.1443	30.8446	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-593.0122	0.1337	-79.2893	
PV Unit electricity exported	-521.1414	0.1254	-65.3469	
Total			-144.6362	(269)
Total CO2, kg/year			960.3454	(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	2862.6992	1.1300	3234.8502	(275)
Total CO2 associated with community systems			0.0000	(473)

Full SAP Calculation Printout



Water heating (other fuel)	2125.1866	1.1300	2401.4609 (278)
Space and water heating			5636.3110 (279)
Pumps, fans and electric keep-hot	192.3477	1.5128	290.9835 (281)
Energy for lighting	213.7076	1.5338	327.7918 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-593.0122	1.4941	-886.0119
PV Unit electricity exported	-521.1414	0.4602	-239.8162
Total			-1125.8281 (283)
Total Primary energy kWh/year			5129.2583 (286)

SAP 10 EPC IMPROVEMENTS

Rev C

Current energy efficiency rating: B 90
 Current environmental impact rating: B 90

N Solar water heating SAP increase too small
 U Solar photovoltaic panels Already installed
 V2 Wind turbine Not applicable

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

Measures omitted - SAP change or cost saving too small:			
N Solar water heating	+ 0.5	-£ 27	-167 kg (17.4%)

Recommended measures (none)	Typical annual savings	Energy efficiency impact	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating: B 90
 Potential environmental impact rating: B 90

Fuel prices for cost data on this page from database revision number 556 TEST (29 Nov 2024)
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current	Potential	Saving
Electricity	£106	£106	£0
Mains gas	£378	£378	£0
Space heating	£309	£309	£0
Water heating	£119	£119	£0
Lighting	£56	£56	£0
Generated (PV)	-£185	-£185	£0
Total cost of fuels	£299	£299	£0
Total cost of uses	£299	£299	£0
Delivered energy	44 kWh/m²	44 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m²	10 kg/m²	10 kg/m²	0 kg/m²
Primary energy	53 kWh/m²	53 kWh/m²	0 kWh/m²

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 (m2)	Storey height (m)	Volume (m3)
Ground floor	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 239.4786 (5)

2. Ventilation rate

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

Full SAP Calculation Printout



Measured/design AP50													4.0000 (17)
Infiltration rate													0.2000 (18)
Number of sides sheltered													2 (19)
Shelter factor													(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor													(21) = (18) x (20) = 0.1700 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998	(22b)

Mechanical extract ventilation - centralised													0.5000 (23a)
If mechanical ventilation													0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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	
Front Door			2.1500	1.1000	2.3650			(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942			(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000	(28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449	(29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344	(29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000	(30)
Total net area of external elements Aum (A, m2)			259.9950					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 57.7499			(33)
Ground Floor Stud			30.3000			9.0000	272.7000	(32c)
First Floor Stud			105.5100			9.0000	949.5900	(32c)
Ground Floor Block			49.7800			75.0000	3733.5000	(32c)
First Floor			43.0600			18.0000	775.0800	(32d)
Internal Ceiling 1			43.0600			9.0000	387.5400	(32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 16384.0893	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							169.8537	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.9237 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 64.6736 (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	
	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	(38)
Heat transfer coeff	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	(39)
Average = Sum(39)m / 12 =													104.1876

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	(40)
HLP (average)													1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.7042 (42)
Hot water usage for mixer showers													69.2946 (42a)
Hot water usage for baths													29.9352 (42b)
Hot water usage for other uses													42.3242 (42c)
Average daily hot water use (litres/day)													130.4585 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541	(44)
Energy conte	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395	(45)
Energy content (annual)													Total = Sum(45)m = 2166.8878
Distribution loss (46)m = 0.15 x (45)m													
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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406	(61)
Total heat required for water heating calculated for each month													
WWHRS	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801	(62)
PV diverter	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376	(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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425	(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)

Full SAP Calculation Printout



Heat gains from water heating, kWh/month
 75.1244 66.1200 69.4906 59.3525 56.3344 49.4596 47.8919 50.5406 51.9154 59.4422 65.0927 74.0803 (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	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2525	26.8700	21.8522	16.5435	12.3665	10.4403	11.2811	14.6636	19.6814	24.9901	29.1672	31.0933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	373.8426	377.7219	367.9462	347.1348	320.8641	296.1733	279.6784	275.7991	285.5749	306.3863	332.6570	357.3477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703 (72)
Total internal gains	616.0835	613.9995	594.2144	557.1271	519.9635	483.3223	463.3451	466.4084	485.3758	522.2865	563.2454	599.0260 (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						
Northeast	4.1800	11.2829	0.4500	0.7000	0.7700	10.2954 (75)						
Southeast	2.4900	36.7938	0.4500	0.7000	0.7700	19.9995 (77)						
Southwest	5.1600	36.7938	0.4500	0.7000	0.7700	41.4447 (79)						
Northwest	9.9000	11.2829	0.4500	0.7000	0.7700	24.3838 (81)						
Solar gains	96.1233	175.2525	270.3847	386.3044	479.5032	496.6259	470.2317	397.5533	310.0315	201.9410	117.2313	80.9041 (83)
Total gains	712.2067	789.2520	864.5992	943.4314	999.4668	979.9482	933.5768	863.9617	795.4073	724.2275	680.4767	679.9302 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9818	0.9716	0.9485	0.8934	0.7839	0.6237	0.4751	0.5287	0.7543	0.9204	0.9717	0.9847 (86)
MIT	19.4240	19.6210	19.9541	20.3672	20.7191	20.9157	20.9774	20.9659	20.8199	20.3686	19.8082	19.3632 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9779	0.9654	0.9370	0.8691	0.7361	0.5457	0.3759	0.4265	0.6849	0.8970	0.9644	0.9814 (89)
MIT 2	18.5920	18.7858	19.1113	19.5047	19.8189	19.9723	20.0094	20.0044	19.9086	19.5150	18.9729	18.5320 (90)
Living area fraction	18.7209	18.9153	19.2419	19.6384	19.9585	20.1185	20.1594	20.1534	20.0498	19.6473	19.1024	18.6608 (91)
Temperature adjustment												0.0000 (92)
adjusted MIT	18.7209	18.9153	19.2419	19.6384	19.9585	20.1185	20.1594	20.1534	20.0498	19.6473	19.1024	18.6608 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9709	0.9565	0.9258	0.8582	0.7329	0.5542	0.3907	0.4413	0.6875	0.8862	0.9556	0.9751 (94)
Useful gains	691.4820	754.9083	800.4689	809.6153	732.5355	543.1299	364.7442	381.2233	546.8531	641.8044	650.2639	662.9947 (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	1502.4802	1460.2160	1327.5455	1118.8084	860.4289	574.9580	370.8456	391.0562	619.8967	942.6194	1250.4974	1506.6359 (97)
Space heating kWh	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98a)
Space heating requirement - total per year (kWh/year)												3070.9096
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	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3070.9096
Space heating per m2										(98c) / (4) =		31.8361 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fraction of space heat from main system(s)												0.0000 (201)
Efficiency of main space heating system 1 (in %)												1.0000 (202)
Efficiency of main space heating system 2 (in %)												88.7000 (206)
Efficiency of secondary/supplementary heating system, %												0.0000 (207)
												0.0000 (208)
Space heating requirement	603.3827	473.9668	392.1450	222.6190	95.1527	0.0000	0.0000	0.0000	0.0000	223.8063	432.1681	627.6690 (98)
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	0.0000	0.0000	0.0000	0.0000	88.7000	88.7000	88.7000 (210)
Space heating fuel (main heating system)	680.2511	534.3481	442.1026	250.9797	107.2747	0.0000	0.0000	0.0000	0.0000	252.3183	487.2245	707.6314 (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)

Full SAP Calculation Printout



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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425	(64)
Efficiency of water heater (217)m	85.5117	85.2372	84.6046	83.3863	80.9168	76.2000	76.2000	76.2000	76.2000	83.3749	85.0208	76.2000	(216)
Fuel for water heating, kWh/month	207.5519	183.0377	194.0272	169.5882	166.6981	156.4598	152.7238	160.8533	164.7857	171.1532	182.1387	204.6413	(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	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	15.8094	16.3364	15.8094	16.3364	15.8094	(231)
Lighting	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-21.5903	-32.2235	-49.0082	-58.4189	-65.9430	-62.6537	-61.9074	-56.9798	-48.8060	-38.2945	-24.3670	-18.4649	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-7.3184	-15.7745	-32.0674	-49.2246	-66.1297	-66.8126	-66.0101	-55.3973	-39.9734	-22.8850	-9.8757	-5.7583	(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												3462.1304	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.2000	
Water heating fuel used												2113.6588	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.3640)													
mechanical ventilation fans (SFP = 0.3640)												106.3477	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												192.3477	(231)
Electricity for lighting (calculated in Appendix L)												213.7076	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-975.8843	(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												5005.9601	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3462.1304	3.6400	126.0215	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2113.6588	3.6400	76.9372	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	192.3477	16.4900	31.7181	(249)
Energy for lighting	213.7076	16.4900	35.2404	(250)
Additional standing charges			92.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-538.6574	16.4900	-88.8246	
PV Unit electricity exported	-437.2269	5.5900	-24.4410	
Total			-113.2656	(252)
Total energy cost			248.6516	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.6328	(257)
SAP value		89.7425	
SAP rating (Section 12)		90	(258)
SAP band		B	

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	3462.1304	0.2100	727.0474	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2113.6588	0.2100	443.8684	(264)
Space and water heating			1170.9157	(265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810	(267)
Energy for lighting	213.7076	0.1443	30.8446	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-538.6574	0.1334	-71.8551	
PV Unit electricity exported	-437.2269	0.1253	-54.7710	
Total			-126.6262	(269)
Total CO2, kg/year			1101.8152	(272)
CO2 emissions per m2			11.4200	(273)
EI value			89.5629	
EI rating			90	(274)
EI band			B	

Full SAP Calculation Printout



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 (m ²)	Storey height (m)	Volume (m ³)
Ground floor	43.0600 (1b)	x 2.6100 (2b)	= 112.3866 (1b) - (3b)
First floor	53.4000 (1c)	x 2.3800 (2c)	= 127.0920 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	96.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	239.4786 (5)

2. Ventilation rate

	m ³ per hour												
Number of open chimneys	0 * 80 =											0.0000 (6a)	
Number of open flues	0 * 20 =											0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)	
Number of blocked chimneys	0 * 20 =											0.0000 (6f)	
Number of intermittent extract fans	0 * 10 =											0.0000 (7a)	
Number of passive vents	0 * 10 =											0.0000 (7b)	
Number of flueless gas fires	0 * 40 =											0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =											0.0000 (8)	
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												4.0000 (17)	
Infiltration rate												0.2000 (18)	
Number of sides sheltered												2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1700 (21)	
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	4.7000	4.6000	4.3000	4.3000	4.0000	4.0000	3.9000	4.0000	4.5000	4.4000	4.7000	(22)
Wind factor	1.2750	1.1750	1.1500	1.0750	1.0750	1.0000	1.0000	0.9750	1.0000	1.1250	1.1000	1.1750	(22a)
Adj infilt rate	0.2167	0.1998	0.1955	0.1827	0.1827	0.1700	0.1700	0.1658	0.1700	0.1913	0.1870	0.1998	(22b)
Mechanical extract ventilation - centralised													0.5000 (23a)
If mechanical ventilation													0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1500	1.1000	2.3650		(26)
Windows (Uw = 1.00)			21.7300	0.9615	20.8942		(27)
Ground Floor			53.4000	0.1200	6.4080	90.0000	4806.0000 (28a)
Brick and Block	102.1350	17.3400	84.7950	0.1800	15.2631	42.2200	3580.0449 (29a)
Tile Hung	51.0600	6.5400	44.5200	0.1800	8.0136	42.2200	1879.6344 (29a)
Pitched Roof	53.4000		53.4000	0.0900	4.8060	0.0000	0.0000 (30)
Total net area of external elements Aum(A, m ²)			259.9950				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	57.7499			(33)
Ground Floor Stud			30.3000			9.0000	272.7000 (32c)
First Floor Stud			105.5100			9.0000	949.5900 (32c)
Ground Floor Block			49.7800			75.0000	3733.5000 (32c)
First Floor			43.0600			18.0000	775.0800 (32d)
Internal Ceiling 1			43.0600			9.0000	387.5400 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 16384.0893 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 169.8537 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	16.0600	0.0300	0.4818
E3 Sill	13.6800	0.0250	0.3420
E4 Jamb	36.7500	0.0190	0.6983
E5 Ground floor (normal)	34.8900	0.0580	2.0236
E6 Intermediate floor within a dwelling	26.8800	0.0020	0.0538
E10 Eaves (insulation at ceiling level)	28.0600	0.0650	1.8239
E12 Gable (insulation at ceiling level)	10.4000	0.0400	0.4160
E16 Corner (normal)	27.1100	0.0360	0.9760
E24 Eaves (insulation at ceiling level - inverted)	4.3200	0.1610	0.6955
E17 Corner (inverted - internal area greater than external area)	7.1600	-0.0820	-0.5871

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.9237 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 64.6736 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140	39.5140
Heat transfer coeff	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876	104.1876
Average = Sum(39)m / 12 =	104.1876 (39)											

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801	1.0801 (40)
HLP (average)												1.0801
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7042 (42)
Hot water usage for mixer showers	69.5612	68.5158	66.9925	64.0779	61.9270	59.5284	58.1650	59.6768	61.3340	63.9094	66.8865	69.2946 (42a)
Hot water usage for baths	30.0368	29.5907	28.9625	27.8043	26.9370	25.9753	25.4558	26.0796	26.7588	27.7878	28.9700	29.9352 (42b)
Hot water usage for other uses	42.3242	40.7852	39.2461	37.7070	36.1680	34.6289	34.6289	36.1680	37.7070	39.2461	40.7852	42.3242 (42c)
Average daily hot water use (litres/day)												130.4585 (43)
Daily hot water use	141.9222	138.8916	135.2011	129.5892	125.0320	120.1326	118.2497	121.9243	125.7998	130.9433	136.6417	141.5541 (44)
Energy conte	224.7700	197.7799	207.7990	177.4011	168.3170	147.7170	143.0128	150.9678	155.1237	177.6888	194.6711	221.6395 (45)
Energy content (annual)												Total = Sum(45)m = 2166.8878
Distribution loss (46)m = 0.15 x (45)m	33.7155	29.6670	31.1699	26.6102	25.2476	22.1575	21.4519	22.6452	23.2686	26.6533	29.2007	33.2459 (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												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	1.5533	1.4327	1.5896	1.4666	1.4759	1.3749	1.3607	1.3754	1.3471	1.4425	1.4584	1.5406 (61)
Total heat required for water heating calculated for each month	226.3233	199.2126	209.3887	178.8677	169.7929	149.0919	144.3735	152.3432	156.4708	179.1314	196.1295	223.1801 (62)
WWHRS	-48.8421	-43.1963	-45.2327	-37.4545	-34.9062	-29.8695	-27.9979	-29.7730	-30.9041	-36.4326	-41.2737	-47.9376 (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	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	75.1244	66.1200	69.4906	59.3525	56.3344	49.4596	47.8919	50.5406	51.9154	59.4422	65.0927	74.0803 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550	162.2550 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	30.2525	26.8700	21.8522	16.5435	12.3665	10.4403	11.2811	14.6636	19.6814	24.9901	29.1672	31.0933 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	373.8426	377.7219	367.9462	347.1348	320.8641	296.1733	279.6784	275.7991	285.5749	306.3863	332.6570	357.3477 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297	53.9297 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700	-108.1700 (71)
Water heating gains (Table 5)	100.9736	98.3928	93.4013	82.4341	75.7183	68.6939	64.3709	67.9310	72.1047	79.8954	90.4066	99.5703 (72)
Total internal gains	616.0835	613.9995	594.2144	557.1271	519.9635	483.3223	463.3451	466.4084	485.3758	522.2865	563.2454	599.0260 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b g	Specific data or Table 6c FF	Access factor Table 6d	Gains W						
Northeast	4.1800	15.0428	0.4500	0.7000	0.7700	13.7262 (75)						
Southeast	2.4900	46.3896	0.4500	0.7000	0.7700	25.2153 (77)						
Southwest	5.1600	46.3896	0.4500	0.7000	0.7700	52.2533 (79)						
Northwest	9.9000	15.0428	0.4500	0.7000	0.7700	32.5094 (81)						
Solar gains	123.7042	193.6840	299.2716	437.7084	519.8634	582.7034	538.5606	464.6662	364.7599	236.6587	149.6906	99.2944 (83)
Total gains	739.7876	807.6835	893.4860	994.8355	1039.8269	1066.0257	1001.9057	931.0746	850.1356	758.9452	712.9361	698.3205 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821	43.6821
alpha	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121	3.9121
util living area	0.9744	0.9642	0.9335	0.8603	0.7228	0.5226	0.3791	0.4062	0.6603	0.8776	0.9559	0.9783 (86)
MIT	19.6303	19.7653	20.1015	20.4974	20.8128	20.9601	20.9914	20.9890	20.9034	20.5571	20.0440	19.5890 (87)
Th 2	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171	20.0171 (88)
util rest of house	0.9686	0.9563	0.9185	0.8295	0.6653	0.4400	0.2811	0.3020	0.5760	0.8414	0.9440	0.9732 (89)
MIT 2	18.7959	18.9278	19.2534	19.6233	19.8945	19.9990	20.0149	20.0143	19.9670	19.6877	19.2034	18.7558 (90)
Living area fraction										fLA = Living area / (4) =		0.1550 (91)
MIT	18.9253	19.0576	19.3849	19.7588	20.0368	20.1479	20.1662	20.1653	20.1122	19.8224	19.3337	18.8849 (92)
Temperature adjustment												0.0000

Full SAP Calculation Printout



adjusted MIT 18.9253 19.0576 19.3849 19.7588 20.0368 20.1479 20.1662 20.1653 20.1122 19.8224 19.3337 18.8849 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9601	0.9464	0.9068	0.8203	0.6665	0.4514	0.2962	0.3181	0.5848	0.8329	0.9335	0.9655	(94)
Useful gains	710.2952	764.3576	810.2452	816.0850	693.0809	481.2144	296.7827	296.1550	497.1181	632.1594	665.5512	674.2197	(95)
Ext temp.	5.4000	5.7000	7.3000	9.6000	12.6000	15.4000	17.3000	17.3000	15.0000	11.8000	8.4000	5.5000	(96)
Heat loss rate W	1409.1639	1391.6959	1259.0943	1058.4157	774.8221	494.6753	298.6276	298.5327	532.6239	835.8346	1139.1512	1394.5436	(97)
Space heating kWh	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210	(98a)
Space heating requirement - total per year (kWh/year)												2539.2142	
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	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2539.2142	
Space heating per m2										(98c) / (4) =		26.3240	(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 %)													88.7000	(206)	
Efficiency of main space heating system 2 (in %)													0.0000	(207)	
Efficiency of secondary/supplementary heating system, %													0.0000	(208)	
Space heating requirement	519.9583	421.5713	333.9437	174.4781	60.8154	0.0000	0.0000	0.0000	0.0000	151.5343	340.9920	535.9210	(98)		
Space heating efficiency (main heating system 1)	88.7000	88.7000	88.7000	88.7000	88.7000	0.0000	0.0000	0.0000	0.0000	88.7000	88.7000	88.7000	(210)		
Space heating fuel (main heating system)	586.1988	475.2777	376.4867	196.7059	68.5630	0.0000	0.0000	0.0000	0.0000	170.8392	384.4329	604.1951	(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 requirement	177.4812	156.0162	164.1560	141.4133	134.8867	119.2223	116.3756	122.5702	125.5667	142.6988	154.8558	175.2425	(64)		
Efficiency of water heater (217)m	85.1456	84.9364	84.1506	82.6319	79.6899	76.2000	76.2000	76.2000	76.2000	82.1633	84.3773	85.2538	(216)		
Fuel for water heating, kWh/month	208.4443	183.6859	195.0740	171.1365	169.2646	156.4598	152.7238	160.8533	164.7857	173.6771	183.5279	205.5539	(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 (231)m	16.3364	14.7554	16.3364	15.8094	16.3364	15.8094	16.3364	16.3364	15.8094	16.3364	15.8094	16.3364	(231)		
Lighting (232)m	26.4798	21.2431	19.1271	14.0133	10.8243	8.8435	9.8743	12.8350	16.6713	21.8737	24.7063	27.2158	(232)		
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-26.7804	-34.8731	-52.5504	-63.0657	-68.8420	-68.5683	-66.7629	-62.4376	-54.1834	-43.0554	-29.8065	-22.0865	(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	-10.5725	-18.1668	-36.5838	-57.4315	-72.4307	-81.3563	-77.7981	-67.2063	-49.3005	-28.4583	-14.0450	-7.7915	(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													2862.6992	(211)	
Space heating fuel - main system 2													0.0000	(213)	
Space heating fuel - secondary													0.0000	(215)	
Efficiency of water heater													76.2000		
Water heating fuel used													2125.1866	(219)	
Space cooling fuel													0.0000	(221)	
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.3640)															
mechanical ventilation fans (SFP = 0.3640)														106.3477	(230a)
central heating pump														41.0000	(230c)
main heating flue fan														45.0000	(230e)
Total electricity for the above, kWh/year														192.3477	(231)
Electricity for lighting (calculated in Appendix L)														213.7076	(232)
Energy saving/generation technologies (Appendices M ,N and Q)															
PV generation														-1114.1536	(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														4279.7875	(238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2862.6992	5.6000	160.3112	(240)
Total CO2 associated with community systems			0.0000	(473)

Full SAP Calculation Printout



Water heating (other fuel)	2125.1866	5.6000	119.0105 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	192.3477	26.0600	50.1258 (249)
Energy for lighting	213.7076	26.0600	55.6922 (250)
Additional standing charges			99.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-593.0122	26.0600	-154.5390
PV Unit electricity exported	-521.1414	5.8100	-30.2783
Total			-184.8173 (252)
Total energy cost			299.3223 (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	2862.6992	0.2100	601.1668 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2125.1866	0.2100	446.2892 (264)
Space and water heating			1047.4560 (265)
Pumps, fans and electric keep-hot	192.3477	0.1387	26.6810 (267)
Energy for lighting	213.7076	0.1443	30.8446 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-593.0122	0.1337	-79.2893
PV Unit electricity exported	-521.1414	0.1254	-65.3469
Total			-144.6362 (269)
Total CO2, kg/year			960.3454 (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	2862.6992	1.1300	3234.8502 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2125.1866	1.1300	2401.4609 (278)
Space and water heating			5636.3110 (279)
Pumps, fans and electric keep-hot	192.3477	1.5128	290.9835 (281)
Energy for lighting	213.7076	1.5338	327.7918 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-593.0122	1.4941	-886.0119
PV Unit electricity exported	-521.1414	0.4602	-239.8162
Total			-1125.8281 (283)
Total Primary energy kWh/year			5129.2583 (286)

Predicted Energy Assessment

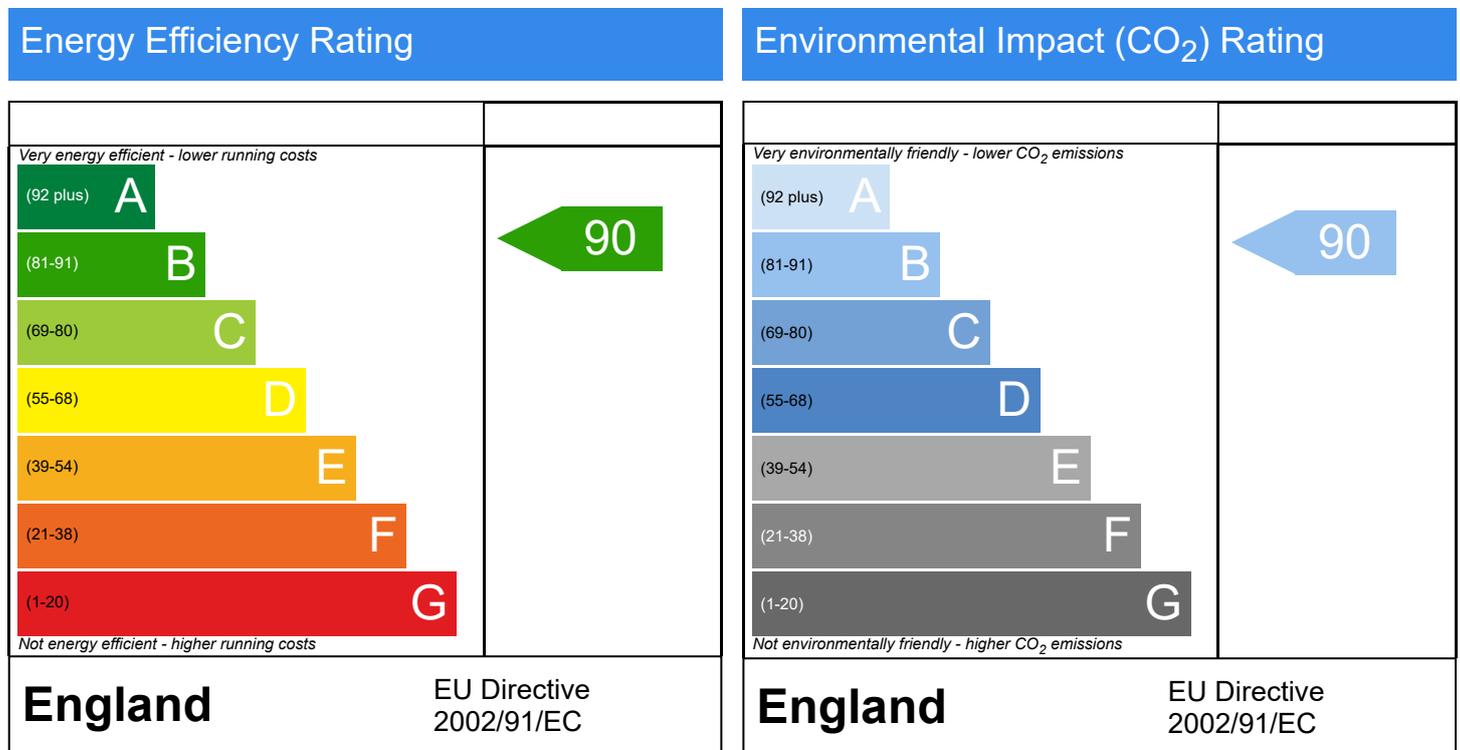


Plot 10, Wharton's Lane, Southampton

Dwelling type: House, Detached
 Date of assessment: 06/01/2025
 Produced by: Tobias Whiting
 Total floor area: 96.46 m²
 DRRN: 9205-7690-6061

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO₂) emissions.



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO₂) emissions. The higher the rating the less impact it has on the environment.

Thermal Bridging



Property Reference	SAP 0898 Plot 10	Issued on Date	06/01/2025
Assessment Reference	Rev C	Prop Type Ref	Detached House
Property	Plot 10, Wharton's Lane, Southampton		

SAP Rating	90 B	DER	11.91	TER	12.70
Environmental	90 B	% DER < TER			6.22
CO ₂ Emissions (t/year)	0.96	DFEE	39.46	TFEE	44.52
Compliance Check	See BREL	% DFEE < TFEE			11.35
% DPER < TPER	3.85	DPER	63.95	TPER	66.51

Assessor Details	Mr. Tobias Whiting	Assessor ID	E477-0001
Client			

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E1 Steel lintel with perforated steel base plate	Non Gov Approved Schemes	0.030	16.06	0.48	Catnic WT-5077
External wall	E3 Sill	Non Gov Approved Schemes	0.025	13.68	0.34	Knauf P5
External wall	E4 Jamb	Non Gov Approved Schemes	0.019	36.75	0.70	Knauf P6
External wall	E5 Ground floor (normal)	Independently assessed	0.058	34.89	2.02	SEES-2242-E5
External wall	E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	0.002	26.88	0.05	Knauf P14
External wall	E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.065	28.06	1.82	Knauf P16
External wall	E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.040	10.40	0.42	Knauf P21
External wall	E16 Corner (normal)	Non Gov Approved Schemes	0.036	27.11	0.98	Knauf P23
External wall	E24 Eaves (insulation at ceiling level - inverted)	Non Gov Approved Schemes	0.161	4.32	0.70	Knauf P19
External wall	E17 Corner (inverted – internal area greater than external area)	Non Gov Approved Schemes	-0.082	7.16	-0.59	Knauf P24

Total: 205.31 W/mK:
 Y-Value: 0.03 W/m²K:

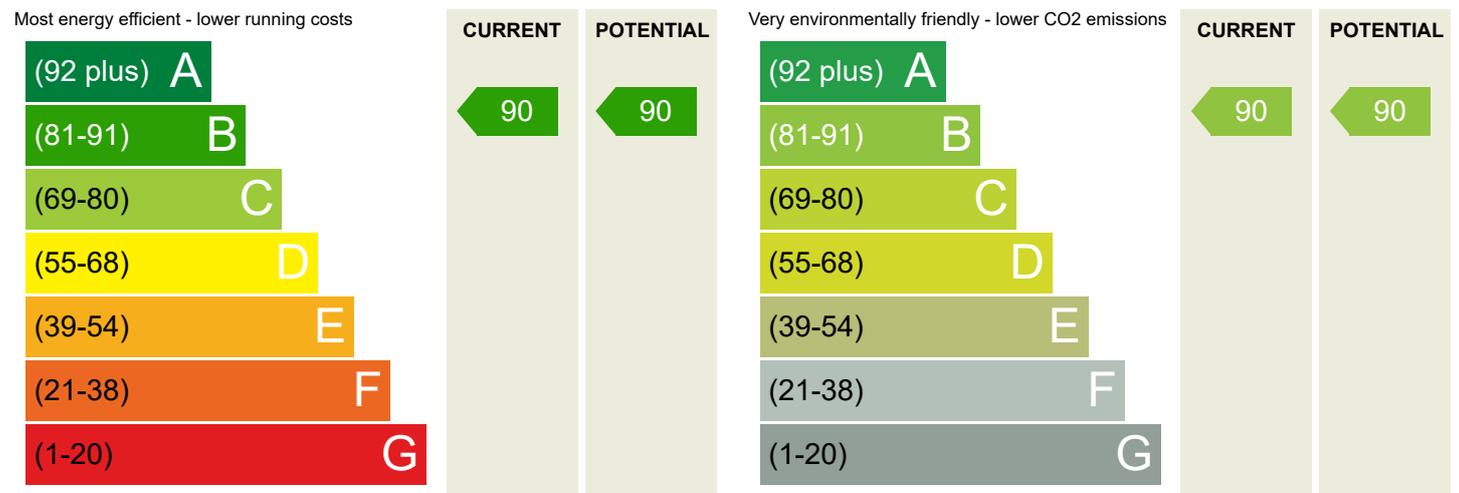
Dwelling Address	Plot 10, Wharton's Lane, Southampton
Reference	SAP 0898 Plot 10-Rev C
Assessment Date	06/01/2025
Submission Date	06/01/2025
Property Type	House, Detached
Total Floor Area	96

This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

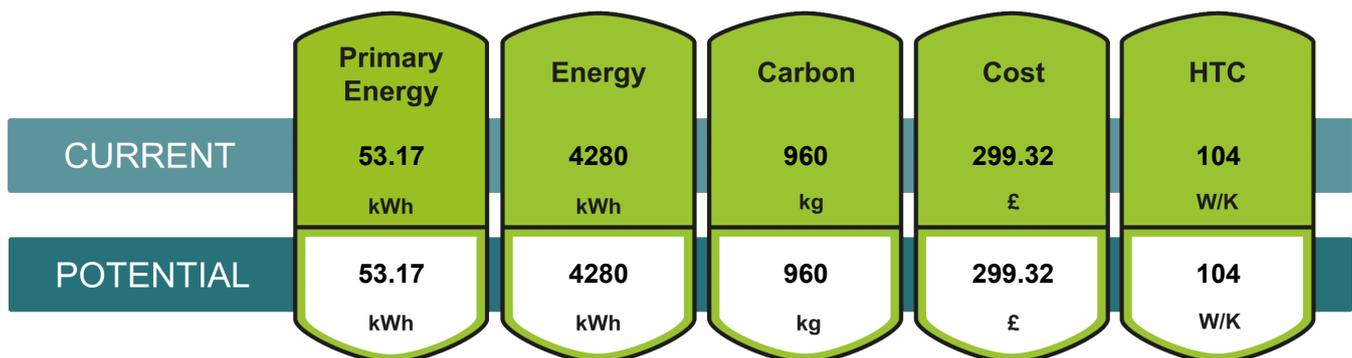
This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

Energy Efficiency Rating

Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Breakdown of property's energy performance

Each feature is assessed as one of the following:



Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.18 W/m ² K	Very Good
Roof	Average thermal transmittance 0.09 W/m ² K	Very Good
Floor	Average thermal transmittance 0.12 W/m ² K	Very Good
Windows	High performance glazing	Very Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system, waste water heat recovery	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.0 m ³ /h.m ² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£27	 B 90			 B 91

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

		Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting		£56	£56	
Heating		£309	£309	
Hot Water		£119	£119	
New Technologies e.g. Impact of PV		-(£185)	-(£185)	
TOTAL		£299	£299	

Estimated energy use and potential savings



Space Heating

2863

kWh per year



Water Heating

2125

kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO ₂)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.