

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Array SAP 10 program, Array

Date: Fri 13 Dec 2024 12:40:23

Project Information			
Assessed By	Rob Carswell	Building Type	House, Mid-terrace
OCDEA Registration	EES/001469	Assessment Date	2024-12-13

Dwelling Details			
Assessment Type	As designed	Total Floor Area	68 m ²
Site Reference	0214-0522-03_053	Plot Reference	r2
Address	Plot 53 Hoe Lane, ROMSEY, SO52 9NH		

Client Details	
Name	Morrish Homes
Company	Morrish Homes
Address	Unit 5 Factory Road, Poole, BH16 5SL

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	11.28 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	4.14 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	58.96 kWh _{PE} /m ²	
Dwelling primary energy	43.91 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	31.6 kWh/m ²	
Dwelling fabric energy efficiency	27.6 kWh/m ²	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.17	Walls (1) (0.17)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.12	Heat Loss Floor 1 (0.12)	OK
Roofs	0.16	0.09	Roof (1) (0.09)	OK
Windows, doors, and roof windows	1.6	1.3	S (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	37.07	0.17
Party wall: Party Wall (1)	76.2	0 (!)
Ground floor: Heat Loss Floor 1, Heat Loss Floor 1	34	0.12
Exposed roof: Roof (1)	34	0.09 (!)

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
N, Solid Door	2.1	North	N/A	1.2
N, Window	4.1	North	0.7	1.3
S, Window	3.31	South	0.7	1.3
S, Full Glz Door	1.97	South	0.7	1.4

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part 1 - Main Dwelling: Thermal bridging calculated from linear thermal transmittances for each junction				
Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.05	Catnic
External wall	E3: Sill	Calculated by person with suitable expertise	0.02 (!)	Xtratherm

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E4: Jamb	Calculated by person with suitable expertise	0.01 (!)	Xtratherm
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.02 (!)	Xtratherm
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0 (!)	Xtratherm
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.04	Xtratherm
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.05	Xtratherm
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.05	Xtratherm
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.07	Xtratherm
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 (!)	
Party wall	P4: Roof (insulation at ceiling level)	Calculated by person with suitable expertise	0.1	Xtratherm

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	4 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating	
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	331.8%
Emitter type	Radiators
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Ideal Boilers
Model	Logic Air 4kW
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	180 litres
Declared heat loss	1.6 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services	
Function	
Ecodesign class	
Manufacturer	
Model	
Water heating - type: Cylinder thermostat and HW separately timed	
Manufacturer	
Model	

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	100 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Summary for Input Data



Property Reference	0214-0522-03_053	Issued on Date	13/12/2024
Assessment Reference	r2	Prop Type Ref	Type G
Property	Plot 53, Hoe Lane, ROMSEY, SO52 9NH		

SAP Rating	84 B	DER	4.14	TER	11.28
Environmental	97 A	% DER < TER			63.30
CO ₂ Emissions (t/year)	0.26	DFEE	27.62	TFEE	31.59
Compliance Check	See BREL	% DFEE < TFEE			12.55
% DPER < TPER	25.53	DPER	43.91	TPER	58.96

Assessor Details	Mr. Rob Carswell	Assessor ID	7134-0001
Client			

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

Orientation	North
Property Tenure	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, Mid-Terrace
Which Floor	0
2.0 Number of Storeys	2
3.0 Date Built	2022
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	188.55 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:	9.30 m	34.00 m ²	2.46 m
	1st Storey:	9.30 m	34.00 m ²	2.76 m

8.0 Living Area	25.90 m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.17	70.00	48.55	37.07	0.00	None	11.48	Calculate Wall Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	76.20	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
TF	Plasterboard on timber frame	9.00	124.30

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
Plane	External Plane Roof	Plasterboard, insulated at ceiling level	0.09	9.00	34.00	34.00	None	0.00	Calculate Wall Area	0.00

Description	Storey	Construction	Area (m ²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	34.00

Summary for Input Data



11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heat Loss Floor 1	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	34.00

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Plasterboard ceiling, carpeted chipboard floor	9.00	34.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Solid Door	Manufacturer	Solid Door				0.00			1.20
Part Glz Door	Manufacturer	Half Glazed Door	Double Low-E Soft 0.05			0.70		0.70	1.20
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.70		0.70	1.30
Full Glz Door	Manufacturer	Window	Double Low-E Soft 0.05			0.70		0.70	1.40
Rooflight	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.70		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
N	Solid Door	External Wall 1	North	2.10	0
N	Window	External Wall 1	North	4.10	0
S	Window	External Wall 1	South	3.31	0
S	Full Glz Door	External Wall 1	South	1.97	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
E2 Other lintels (including other steel lintels)	Independently assessed	9.00	0.05	0.05 Catnic	No
E3 Sill	Independently assessed	7.10	0.02	0.02 Xtratherm	No
E4 Jamb	Independently assessed	21.00	0.01	0.01 Xtratherm	No
E5 Ground floor (normal)	Independently assessed	9.30	0.02	0.02 Xtratherm	No
E6 Intermediate floor within a dwelling	Independently assessed	9.30	0.00	0.00 Xtratherm	No
E10 Eaves (insulation at ceiling level)	Independently assessed	9.30	0.04	0.04 Xtratherm	No
E12 Gable (insulation at ceiling level)	Independently assessed	7.30	0.05	0.05 Xtratherm	No
E18 Party wall between dwellings	Independently assessed	20.90	0.05	0.05 Xtratherm	No
P1 Party wall - Ground floor	Independently assessed	14.60	0.07	0.07 Xtratherm	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	14.60	0.00	0.00	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	14.60	0.10	0.10 Xtratherm	No

Y-value W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation
Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys

Number of open flues

Number of chimneys/flues attached to closed fire

Number of flues attached to solid fuel boiler

Number of flues attached to other heater

Number of blocked chimneys

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Property Tested?

Test Method

22.0 Lighting
No Fixed Lighting

Summary for Input Data



	Name	Efficacy	Power	Capacity	Count
	Low energy Lighting	100.00	10.00	1000.00	15
24.0 Main Heating 1	Database				
Percentage of Heat	100.00			%	
Database Ref. No.	107447				
Fuel Type	Electricity				
SAP Code	224				
In Winter	331.84				
In Summer	185.77				
Model Name	Logic Air 4kW				
Manufacturer	Ideal Boilers				
System Type	Heat Pump				
Controls SAP Code	2207				
PCDF Controls	0				
Delayed Start Stat	No				
HETAS approved System	No				
Is MHS Pumped	Pump in heated space				
Heating Pump Age	2013 or later				
Heat Emitter	Radiators				
Flow Temperature	Enter value				
Flow Temperature Value	35.00				

25.0 Main Heating 2

26.0 Heat Networks

	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

28.0 Water Heating	Main Heating 1				
Water Heating	Main Heating 1				
SAP Code	901				
Flue Gas Heat Recovery System	No				
Waste Water Heat Recovery Instantaneous System 1	No				
Waste Water Heat Recovery Instantaneous System 2	No				
Waste Water Heat Recovery Storage System	No				
Solar Panel	No				
Water use <= 125 litres/person/day	Yes				
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
1		Combi boiler or unvented hot water system	8.00		No	

28.3 Waste Water Heat Recovery System

Summary for Input Data



29.0 Hot Water Cylinder

Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Insulation Thickness	80	
Cylinder Volume	180.00	L
Loss	1.60	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store

Thermal Store	None	
Thermal Store Pipework	within a single casing	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Environmental	97 A	% DER < TER			63.30
CO ₂ Emissions (t/year)	0.26	DFEE	27.62	TFEE	31.59
Compliance Check	See BREL	% DFEE < TFEE			12.55
% DPER < TPER	25.53	DPER	43.91	TPER	58.96
Assessor Details	Mr. Rob Carswell			Assessor ID	7134-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1127 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3127 (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) = 0.2658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3389	0.3322	0.3256	0.2924	0.2857	0.2525	0.2525	0.2459	0.2658	0.2857	0.2990	0.3123 (22b)
Effective ac	0.5574	0.5552	0.5530	0.5427	0.5408	0.5319	0.5319	0.5302	0.5353	0.5408	0.5447	0.5488 (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
Solid Door			2.1000	1.2000	2.5200		(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)
Total net area of external elements Aum(A, m ²)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.7298		(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)
TF			124.3000			9.0000	1118.7000 (32c)
Internal Floor 1			34.0000			18.0000	612.0000 (32d)
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12821.3199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.5488 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.0000	0.0500	0.4500	
E3 Sill				7.1000	0.0200	0.1420	

Full SAP Calculation Printout



E4 Jamb				21.0000	0.0100	0.2100	
E5 Ground floor (normal)				9.3000	0.0200	0.1860	
E6 Intermediate floor within a dwelling				9.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)				9.3000	0.0400	0.3720	
E12 Gable (insulation at ceiling level)				7.3000	0.0500	0.3650	
E18 Party wall between dwellings				20.9000	0.0500	1.0450	
P1 Party wall - Ground floor				14.6000	0.0700	1.0220	
P2 Party wall - Intermediate floor within a dwelling				14.6000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)				14.6000	0.1000	1.4600	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2520 (36)
Point Thermal bridges							0.0000
Total fabric heat loss						(33) + (36) + (36a) =	32.9818 (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	32.6471	32.5165	32.3885	31.7873	31.6748	31.1512	31.1512	31.0542	31.3529	31.6748	31.9024	32.1403 (38)
Average = Sum(39)m / 12 =	65.6289	65.4983	65.3703	64.7691	64.6566	64.1330	64.1330	64.0360	64.3347	64.6566	64.8842	65.1221 (39)
												64.7686

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9651	0.9632	0.9613	0.9525	0.9508	0.9431	0.9431	0.9417	0.9461	0.9508	0.9542	0.9577 (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													2.1966 (42)
Hot water usage for mixer showers	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156	62.1966 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	37.1254 (42c)
Average daily hot water use (litres/day)													114.4912 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)	
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)	
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)	
Water storage loss:													180.0000 (47)
Store volume													1.6000 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8640 (55)
Enter (49) or (54) in (55)													
Total storage loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840 (56)
If cylinder contains dedicated solar storage	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580	244.5580 (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	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	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	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	0.0000 (63d)
Output from w/h	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580	244.5580 (64)
Total per year (kWh/year)													2490.9307 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	105.6258	93.8756	100.6739	90.5121	89.1529	81.8503	81.7689	84.0901	84.0112	91.8873	95.5513	104.7122	104.7122 (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	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5474	115.7489	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474	108.0323	104.5474	108.0323	104.5474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.9701	139.6958	135.3144	125.7113	119.8292	113.6809	109.9045	113.0244	116.6822	123.5044	132.7101	140.7423 (72)
Total internal gains	495.0515	505.9771	485.3583	468.5191	445.6187	430.2359	414.4772	415.5987	427.7774	441.8357	468.0596	485.3263 (73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains					
		m2	Table 6a	Specific data	Specific data	factor	W					
			W/m2	or Table 6b	or Table 6c	Table 6d						
North		4.1000	10.6334	0.7000	0.7000	0.7700	14.8042 (74)					
South		3.3100	46.7521	0.7000	0.7000	0.7700	52.5482 (78)					
South		1.9700	46.7521	0.7000	0.7000	0.7700	31.2749 (78)					
Solar gains	98.6274	165.5723	222.9456	274.8622	309.9777	309.5630	297.6253	270.5535	240.4746	181.7476	117.6219	84.7724 (83)

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Total gains 593.6789 671.5494 708.3039 743.3813 755.5965 739.7989 712.1025 686.1521 668.2521 623.5833 585.6816 570.0987 (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	54.2669	54.3751	54.4816	54.9873	55.0829	55.5327	55.5327	55.6168	55.3586	55.0829	54.8898	54.6892
alpha	4.6178	4.6250	4.6321	4.6658	4.6722	4.7022	4.7022	4.7078	4.6906	4.6722	4.6593	4.6459
util living area	0.9721	0.9511	0.9187	0.8445	0.7188	0.5388	0.3932	0.4247	0.6280	0.8533	0.9486	0.9762 (86)
Living	19.9404	20.1505	20.3927	20.6807	20.8808	20.9757	20.9955	20.9935	20.9503	20.7124	20.2910	19.9005
Non living	18.8961	19.1585	19.4571	19.8033	20.0218	20.1154	20.1291	20.1293	20.0935	19.8474	19.3428	18.8507
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4580	20.1505	20.3927	20.6807	20.8808	20.9757	20.9955	20.9935	20.9503	20.7124	20.2910	20.0543 (87)
Th 2	20.1125	20.1141	20.1157	20.1231	20.1245	20.1310	20.1310	20.1322	20.1285	20.1245	20.1217	20.1188 (88)
util rest of house	0.9661	0.9410	0.9021	0.8142	0.6692	0.4715	0.3170	0.3467	0.5605	0.8185	0.9364	0.9710 (89)
MIT 2	19.6276	19.1585	19.4571	19.8033	20.0218	20.1154	20.1291	20.1293	20.0935	19.8474	19.3428	19.0792 (90)
Living area fraction										fLA = Living area / (4) =		0.3809 (91)
MIT	19.9439	19.5363	19.8134	20.1375	20.3490	20.4431	20.4591	20.4585	20.4199	20.1769	19.7040	19.4506 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9439	19.5363	19.8134	20.1375	20.3490	20.4431	20.4591	20.4585	20.4199	20.1769	19.7040	19.4506 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9648	0.9333	0.8956	0.8147	0.6825	0.4961	0.3460	0.3763	0.5838	0.8208	0.9294	0.9662 (94)
Useful gains	572.7576	626.7258	634.3331	605.6287	515.7050	367.0230	246.3714	258.2106	390.1316	511.8300	544.3411	550.8374 (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	1026.6891	958.6552	870.3028	727.8430	559.2163	374.7333	247.4960	259.8886	406.5857	619.2071	817.7985	993.1522 (97)
Space heating kWh	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98a)
Space heating requirement - total per year (kWh/year)												1462.5698
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	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1462.5698
Space heating per m2										(98c) / (4) =		21.5084 (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 %)												331.8363 (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	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98)
Space heating efficiency (main heating system 1)	331.8363	331.8363	331.8363	331.8363	331.8363	0.0000	0.0000	0.0000	0.0000	331.8363	331.8363	331.8363 (210)
Space heating fuel (main heating system)	101.7746	67.2188	52.9060	26.5174	9.7555	0.0000	0.0000	0.0000	0.0000	24.0747	59.3333	99.1700 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (64)
Efficiency of water heater (217)m	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698 (216)
Fuel for water heating, kWh/month	133.1247	117.7674	125.1079	109.8784	106.4560	95.8552	94.5017	98.2596	99.3537	110.8828	118.0365	131.6458 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6922	18.8594	20.7751 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												440.7503 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												185.7698
Water heating fuel used												1340.8697 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:		
Total electricity for the above, kWh/year		0.0000 (231)
Electricity for lighting (calculated in Appendix L)		163.1327 (232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation		0.0000 (233)
Wind generation		0.0000 (234)
Hydro-electric generation (Appendix N)		0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)		0.0000 (235)
Appendix Q - special features		
Energy saved or generated		-0.0000 (236)
Energy used		0.0000 (237)
Total delivered energy for all uses		1944.7527 (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	440.7503	0.1564	68.9168 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1340.8697	0.1409	188.9288 (264)
Space and water heating			257.8456 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	163.1327	0.1443	23.5451 (268)
Total CO2, kg/year			281.3907 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1400 (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	440.7503	1.5788	695.8755 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1340.8697	1.5210	2039.4600 (278)
Space and water heating			2735.3355 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	163.1327	1.5338	250.2183 (282)
Total Primary energy kWh/year			2985.5538 (286)
Dwelling Primary energy Rate (DPER)			43.9100 (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	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.4800 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1127 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000 (17)	
Infiltration rate		0.3627 (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) =		0.3083 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3931	0.3854	0.3776	0.3391	0.3314	0.2929	0.2929	0.2852	0.3083	0.3314	0.3468	0.3622 (22b)
Effective ac	0.5772	0.5742	0.5713	0.5575	0.5549	0.5429	0.5429	0.5407	0.5475	0.5549	0.5601	0.5656 (25)

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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			2.1000	1.0000	2.1000			(26)
TER Opening Type (Uw = 1.20)			9.3800	1.1450	10.7405			(27)
Heat Loss Floor 1			34.0000	0.1300	4.4200			(28a)
External Wall 1	48.5460	11.4800	37.0660	0.1800	6.6719			(29a)
Plane	34.0000		34.0000	0.1100	3.7400			(30)
Total net area of external elements Aum(A, m2)			116.5460					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.6723		(33)
Party Wall 1			76.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5488 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	9.0000	0.0500	0.4500	
E2 Other lintels (including other steel lintels)	7.1000	0.0500	0.3550	
E3 Sill	21.0000	0.0500	1.0500	
E4 Jamb	9.3000	0.1600	1.4880	
E5 Ground floor (normal)	9.3000	0.0000	0.0000	
E6 Intermediate floor within a dwelling	9.3000	0.0600	0.5580	
E10 Eaves (insulation at ceiling level)	7.3000	0.0600	0.4380	
E12 Gable (insulation at ceiling level)	20.9000	0.0600	1.2540	
E18 Party wall between dwellings	14.6000	0.0800	1.1680	
P1 Party wall - Ground floor	14.6000	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.1200	1.7520	
P4 Party wall - Roof (insulation at ceiling level)				8.5130 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K) (36a) = 0.0000
 Point Thermal bridges (33) + (36) + (36a) = 36.1853 (37)
 Total fabric heat loss

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	33.8086	33.6329	33.4607	32.6518	32.5005	31.7960	31.7960	31.6655	32.0674	32.5005	32.8066	33.1267	(38)
Average = Sum(39)m / 12 =	69.9939	69.8182	69.6460	68.8372	68.6858	67.9813	67.9813	67.8509	68.2527	68.6858	68.9920	69.3120	(39)
												68.8364	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0293	1.0267	1.0242	1.0123	1.0101	0.9997	0.9997	0.9978	1.0037	1.0101	1.0146	1.0193	(40)
HLP (average)												1.0123	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156	60.8156 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	37.1254 (42c)
Average daily hot water use (litres/day)													114.4912 (43)
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284	124.2284 (44)
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116	194.5116 (45)
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767	29.1767 (46)
Water storage loss:													180.0000 (47)
Store volume													1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8381 (55)
Enter (49) or (54) in (55)													
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	246.5017	218.0502	231.6090	203.3430	196.9594	177.2923	174.7519	181.7329	183.7914	205.1830	218.4984	243.7543	243.7543 (62)
WWHRS	-27.9093	-24.6832	-25.8468	-21.4022	-19.9461	-17.0680	-15.9985	-17.0128	-17.6592	-20.8183	-23.5846	-27.3924	-27.3924 (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	-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	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	0.0000 (63d)
Output from w/h	218.5925	193.3670	205.7622	181.9408	177.0133	160.2243	158.7534	164.7201	166.1322	184.3648	194.9138	216.3619	216.3619 (64)
12Total per year (kWh/year)													2222.1461 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	104.9828	93.2948	100.0309	89.8899	88.5100	81.2280	81.1259	83.4471	83.3890	91.2443	94.9290	104.0693	104.0693 (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	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5474	115.7489	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (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	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.1059	138.8316	134.4502	124.8471	118.9650	112.8167	109.0403	112.1601	115.8180	122.6402	131.8459	139.8780	139.8780 (72)
Total internal gains													

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497.1873 508.1129 487.4940 470.6548 447.7545 429.3717 413.6130 414.7344 426.9132 443.9715 470.1954 487.4621 (73)

6. Solar gains

[Jan]												Gains W
	Area m2	Solar flux Table 6a W/m2		Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d					
North	4.1000	10.6334		0.6300		0.7000	0.7700					13.3238 (74)
South	5.2800	46.7521		0.6300		0.7000	0.7700					75.4408 (78)
Solar gains	88.7646	149.0151	200.6511	247.3760	278.9800	278.6067	267.8627	243.4981	216.4272	163.5728	105.8597	76.2952 (83)
Total gains	585.9519	657.1280	688.1451	718.0308	726.7345	707.9784	681.4757	658.2326	643.3404	607.5443	576.0551	563.7573 (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	50.8827	51.0107	51.1368	51.7377	51.8517	52.3890	52.3890	52.4898	52.1808	51.8517	51.6216	51.3832
alpha	4.3922	4.4007	4.4091	4.4492	4.4568	4.4926	4.4926	4.4993	4.4787	4.4568	4.4414	4.4255
util living area	0.9754	0.9586	0.9329	0.8715	0.7605	0.5860	0.4328	0.4653	0.6728	0.8762	0.9557	0.9788 (86)
MIT	19.7984	20.0054	20.2590	20.5816	20.8261	20.9591	20.9915	20.9882	20.9229	20.6322	20.1756	19.7648 (87)
Th 2	20.0590	20.0611	20.0632	20.0731	20.0749	20.0836	20.0836	20.0852	20.0802	20.0749	20.0712	20.0673 (88)
util rest of house	0.9699	0.9496	0.9181	0.8434	0.7108	0.5121	0.3455	0.3768	0.6015	0.8437	0.9446	0.9740 (89)
MIT 2	18.6788	18.9390	19.2547	19.6493	19.9228	20.0571	20.0801	20.0800	20.0252	19.7165	19.1627	18.6425 (90)
Living area fraction	fLA = Living area / (4) = 0.3809 (91)											
MIT	19.1052	19.3451	19.6372	20.0044	20.2668	20.4006	20.4272	20.4259	20.3671	20.0653	19.5485	19.0700 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1052	19.3451	19.6372	20.0044	20.2668	20.4006	20.4272	20.4259	20.3671	20.0653	19.5485	19.0700 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9628	0.9413	0.9102	0.8411	0.7218	0.5384	0.3787	0.4103	0.6248	0.8433	0.9370	0.9674 (94)
Useful gains	564.1294	618.5545	626.3258	603.9199	524.5215	381.2040	258.0419	270.0814	401.9484	512.3337	539.7379	545.3764 (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	1036.2740	1008.5347	914.9559	764.3957	588.4183	394.3343	260.1794	273.1609	427.7472	650.1329	858.8462	1030.6675 (97)
Space heating kWh	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98a)
Space heating requirement - total per year (kWh/year)	1684.5020											
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	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1684.5020											
Space heating per m2	(98c) / (4) = 24.7721 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)

Fraction of space heat from main system(s) 1.0000 (202)

Efficiency of main space heating system 1 (in %) 92.3000 (206)

Efficiency of main space heating system 2 (in %) 0.0000 (207)

Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	380.5802	283.9293	232.6552	125.1816	51.5051	0.0000	0.0000	0.0000	0.0000	111.0754	248.9252	391.1772 (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	218.5925	193.3670	205.7622	181.9408	177.0133	160.2243	158.7534	164.7201	166.1322	184.3648	194.9138	216.3619 (64)
Efficiency of water heater (217)m	85.1177	84.7421	84.1557	83.0700	81.5498	79.8000	79.8000	79.8000	79.8000	82.7989	84.4296	85.1995 (216)
Fuel for water heating, kWh/month	256.8120	228.1828	244.5017	219.0210	217.0617	200.7823	198.9390	206.4161	208.1857	222.6657	230.8596	253.9474 (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	21.7229	17.4269	15.6910	11.4959	8.8798	7.2548	8.1004	10.5292	13.6764	17.9442	20.2679	22.3266 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-32.0131	-45.2314	-65.1597	-73.4398	-79.3552	-74.1485	-73.2585	-69.0997	-61.7534	-51.8339	-35.2407	-27.6678 (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	-17.7696	-37.4241	-74.4575	-111.9292	-148.0825	-148.8008	-147.0237	-124.4209	-91.1305	-53.5211	-23.7275	-14.0461 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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												1825.0292	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2687.3751	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												175.3161	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1680.5352	(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												3093.1853	(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	1825.0292	0.2100	383.2561	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2687.3751	0.2100	564.3488	(264)
Space and water heating			947.6049	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3161	0.1443	25.3035	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-688.2018	0.1345	-92.5846	
PV Unit electricity exported	-992.3334	0.1259	-124.9088	
Total			-217.4934	(269)
Total CO2, kg/year			767.3443	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2800	(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	1825.0292	1.1300	2062.2830	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2687.3751	1.1300	3036.7339	(278)
Space and water heating			5099.0169	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3161	1.5338	268.9057	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-688.2018	1.4972	-1030.3766	
PV Unit electricity exported	-992.3334	0.4620	-458.5005	
Total			-1488.8770	(283)
Total Primary energy kWh/year			4009.1464	(286)
Target Primary Energy Rate (TPER)			58.9600	(287)

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Property Reference	0214-0522-03_053		Issued on Date	13/12/2024	
Assessment Reference	r2	Prop Type Ref	Type G		
Property	Plot 53, Hoe Lane, ROMSEY, SO52 9NH				
SAP Rating	84 B	DER	4.14	TER	11.28
Environmental	97 A	% DER < TER			63.30
CO ₂ Emissions (t/year)	0.26	DFEE	27.62	TFEE	31.59
Compliance Check	See BREL	% DFEE < TFEE			12.55
% DPER < TPER	25.53	DPER	43.91	TPER	58.96
Assessor Details	Mr. Rob Carswell			Assessor ID	7134-0001
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	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.4800 (5)

2. Ventilation rate

	m ³ per hour												
Number of open chimneys	0 * 80 =											0.0000 (6a)	
Number of open flues	0 * 20 =											0.0000 (6b)	
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)	
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)	
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)	
Number of blocked chimneys	0 * 20 =											0.0000 (6f)	
Number of intermittent extract fans	2 * 10 =											20.0000 (7a)	
Number of passive vents	0 * 10 =											0.0000 (7b)	
Number of flueless gas fires	0 * 40 =											0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =											0.1127 (8)	
Pressure test	Yes												
Pressure Test Method	Blower Door												
Measured/design AP50	4.0000											(17)	
Infiltration rate	0.3127											(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) =											0.2658 (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	0.3389	0.3322	0.3256	0.2924	0.2857	0.2525	0.2525	0.2459	0.2658	0.2857	0.2990	0.3123	(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	0.5574	0.5552	0.5530	0.5427	0.5408	0.5319	0.5319	0.5302	0.5353	0.5408	0.5447	0.5488	(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
Solid Door			2.1000	1.2000	2.5200		(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)
Total net area of external elements Aum(A, m ²)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.7298		(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)
TF			124.3000			9.0000	1118.7000 (32c)
Internal Floor 1			34.0000			18.0000	612.0000 (32d)
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12821.3199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.5488 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total

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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	54.2669	54.3751	54.4816	54.9873	55.0829	55.5327	55.5327	55.6168	55.3586	55.0829	54.8898	54.6892
alpha	4.6178	4.6250	4.6321	4.6658	4.6722	4.7022	4.7022	4.7078	4.6906	4.6722	4.6593	4.6459
util living area	0.9857	0.9714	0.9480	0.8878	0.7746	0.5943	0.4384	0.4761	0.6930	0.9013	0.9715	0.9882 (86)
MIT	19.7620	19.9885	20.2549	20.5889	20.8355	20.9636	20.9929	20.9895	20.9252	20.6174	20.1379	19.7205 (87)
Th 2	20.1125	20.1141	20.1157	20.1231	20.1245	20.1310	20.1310	20.1322	20.1285	20.1245	20.1217	20.1188 (88)
util rest of house	0.9823	0.9650	0.9362	0.8626	0.7275	0.5231	0.3544	0.3901	0.6245	0.8739	0.9640	0.9855 (89)
MIT 2	18.9901	19.2136	19.4738	19.7945	20.0110	20.1124	20.1287	20.1285	20.0860	19.8276	19.3687	18.9540 (90)
Living area fraction									fLA = Living area / (4) =			
MIT	19.2841	19.5087	19.7713	20.0970	20.3250	20.4366	20.4578	20.4565	20.4057	20.1284	19.6617	19.2460 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2841	19.5087	19.7713	20.0970	20.3250	20.4366	20.4578	20.4565	20.4057	20.1284	19.6617	19.2460 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9784	0.9596	0.9308	0.8618	0.7389	0.5489	0.3864	0.4227	0.6473	0.8740	0.9591	0.9820 (94)
Useful gains	486.1229	552.6321	572.6829	565.8940	497.0078	362.6455	245.6178	257.0228	380.5703	470.9727	474.6952	465.6061 (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	983.3904	956.8486	867.5492	725.2220	557.6650	374.3166	247.4132	259.7596	405.6722	616.0739	815.0542	979.8248 (97)
Space heating kWh	369.9670	271.6334	219.3805	114.7162	45.1289	0.0000	0.0000	0.0000	0.0000	107.9553	245.0585	382.5787 (98a)
Space heating requirement - total per year (kWh/year)												1756.4186
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	369.9670	271.6334	219.3805	114.7162	45.1289	0.0000	0.0000	0.0000	0.0000	107.9553	245.0585	382.5787 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1756.4186
Space heating per m2												(98c) / (4) = 25.8297 (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	602.8502	474.5842	486.6738	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8924	0.9420	0.9277	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	537.9708	447.0812	451.4746	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	727.6231	700.6368	670.3024	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	136.5496	188.6454	162.8079	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	34.1374	47.1613	40.7020	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												122.0007 (107)
Energy for space heating												25.8297 (99)
Energy for space cooling												1.7941 (108)
Total												27.6238 (109)
Fabric Energy Efficiency (DFEE)												27.6 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	34.0000 (1b)	x	2.4600 (2b) = 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x	2.7600 (2c) = 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	177.4800 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)

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Number of flueless gas fires												0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											20.0000 / (5) =	0.1127 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												5.0000	(17)
Infiltration rate												0.3627	(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) =											0.3083	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3931	0.3854	0.3776	0.3391	0.3314	0.2929	0.2929	0.2852	0.3083	0.3314	0.3468	0.3622 (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	0.5772	0.5742	0.5713	0.5575	0.5549	0.5429	0.5429	0.5407	0.5475	0.5549	0.5601	0.5656 (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			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.20)			9.3800	1.1450	10.7405		(27)
Heat Loss Floor 1			34.0000	0.1300	4.4200		(28a)
External Wall 1	48.5460	11.4800	37.0660	0.1800	6.6719		(29a)
Plane	34.0000		34.0000	0.1100	3.7400		(30)
Total net area of external elements Aum(A, m2)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)					27.6723		(32)
Party Wall 1			76.2000	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5488 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	9.0000	0.0500	0.4500
E2 Other lintels (including other steel lintels)	7.1000	0.0500	0.3550
E3 Sill	21.0000	0.0500	1.0500
E4 Jamb	9.3000	0.1600	1.4880
E5 Ground floor (normal)	9.3000	0.0000	0.0000
E6 Intermediate floor within a dwelling	9.3000	0.0600	0.5580
E10 Eaves (insulation at ceiling level)	7.3000	0.0600	0.4380
E12 Gable (insulation at ceiling level)	20.9000	0.0600	1.2540
E18 Party wall between dwellings	14.6000	0.0800	1.1680
P1 Party wall - Ground floor	14.6000	0.0000	0.0000
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.1200	1.7520
P4 Party wall - Roof (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.5130 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 36.1853 (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	33.8086	33.6329	33.4607	32.6518	32.5005	31.7960	31.7960	31.6655	32.0674	32.5005	32.8066	33.1267 (38)
Average = Sum(39)m / 12 =	69.9939	69.8182	69.6460	68.8372	68.6858	67.9813	67.9813	67.8509	68.2527	68.6858	68.9920	69.3120 (39)
												68.8364

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0293	1.0267	1.0242	1.0123	1.0101	0.9997	0.9997	0.9978	1.0037	1.0101	1.0146	1.0193 (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												2.1966 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												58.2056 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	63.5020	61.7602	59.8586	57.4914	55.3798	53.1853	52.7291	54.6269	56.5734	58.8270	61.2151	63.4128 (44)
Energy content (annual)	100.5716	87.9457	92.0004	78.7029	74.5519	65.3975	63.7713	67.6396	69.7606	79.8277	87.2122	99.2891 (45)
Distribution loss (46)m = 0.15 x (45)m												966.6705
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	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957 (62)
WWHRs	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	85.4858	74.7539	78.2003	66.8975	63.3691	55.5879	54.2056	57.4936	59.2965	67.8536	74.1303	84.3957 (64)
12Total per year (kWh/year)												821.6699 (64)
Electric shower(s)	48.8905	43.5618	47.5678	45.3934	46.2452	44.1134	45.5839	46.2452	45.3934	47.5678	46.6734	48.8905 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												556.1263 (64a)

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Heat gains from water heating, kWh/month	33.5941	29.5789	31.4420	28.0727	27.4036	24.9253	24.9474	25.9347	26.1725	28.8554	30.2009	33.3216 (65)
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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	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5474	115.7489	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474	108.0323	104.5474	108.0323	104.5474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	45.1533	44.0163	42.2608	38.9899	36.8328	34.6185	33.5314	34.8585	36.3507	38.7841	41.9457	44.7870 (72)
Total internal gains	398.2347	410.2976	392.3047	381.7976	362.6223	351.1735	338.1042	337.4328	347.4459	357.1154	377.2953	389.3711 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	4.1000	10.6334	0.6300	0.7000	0.7700	13.3238 (74)						
South	5.2800	46.7521	0.6300	0.7000	0.7700	75.4408 (78)						
Solar gains	88.7646	149.0151	200.6511	247.3760	278.9800	278.6067	267.8627	243.4981	216.4272	163.5728	105.8597	76.2952 (83)
Total gains	486.9994	559.3127	592.9557	629.1737	641.6022	629.7802	605.9669	580.9309	563.8731	520.6882	483.1550	465.6663 (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	50.8827	51.0107	51.1368	51.7377	51.8517	52.3890	52.3890	52.4898	52.1808	51.8517	51.6216	51.3832
alpha	4.3922	4.4007	4.4091	4.4492	4.4568	4.4926	4.4926	4.4993	4.4787	4.4568	4.4414	4.4255
util living area	0.9874	0.9762	0.9582	0.9103	0.8149	0.6442	0.4829	0.5216	0.7372	0.9194	0.9758	0.9895 (86)
MIT	19.6160	19.8365	20.1104	20.4746	20.7658	20.9405	20.9869	20.9815	20.8882	20.5239	20.0160	19.5813 (87)
Th 2	20.0590	20.0611	20.0632	20.0731	20.0749	20.0836	20.0836	20.0852	20.0802	20.0749	20.0712	20.0673 (88)
util rest of house	0.9844	0.9706	0.9480	0.8881	0.7696	0.5677	0.3873	0.4248	0.6672	0.8949	0.9691	0.9870 (89)
MIT 2	18.8045	19.0232	19.2929	19.6483	19.9103	20.0526	20.0792	20.0786	20.0156	19.7015	19.2100	18.7766 (90)
Living area fraction									fLA = Living area / (4) =			0.3809 (91)
MIT	19.1136	19.3330	19.6043	19.9630	20.2361	20.3908	20.4249	20.4225	20.3480	20.0147	19.5170	19.0831 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1136	19.3330	19.6043	19.9630	20.2361	20.3908	20.4249	20.4225	20.3480	20.0147	19.5170	19.0831 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9805	0.9652	0.9421	0.8851	0.7782	0.5944	0.4236	0.4614	0.6890	0.8930	0.9642	0.9835 (94)
Useful gains	477.4928	539.8458	558.5986	556.8621	499.2638	374.3239	256.6749	268.0184	388.4811	464.9956	465.8346	458.0022 (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	1036.8634	1007.6852	912.6633	761.5453	586.3120	393.6651	260.0247	272.9302	426.4399	646.6592	856.6722	1031.5762 (97)
Space heating kWh	416.1717	314.3880	263.4241	147.3719	64.7638	0.0000	0.0000	0.0000	0.0000	135.1577	281.4030	426.7390 (98a)
Space heating requirement - total per year (kWh/year)												2049.4194
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	416.1717	314.3880	263.4241	147.3719	64.7638	0.0000	0.0000	0.0000	0.0000	135.1577	281.4030	426.7390 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2049.4194
Space heating per m2												30.1385 (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	639.0247	503.0620	515.6667	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8486	0.9117	0.8937	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	542.2955	458.6319	460.8266	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	691.4404	665.8495	638.6793	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	107.3843	154.1699	132.3224	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	26.8461	38.5425	33.0806	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												98.4691 (107)
Energy for space heating												30.1385 (99)
Energy for space cooling												1.4481 (108)
Total												31.5866 (109)

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Property Reference	0214-0522-03_053		Issued on Date	13/12/2024	
Assessment Reference	r2	Prop Type Ref	Type G		
Property	Plot 53, Hoe Lane, ROMSEY, SO52 9NH				
SAP Rating	84 B	DER	4.14	TER	11.28
Environmental	97 A	% DER < TER			63.30
CO ₂ Emissions (t/year)	0.26	DFEE	27.62	TFEE	31.59
Compliance Check	See BREL	% DFEE < TFEE			12.55
% DPER < TPER	25.53	DPER	43.91	TPER	58.96
Assessor Details	Mr. Rob Carswell			Assessor ID	7134-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.0000 (1b)	2.4600 (2b)	83.6400 (1b) - (3b)
First floor	34.0000 (1c)	2.7600 (2c)	93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1127 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3127 (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) = 0.2658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3389	0.3322	0.3256	0.2924	0.2857	0.2525	0.2525	0.2459	0.2658	0.2857	0.2990	0.3123 (22b)
Effective ac	0.5574	0.5552	0.5530	0.5427	0.5408	0.5319	0.5319	0.5302	0.5353	0.5408	0.5447	0.5488 (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
Solid Door			2.1000	1.2000	2.5200		(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)
Total net area of external elements Aum(A, m ²)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.7298		(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)
TF			124.3000			9.0000	1118.7000 (32c)
Internal Floor 1			34.0000			18.0000	612.0000 (32d)
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12821.3199 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.5488 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.0000	0.0500	0.4500	
E3 Sill				7.1000	0.0200	0.1420	

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E4 Jamb	21.0000	0.0100	0.2100	
E5 Ground floor (normal)	9.3000	0.0200	0.1860	
E6 Intermediate floor within a dwelling	9.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.3000	0.0400	0.3720	
E12 Gable (insulation at ceiling level)	7.3000	0.0500	0.3650	
E18 Party wall between dwellings	20.9000	0.0500	1.0450	
P1 Party wall - Ground floor	14.6000	0.0700	1.0220	
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	14.6000	0.1000	1.4600	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.2520 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		32.9818 (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	32.6471	32.5165	32.3885	31.7873	31.6748	31.1512	31.1512	31.0542	31.3529	31.6748	31.9024	32.1403 (38)
Average = Sum(39)m / 12 =	65.6289	65.4983	65.3703	64.7691	64.6566	64.1330	64.1330	64.0360	64.3347	64.6566	64.8842	65.1221 (39)
HLP	0.9651	0.9632	0.9613	0.9525	0.9508	0.9431	0.9431	0.9417	0.9461	0.9508	0.9542	0.9577 (40)
HLP (average)												0.9525
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	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												114.4912 (43)
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Energy conte	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Energy content (annual)												Total = Sum(45)m = 1901.6747
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)
Water storage loss:												180.0000 (47)
Store volume												1.6000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8640 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (56)
If cylinder contains dedicated solar storage	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (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	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (64)
Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2490.9307 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	105.6258	93.8756	100.6739	90.5121	89.1529	81.8503	81.7689	84.0901	84.0112	91.8873	95.5513	104.7122 (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	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5474	115.7489	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474	108.0323	104.5474	108.0323	104.5474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.9701	139.6958	135.3144	125.7113	119.8292	113.6809	109.9045	113.0244	116.6822	123.5044	132.7101	140.7423 (72)
Total internal gains	495.0515	505.9771	485.3583	468.5191	445.6187	430.2359	414.4772	415.5987	427.7774	441.8357	468.0596	485.3263 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	4.1000	10.6334	0.7000	0.7000	0.7700	14.8042 (74)						
South	3.3100	46.7521	0.7000	0.7000	0.7700	52.5482 (78)						
South	1.9700	46.7521	0.7000	0.7000	0.7700	31.2749 (78)						
Solar gains	98.6274	165.5723	222.9456	274.8622	309.9777	309.5630	297.6253	270.5535	240.4746	181.7476	117.6219	84.7724 (83)

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Total gains 593.6789 671.5494 708.3039 743.3813 755.5965 739.7989 712.1025 686.1521 668.2521 623.5833 585.6816 570.0987 (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	54.2669	54.3751	54.4816	54.9873	55.0829	55.5327	55.5327	55.6168	55.3586	55.0829	54.8898	54.6892
alpha	4.6178	4.6250	4.6321	4.6658	4.6722	4.7022	4.7022	4.7078	4.6906	4.6722	4.6593	4.6459
util living area	0.9721	0.9511	0.9187	0.8445	0.7188	0.5388	0.3932	0.4247	0.6280	0.8533	0.9486	0.9762 (86)
Living	19.9404	20.1505	20.3927	20.6807	20.8808	20.9757	20.9955	20.9935	20.9503	20.7124	20.2910	19.9005
Non living	18.8961	19.1585	19.4571	19.8033	20.0218	20.1154	20.1291	20.1293	20.0935	19.8474	19.3428	18.8507
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4580	20.1505	20.3927	20.6807	20.8808	20.9757	20.9955	20.9935	20.9503	20.7124	20.2910	20.0543 (87)
Th 2	20.1125	20.1141	20.1157	20.1231	20.1245	20.1310	20.1310	20.1322	20.1285	20.1245	20.1217	20.1188 (88)
util rest of house	0.9661	0.9410	0.9021	0.8142	0.6692	0.4715	0.3170	0.3467	0.5605	0.8185	0.9364	0.9710 (89)
MIT 2	19.6276	19.1585	19.4571	19.8033	20.0218	20.1154	20.1291	20.1293	20.0935	19.8474	19.3428	19.0792 (90)
Living area fraction										fLA = Living area / (4) =		0.3809 (91)
MIT	19.9439	19.5363	19.8134	20.1375	20.3490	20.4431	20.4591	20.4585	20.4199	20.1769	19.7040	19.4506 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9439	19.5363	19.8134	20.1375	20.3490	20.4431	20.4591	20.4585	20.4199	20.1769	19.7040	19.4506 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9648	0.9333	0.8956	0.8147	0.6825	0.4961	0.3460	0.3763	0.5838	0.8208	0.9294	0.9662 (94)
Useful gains	572.7576	626.7258	634.3331	605.6287	515.7050	367.0230	246.3714	258.2106	390.1316	511.8300	544.3411	550.8374 (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	1026.6891	958.6552	870.3028	727.8430	559.2163	374.7333	247.4960	259.8886	406.5857	619.2071	817.7985	993.1522 (97)
Space heating kWh	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98a)
Space heating requirement - total per year (kWh/year)												1462.5698
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	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1462.5698
Space heating per m2										(98c) / (4) =		21.5084 (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 %)												331.8363 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	337.7250	223.0566	175.5615	87.9943	32.3723	0.0000	0.0000	0.0000	0.0000	79.8885	196.8893	329.0822 (98)
Space heating efficiency (main heating system 1)	331.8363	331.8363	331.8363	331.8363	331.8363	0.0000	0.0000	0.0000	0.0000	331.8363	331.8363	331.8363 (210)
Space heating fuel (main heating system)	101.7746	67.2188	52.9060	26.5174	9.7555	0.0000	0.0000	0.0000	0.0000	24.0747	59.3333	99.1700 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (64)
Efficiency of water heater (217)m	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698 (216)
Fuel for water heating, kWh/month	133.1247	117.7674	125.1079	109.8784	106.4560	95.8552	94.5017	98.2596	99.3537	110.8828	118.0365	131.6458 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6922	18.8594	20.7751 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												440.7503 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												185.7698
Water heating fuel used												1340.8697 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:		
Total electricity for the above, kWh/year		0.0000 (231)
Electricity for lighting (calculated in Appendix L)		163.1327 (232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation		0.0000 (233)
Wind generation		0.0000 (234)
Hydro-electric generation (Appendix N)		0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)		0.0000 (235)
Appendix Q - special features		
Energy saved or generated		-0.0000 (236)
Energy used		0.0000 (237)
Total delivered energy for all uses		1944.7527 (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	440.7503	0.1564	68.9168 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1340.8697	0.1409	188.9288 (264)
Space and water heating			257.8456 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	163.1327	0.1443	23.5451 (268)
Total CO2, kg/year			281.3907 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1400 (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	440.7503	1.5788	695.8755 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1340.8697	1.5210	2039.4600 (278)
Space and water heating			2735.3355 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	163.1327	1.5338	250.2183 (282)
Total Primary energy kWh/year			2985.5538 (286)
Dwelling Primary energy Rate (DPER)			43.9100 (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	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.4800 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1127 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000 (17)	
Infiltration rate	0.3627 (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) =	0.3083 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3931	0.3854	0.3776	0.3391	0.3314	0.2929	0.2929	0.2852	0.3083	0.3314	0.3468	0.3622 (22b)
Effective ac	0.5772	0.5742	0.5713	0.5575	0.5549	0.5429	0.5429	0.5407	0.5475	0.5549	0.5601	0.5656 (25)

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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			2.1000	1.0000	2.1000			(26)
TER Opening Type (Uw = 1.20)			9.3800	1.1450	10.7405			(27)
Heat Loss Floor 1			34.0000	0.1300	4.4200			(28a)
External Wall 1	48.5460	11.4800	37.0660	0.1800	6.6719			(29a)
Plane	34.0000		34.0000	0.1100	3.7400			(30)
Total net area of external elements Aum(A, m2)			116.5460					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.6723		(33)
Party Wall 1			76.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5488 (35)

List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	9.0000	0.0500	0.4500	
E2 Other lintels (including other steel lintels)	7.1000	0.0500	0.3550	
E3 Sill	21.0000	0.0500	1.0500	
E4 Jamb	9.3000	0.1600	1.4880	
E5 Ground floor (normal)	9.3000	0.0000	0.0000	
E6 Intermediate floor within a dwelling	9.3000	0.0600	0.5580	
E10 Eaves (insulation at ceiling level)	7.3000	0.0600	0.4380	
E12 Gable (insulation at ceiling level)	20.9000	0.0600	1.2540	
E18 Party wall between dwellings	14.6000	0.0800	1.1680	
P1 Party wall - Ground floor	14.6000	0.0000	0.0000	
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.1200	1.7520	
P4 Party wall - Roof (insulation at ceiling level)				8.5130 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K) (36a) = 0.0000
 Point Thermal bridges (33) + (36) + (36a) = 36.1853 (37)
 Total fabric heat loss

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	33.8086	33.6329	33.4607	32.6518	32.5005	31.7960	31.7960	31.6655	32.0674	32.5005	32.8066	33.1267	(38)
Average = Sum(39)m / 12 =	69.9939	69.8182	69.6460	68.8372	68.6858	67.9813	67.9813	67.8509	68.2527	68.6858	68.9920	69.3120	(39)
												68.8364	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0293	1.0267	1.0242	1.0123	1.0101	0.9997	0.9997	0.9978	1.0037	1.0101	1.0146	1.0193	(40)
HLP (average)												1.0123	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156	60.8156 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	37.1254 (42c)
Average daily hot water use (litres/day)													114.4912 (43)
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284	124.2284 (44)
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116	194.5116 (45)
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767	29.1767 (46)
Water storage loss:													180.0000 (47)
Store volume													1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8381 (55)
Enter (49) or (54) in (55)													
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	246.5017	218.0502	231.6090	203.3430	196.9594	177.2923	174.7519	181.7329	183.7914	205.1830	218.4984	243.7543	243.7543 (62)
WWHRS	-27.9093	-24.6832	-25.8468	-21.4022	-19.9461	-17.0680	-15.9985	-17.0128	-17.6592	-20.8183	-23.5846	-27.3924	-27.3924 (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	-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	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	0.0000 (63d)
Output from w/h	218.5925	193.3670	205.7622	181.9408	177.0133	160.2243	158.7534	164.7201	166.1322	184.3648	194.9138	216.3619	216.3619 (64)
12Total per year (kWh/year)													2222.1461 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	104.9828	93.2948	100.0309	89.8899	88.5100	81.2280	81.1259	83.4471	83.3890	91.2443	94.9290	104.0693	104.0693 (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	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303	109.8303 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.5474	115.7489	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474	108.0323	104.5474	108.0323	104.5474	104.5474 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	192.5849	194.5833	189.5473	178.8263	165.2930	152.5736	144.0762	142.0778	147.1138	157.8348	171.3681	184.0875	184.0875 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830	33.9830 (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	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.1059	138.8316	134.4502	124.8471	118.9650	112.8167	109.0403	112.1601	115.8180	122.6402	131.8459	139.8780	139.8780 (72)
Total internal gains													

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497.1873 508.1129 487.4940 470.6548 447.7545 429.3717 413.6130 414.7344 426.9132 443.9715 470.1954 487.4621 (73)

6. Solar gains

[Jan]												Gains W
	Area m2	Solar flux Table 6a W/m2		Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d					
North	4.1000	10.6334		0.6300		0.7000	0.7700					13.3238 (74)
South	5.2800	46.7521		0.6300		0.7000	0.7700					75.4408 (78)
Solar gains	88.7646	149.0151	200.6511	247.3760	278.9800	278.6067	267.8627	243.4981	216.4272	163.5728	105.8597	76.2952 (83)
Total gains	585.9519	657.1280	688.1451	718.0308	726.7345	707.9784	681.4757	658.2326	643.3404	607.5443	576.0551	563.7573 (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	50.8827	51.0107	51.1368	51.7377	51.8517	52.3890	52.3890	52.4898	52.1808	51.8517	51.6216	51.3832
alpha	4.3922	4.4007	4.4091	4.4492	4.4568	4.4926	4.4926	4.4993	4.4787	4.4568	4.4414	4.4255
util living area	0.9754	0.9586	0.9329	0.8715	0.7605	0.5860	0.4328	0.4653	0.6728	0.8762	0.9557	0.9788 (86)
MIT	19.7984	20.0054	20.2590	20.5816	20.8261	20.9591	20.9915	20.9882	20.9229	20.6322	20.1756	19.7648 (87)
Th 2	20.0590	20.0611	20.0632	20.0731	20.0749	20.0836	20.0836	20.0852	20.0802	20.0749	20.0712	20.0673 (88)
util rest of house	0.9699	0.9496	0.9181	0.8434	0.7108	0.5121	0.3455	0.3768	0.6015	0.8437	0.9446	0.9740 (89)
MIT 2	18.6788	18.9390	19.2547	19.6493	19.9228	20.0571	20.0801	20.0800	20.0252	19.7165	19.1627	18.6425 (90)
Living area fraction	fLA = Living area / (4) = 0.3809 (91)											
MIT	19.1052	19.3451	19.6372	20.0044	20.2668	20.4006	20.4272	20.4259	20.3671	20.0653	19.5485	19.0700 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1052	19.3451	19.6372	20.0044	20.2668	20.4006	20.4272	20.4259	20.3671	20.0653	19.5485	19.0700 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9628	0.9413	0.9102	0.8411	0.7218	0.5384	0.3787	0.4103	0.6248	0.8433	0.9370	0.9674 (94)
Useful gains	564.1294	618.5545	626.3258	603.9199	524.5215	381.2040	258.0419	270.0814	401.9484	512.3337	539.7379	545.3764 (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	1036.2740	1008.5347	914.9559	764.3957	588.4183	394.3343	260.1794	273.1609	427.7472	650.1329	858.8462	1030.6675 (97)
Space heating kWh	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98a)
Space heating requirement - total per year (kWh/year)	1684.5020											
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	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1684.5020											
Space heating per m2	(98c) / (4) = 24.7721 (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 %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	351.2755	262.0667	214.7408	115.5426	47.5392	0.0000	0.0000	0.0000	0.0000	102.5226	229.7580	361.0565 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	380.5802	283.9293	232.6552	125.1816	51.5051	0.0000	0.0000	0.0000	0.0000	111.0754	248.9252	391.1772 (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	218.5925	193.3670	205.7622	181.9408	177.0133	160.2243	158.7534	164.7201	166.1322	184.3648	194.9138	216.3619 (64)
Efficiency of water heater (217)m	85.1177	84.7421	84.1557	83.0700	81.5498	79.8000	79.8000	79.8000	79.8000	82.7989	84.4296	85.1995 (216)
Fuel for water heating, kWh/month	256.8120	228.1828	244.5017	219.0210	217.0617	200.7823	198.9390	206.4161	208.1857	222.6657	230.8596	253.9474 (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	21.7229	17.4269	15.6910	11.4959	8.8798	7.2548	8.1004	10.5292	13.6764	17.9442	20.2679	22.3266 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-32.0131	-45.2314	-65.1597	-73.4398	-79.3552	-74.1485	-73.2585	-69.0997	-61.7534	-51.8339	-35.2407	-27.6678 (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	-17.7696	-37.4241	-74.4575	-111.9292	-148.0825	-148.8008	-147.0237	-124.4209	-91.1305	-53.5211	-23.7275	-14.0461 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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												1825.0292	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2687.3751	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												175.3161	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1680.5352	(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												3093.1853	(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	1825.0292	0.2100	383.2561	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2687.3751	0.2100	564.3488	(264)
Space and water heating			947.6049	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.3161	0.1443	25.3035	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-688.2018	0.1345	-92.5846	
PV Unit electricity exported	-992.3334	0.1259	-124.9088	
Total			-217.4934	(269)
Total CO2, kg/year			767.3443	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2800	(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	1825.0292	1.1300	2062.2830	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2687.3751	1.1300	3036.7339	(278)
Space and water heating			5099.0169	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.3161	1.5338	268.9057	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-688.2018	1.4972	-1030.3766	
PV Unit electricity exported	-992.3334	0.4620	-458.5005	
Total			-1488.8770	(283)
Total Primary energy kWh/year			4009.1464	(286)
Target Primary Energy Rate (TPER)			58.9600	(287)

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Property Reference	0214-0522-03_053		Issued on Date	13/12/2024	
Assessment Reference	r2	Prop Type Ref	Type G		
Property	Plot 53, Hoe Lane, ROMSEY, SO52 9NH				
SAP Rating	84 B	DER	4.14	TER	11.28
Environmental	97 A	% DER < TER			63.30
CO ₂ Emissions (t/year)	0.26	DFEE	27.62	TFEE	31.59
Compliance Check	See BREL	% DFEE < TFEE			12.55
% DPER < TPER	25.53	DPER	43.91	TPER	58.96
Assessor Details	Mr. Rob Carswell			Assessor ID	7134-0001
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	34.0000 (1b)	2.4600 (2b)	83.6400 (1b) - (3b)
First floor	34.0000 (1c)	2.7600 (2c)	93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	177.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1127 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3127 (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) = 0.2658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3389	0.3322	0.3256	0.2924	0.2857	0.2525	0.2525	0.2459	0.2658	0.2857	0.2990	0.3123 (22b)
Effective ac	0.5574	0.5552	0.5530	0.5427	0.5408	0.5319	0.5319	0.5302	0.5353	0.5408	0.5447	0.5488 (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
Solid Door			2.1000	1.2000	2.5200		(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)
Total net area of external elements Aum(A, m ²)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.7298	(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)
TF			124.3000			9.0000	1118.7000 (32c)
Internal Floor 1			34.0000			18.0000	612.0000 (32d)
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							12821.3199 (34)
List of Thermal Bridges							188.5488 (35)
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				9.0000	0.0500	0.4500	
E3 Sill				7.1000	0.0200	0.1420	

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E4 Jamb	21.0000	0.0100	0.2100	
E5 Ground floor (normal)	9.3000	0.0200	0.1860	
E6 Intermediate floor within a dwelling	9.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.3000	0.0400	0.3720	
E12 Gable (insulation at ceiling level)	7.3000	0.0500	0.3650	
E18 Party wall between dwellings	20.9000	0.0500	1.0450	
P1 Party wall - Ground floor	14.6000	0.0700	1.0220	
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	14.6000	0.1000	1.4600	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.2520 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		32.9818 (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	32.6471	32.5165	32.3885	31.7873	31.6748	31.1512	31.1512	31.0542	31.3529	31.6748	31.9024	32.1403 (38)
Average = Sum(39)m / 12 =	65.6289	65.4983	65.3703	64.7691	64.6566	64.1330	64.1330	64.0360	64.3347	64.6566	64.8842	65.1221 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9651	0.9632	0.9613	0.9525	0.9508	0.9431	0.9431	0.9417	0.9461	0.9508	0.9542	0.9577 (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 2.1966 (42)

Hot water usage for mixer showers

Hot water usage for baths	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)
Hot water usage for other uses	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Average daily hot water use (litres/day)	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)

Daily hot water use

Energy conte	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Energy content (annual)	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)

Water storage loss:

Store volume 180.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):

Temperature factor from Table 2b 1.6000 (48)

Enter (49) or (54) in (55) 0.5400 (49)

Total storage loss 0.8640 (55)

If cylinder contains dedicated solar storage

Primary loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (56)
Combi loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (57)
Total heat required for water heating calculated for each month	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)

WWHRS 0.0000 (62)

PV diverter 0.0000 (63b)

Solar input 0.0000 (63c)

FGHRS 0.0000 (63a)

Output from w/h

Total per year (kWh/year) = Sum(64)m =	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)

Heat gains from water heating, kWh/month

105.6258	93.8756	100.6739	90.5121	89.1529	81.8503	81.7689	84.0901	84.0112	91.8873	95.5513	104.7122 (65)
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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	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	23.0931	20.5111	16.6807	12.6284	9.4399	7.9695	8.6114	11.1934	15.0237	19.0761	22.2646	23.7349 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575 (68)
Pumps, fans	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Total internal gains	141.9701	139.6958	135.3144	125.7113	119.8292	113.6809	109.9045	113.0244	116.6822	123.5044	132.7101	140.7423 (72)
	546.8117	544.9381	529.2100	499.5531	470.2835	443.6806	427.8634	430.5826	445.5872	472.4632	505.0564	533.5431 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains
	m2	Table 6a	Specific data	Specific data	factor	W
		W/m2	or Table 6b	or Table 6c	Table 6d	
North	4.1000	10.6334	0.7000	0.7000	0.7700	14.8042 (74)
South	3.3100	46.7521	0.7000	0.7000	0.7700	52.5482 (78)
South	1.9700	46.7521	0.7000	0.7000	0.7700	31.2749 (78)

Solar gains	98.6274	165.5723	222.9456	274.8622	309.9777	309.5630	297.6253	270.5535	240.4746	181.7476	117.6219	84.7724 (83)
Total gains	645.4391	710.5105	752.1557	774.4153	780.2612	753.2436	725.4887	701.1360	686.0618	654.2108	622.6783	618.3155 (84)

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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	54.2669	54.3751	54.4816	54.9873	55.0829	55.5327	55.5327	55.6168	55.3586	55.0829	54.8898	54.6892
alpha	4.6178	4.6250	4.6321	4.6658	4.6722	4.7022	4.7022	4.7078	4.6906	4.6722	4.6593	4.6459
util living area	0.9624	0.9411	0.9029	0.8284	0.7029	0.5302	0.3861	0.4160	0.6147	0.8348	0.9372	0.9680 (86)
Living	20.0304	20.2117	20.4507	20.7088	20.8916	20.9772	20.9958	20.9940	20.9545	20.7413	20.3483	19.9864
Non living	19.0079	19.2330	19.5252	19.8337	20.0318	20.1165	20.1293	20.1296	20.0967	19.8778	19.4117	18.9579
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5040	20.2117	20.4507	20.7088	20.8916	20.9772	20.9958	20.9940	20.9545	20.7413	20.3483	20.1282 (87)
Th 2	20.1125	20.1141	20.1157	20.1231	20.1245	20.1310	20.1310	20.1322	20.1285	20.1245	20.1217	20.1188 (88)
util rest of house	0.9547	0.9294	0.8840	0.7965	0.6529	0.4636	0.3112	0.3394	0.5477	0.7979	0.9228	0.9613 (89)
MIT 2	19.6721	19.2330	19.5252	19.8337	20.0318	20.1165	20.1293	20.1296	20.0967	19.8778	19.4117	19.1671 (90)
Living area fraction									fLA = Living area / (4) = 0.3809 (91)			
MIT	19.9890	19.6058	19.8777	20.1670	20.3593	20.4443	20.4593	20.4588	20.4234	20.2067	19.7684	19.5332 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9890	19.6058	19.8777	20.1670	20.3593	20.4443	20.4593	20.4588	20.4234	20.2067	19.7684	19.5332 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9534	0.9216	0.8783	0.7982	0.6669	0.4880	0.3397	0.3685	0.5711	0.8017	0.9161	0.9560 (94)
Useful gains	615.3930	654.8230	660.6413	618.1332	520.3201	367.6066	246.4693	258.3762	391.7761	524.4684	570.4220	591.0980 (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	1029.6502	963.2024	874.5061	729.7550	559.8801	374.8132	247.5097	259.9116	406.8143	621.1374	821.9800	998.5271 (97)
Space heating kWh	308.2073	207.2309	159.1154	80.3677	29.4326	0.0000	0.0000	0.0000	0.0000	71.9217	181.1218	303.1273 (98a)
Space heating requirement - total per year (kWh/year)												1340.5248
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	308.2073	207.2309	159.1154	80.3677	29.4326	0.0000	0.0000	0.0000	0.0000	71.9217	181.1218	303.1273 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1340.5248
Space heating per m2										(98c) / (4) =		19.7136 (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 %) 331.8363 (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	308.2073	207.2309	159.1154	80.3677	29.4326	0.0000	0.0000	0.0000	0.0000	71.9217	181.1218	303.1273 (98)
Space heating efficiency (main heating system 1)	331.8363	331.8363	331.8363	331.8363	331.8363	0.0000	0.0000	0.0000	0.0000	331.8363	331.8363	331.8363 (210)
Space heating fuel (main heating system)	92.8793	62.4497	47.9500	24.2191	8.8696	0.0000	0.0000	0.0000	0.0000	21.6738	54.5817	91.3484 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580 (64)
Efficiency of water heater (217)m	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698 (216)
Fuel for water heating, kWh/month	133.1247	117.7674	125.1079	109.8784	106.4560	95.8552	94.5017	98.2596	99.3537	110.8828	118.0365	131.6458 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6972	18.8594	20.7751 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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												403.9717 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												185.7698
Water heating fuel used												1340.8697 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	163.1327 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1907.9741 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	403.9717	16.4900	66.6149 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1340.8697	16.4900	221.1094 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	163.1327	16.4900	26.9006 (250)
Additional standing charges			0.0000 (251)
Total energy cost			314.6249 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.0023 (257)
SAP value		83.7520
SAP rating (Section 12)		84 (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	403.9717	0.1564	63.1810 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1340.8697	0.1409	188.9288 (264)
Space and water heating			252.1098 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	163.1327	0.1443	23.5451 (268)
Total CO2, kg/year			275.6549 (272)
CO2 emissions per m2			4.0500 (273)
EI value			96.7312
EI rating			97 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	177.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1127 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3127 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)

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Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.2658 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.5000	4.2000	4.2000	4.0000	4.0000	3.7000	3.7000	3.5000	3.6000	3.9000	3.8000	4.1000	(22)
Wind factor	1.1250	1.0500	1.0500	1.0000	1.0000	0.9250	0.9250	0.8750	0.9000	0.9750	0.9500	1.0250	(22a)
Adj infilt rate													
Effective ac	0.2990	0.2791	0.2791	0.2658	0.2658	0.2459	0.2459	0.2326	0.2392	0.2591	0.2525	0.2724	(22b)
	0.5447	0.5389	0.5389	0.5353	0.5353	0.5302	0.5302	0.5270	0.5286	0.5336	0.5319	0.5371	(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	
Solid Door			2.1000	1.2000	2.5200			(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568			(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117			(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000	(28a)
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			116.5460					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.7298			(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998	(32)
TF			124.3000			9.0000	1118.7000	(32c)
Internal Floor 1			34.0000			18.0000	612.0000	(32d)
Internal Ceiling 1			34.0000			9.0000	306.0000	(32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12821.3199	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.5488	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	9.0000	0.0500	0.4500	
E3 Sill	7.1000	0.0200	0.1420	
E4 Jamb	21.0000	0.0100	0.2100	
E5 Ground floor (normal)	9.3000	0.0200	0.1860	
E6 Intermediate floor within a dwelling	9.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.3000	0.0400	0.3720	
E12 Gable (insulation at ceiling level)	7.3000	0.0500	0.3650	
E18 Party wall between dwellings	20.9000	0.0500	1.0450	
P1 Party wall - Ground floor	14.6000	0.0700	1.0220	
P2 Party wall - Intermediate floor within a dwelling	14.6000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	14.6000	0.1000	1.4600	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.2520 (36)

Point Thermal bridges

Total fabric heat loss	(33) + (36) + (36a) =	0.0000		
				32.9818 (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	31.9024	31.5649	31.5649	31.3529	31.3529	31.0542	31.0542	30.8680	30.9598	31.2508	31.1512	31.4576	(38)
Average = Sum(39)m / 12 =	64.8842	64.5467	64.5467	64.3347	64.3347	64.0360	64.0360	63.8498	63.9416	64.2326	64.1330	64.4394	(39)
													64.2763

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9542	0.9492	0.9492	0.9461	0.9461	0.9417	0.9417	0.9390	0.9403	0.9446	0.9431	0.9476	(40)
HLP (average)													0.9452
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1966 (42)
Hot water usage for mixer showers													
61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156	60.8156	(42a)
Hot water usage for baths													
26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873	26.2873	(42b)
Hot water usage for other uses													
37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254	37.1254	(42c)
Average daily hot water use (litres/day)													114.4912 (43)
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284	(44)
Energy conte	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116	(45)
Energy content (annual)										Total = Sum(45)m =			1901.6747
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8640 (55)
Total storage loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840	(56)
If cylinder contains dedicated solar storage	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580	(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	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580	(64)
										Total per year (kWh/year) = Sum(64)m =			2490.9307 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =
													0.0000 (64a)
Heat gains from water heating, kWh/month	105.6258	93.8756	100.6739	90.5121	89.1529	81.8503	81.7689	84.0901	84.0112	91.8873	95.5513	104.7122	(65)

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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	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0931	20.5111	16.6807	12.6284	9.4399	7.9695	8.6114	11.1934	15.0237	19.0761	22.2646	23.7349	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	(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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	(71)
Water heating gains (Table 5)	141.9701	139.6958	135.3144	125.7113	119.8292	113.6809	109.9045	113.0244	116.6822	123.5044	132.7101	140.7423	(72)
Total internal gains	546.8117	544.9381	529.2100	499.5531	470.2835	443.6806	427.8634	430.5826	445.5872	472.4632	505.0564	533.5431	(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							
North	4.1000	13.4839	0.7000	0.7000	0.7700	18.7728 (74)							
South	3.3100	56.7559	0.7000	0.7000	0.7700	63.7923 (78)							
South	1.9700	56.7559	0.7000	0.7000	0.7700	37.9670 (78)							
Solar gains	120.5320	172.2312	234.6920	293.8632	314.6448	346.0711	320.3371	301.4563	266.2441	201.5649	143.2566	98.0947	(83)
Total gains	667.3438	717.1693	763.9020	793.4163	784.9283	789.7517	748.2005	732.0388	711.8313	674.0280	648.3130	631.6378	(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)	54.8898	55.1767	55.1767	55.3586	55.3586	55.6168	55.6168	55.7790	55.6989	55.4466	55.5327	55.2686	21.0000 (85)
alpha	4.6593	4.6784	4.6784	4.6906	4.6906	4.7078	4.7078	4.7186	4.7133	4.6964	4.7022	4.6846	
util living area	0.9471	0.9253	0.8734	0.7783	0.6277	0.4251	0.2988	0.3045	0.5092	0.7662	0.9041	0.9546	(86)
Living	20.2085	20.3492	20.5815	20.8018	20.9417	20.9925	20.9989	20.9988	20.9827	20.8472	20.5313	20.1751	
Non living	19.2365	19.4113	19.6891	19.9409	20.0834	20.1283	20.1319	20.1342	20.1233	19.9955	19.6398	19.2006	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5951	20.3492	20.5815	20.8018	20.9417	20.9925	20.9989	20.9988	20.9827	20.8472	20.5313	20.2905	(87)
Th 2	20.1217	20.1259	20.1259	20.1285	20.1285	20.1322	20.1322	20.1345	20.1334	20.1298	20.1310	20.1272	(88)
util rest of house	0.9361	0.9105	0.8495	0.7396	0.5706	0.3575	0.2251	0.2296	0.4378	0.7182	0.8827	0.9449	(89)
MIT 2	19.7688	19.4113	19.6891	19.9409	20.0834	20.1283	20.1319	20.1342	20.1233	19.9955	19.6398	19.3675	(90)
Living area fraction	20.0835	19.7685	20.0290	20.2688	20.4103	20.4575	20.4621	20.4635	20.4506	20.3199	19.9794	19.7191	(92)
MIT	20.0835	19.7685	20.0290	20.2688	20.4103	20.4575	20.4621	20.4635	20.4506	20.3199	19.9794	19.7191	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0835	19.7685	20.0290	20.2688	20.4103	20.4575	20.4621	20.4635	20.4506	20.3199	19.9794	19.7191	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9356	0.9036	0.8465	0.7462	0.5896	0.3831	0.2532	0.2582	0.4643	0.7293	0.8785	0.9396	(94)
Useful gains	624.3790	648.0397	646.6641	592.0140	462.8100	302.5281	189.4605	188.9820	330.5263	491.5774	569.5232	593.4555	(95)
Ext temp.	5.3000	5.8000	7.5000	9.9000	12.9000	15.7000	17.5000	17.5000	15.2000	11.8000	8.3000	5.4000	(96)
Heat loss rate W	959.2161	901.6231	808.7075	667.0747	483.1739	304.6488	189.6820	189.2191	335.7329	547.2562	749.0319	922.7140	(97)
Space heating kWh	249.1188	170.4080	120.5603	54.0437	15.1507	0.0000	0.0000	0.0000	0.0000	41.4250	129.2463	244.9683	(98a)
Space heating requirement - total per year (kWh/year)												1024.9212	
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	249.1188	170.4080	120.5603	54.0437	15.1507	0.0000	0.0000	0.0000	0.0000	41.4250	129.2463	244.9683	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1024.9212	
Space heating per m ²										(98c) / (4) =		15.0724	(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 %)													332.2399 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	249.1188	170.4080	120.5603	54.0437	15.1507	0.0000	0.0000	0.0000	0.0000	41.4250	129.2463	244.9683	(98)
Space heating efficiency (main heating system 1)	332.2399	332.2399	332.2399	332.2399	332.2399	0.0000	0.0000	0.0000	0.0000	332.2399	332.2399	332.2399	(210)
Space heating fuel (main heating system)	74.9816	51.2907	36.2871	16.2665	4.5602	0.0000	0.0000	0.0000	0.0000	12.4684	38.9015	73.7324	(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)													

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	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	(215)
Water heating														
Water heating requirement	247.3055	218.7762	232.4127	204.1208	197.7631	178.0701	175.5556	182.5366	184.5692	205.9868	219.2762	244.5580		(64)
Efficiency of water heater														(216)
(217)m	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323		(217)
Fuel for water heating, kWh/month	133.0799	117.7277	125.0658	109.8414	106.4202	95.8230	94.4699	98.2265	99.3203	110.8455	117.9968	131.6014		(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(231)
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6972	18.8594	20.7751		(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													308.4883	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													185.8323	
Water heating fuel used													1340.4183	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													0.0000	(231)
Electricity for lighting (calculated in Appendix L)													163.1327	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													0.0000	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													1812.0393	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	308.4883	26.0600	80.3921	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1340.4183	26.0600	349.3130	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	163.1327	26.0600	42.5124	(250)
Additional standing charges			0.0000	(251)
Total energy cost			472.2174	(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	308.4883	0.1572	48.4967	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1340.4183	0.1409	188.8652	(264)
Space and water heating			237.3619	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	163.1327	0.1443	23.5451	(268)
Total CO2, kg/year			260.9070	(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	308.4883	1.5820	488.0212	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1340.4183	1.5210	2038.7734	(278)
Space and water heating			2526.7946	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	163.1327	1.5338	250.2183	(282)
Total Primary energy kWh/year			2777.0129	(286)

SAP 10 EPC IMPROVEMENTS

r2

Current energy efficiency rating: B 84
Current environmental impact rating: A 97

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 2.4	-£ 88	-42 kg (16.2%)
U Solar photovoltaic panels	+ 6.7	-£ 217	-113 kg (51.5%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£88	0.62 kg/m ²	B 86	A 97
Solar photovoltaic panels	£217	1.66 kg/m ²	A 93	A 98
Total Savings	£305	2.28 kg/m²		

Potential energy efficiency rating: A 93
 Potential environmental impact rating: A 98

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, Thames Valley):

	Current	Potential	Saving
Electricity	£472	£384	£88
Space heating	£80	£101	-£21
Water heating	£349	£240	£109
Lighting	£43	£43	£0
Generated (PV)	-£0	-£217	£217
Total cost of fuels	£472	£167	£305
Total cost of uses	£472	£167	£305
Delivered energy	27 kWh/m ²	9 kWh/m ²	17 kWh/m ²
Carbon dioxide emissions	0.3 tonnes	0.1 tonnes	0.2 tonnes
CO2 emissions per m ²	4 kg/m ²	2 kg/m ²	2 kg/m ²
Primary energy	41 kWh/m ²	15 kWh/m ²	26 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 177.4800 (5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1127 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3127	(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) =	0.2658 (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	0.3389	0.3322	0.3256	0.2924	0.2857	0.2525	0.2525	0.2459	0.2658	0.2857	0.2990	0.3123 (22b)
Effective ac	0.5574	0.5552	0.5530	0.5427	0.5408	0.5319	0.5319	0.5302	0.5353	0.5408	0.5447	0.5488 (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
Solid Door			2.1000	1.2000	2.5200		(26)
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)

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External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)
Total net area of external elements Aum(A, m2)			116.5460				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	27.7298			(33)
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)
TF			124.3000			9.0000	1118.7000 (32c)
Internal Floor 1			34.0000			18.0000	612.0000 (32d)
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)

Heat capacity Cm = Sum(A x k) (28) ... (30) + (32) + (32a) ... (32e) = 12821.3199 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5488 (35)

List of Thermal Bridges				Length	Psi-value	Total	
K1 Element							
E2 Other lintels (including other steel lintels)				9.0000	0.0500	0.4500	
E3 Sill				7.1000	0.0200	0.1420	
E4 Jamb				21.0000	0.0100	0.2100	
E5 Ground floor (normal)				9.3000	0.0200	0.1860	
E6 Intermediate floor within a dwelling				9.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)				9.3000	0.0400	0.3720	
E12 Gable (insulation at ceiling level)				7.3000	0.0500	0.3650	
E18 Party wall between dwellings				20.9000	0.0500	1.0450	
P1 Party wall - Ground floor				14.6000	0.0700	1.0220	
P2 Party wall - Intermediate floor within a dwelling				14.6000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)				14.6000	0.1000	1.4600	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.2520 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 32.9818 (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	32.6471	32.5165	32.3885	31.7873	31.6748	31.1512	31.1512	31.0542	31.3529	31.6748	31.9024	32.1403 (38)
Average = Sum(39)m / 12 =	65.6289	65.4983	65.3703	64.7691	64.6566	64.1330	64.1330	64.0360	64.3347	64.6566	64.8842	65.1221 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9651	0.9632	0.9613	0.9525	0.9508	0.9431	0.9431	0.9417	0.9461	0.9508	0.9542	0.9577 (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												2.1966 (42)
Hot water usage for mixer showers	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												114.4912 (43)
Daily hot water use	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Energy conte	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Energy content (annual)												Total = Sum(45)m = 1901.6747
Distribution loss (46)m = 0.15 x (45)m	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)
Water storage loss:												180.0000 (47)
Store volume												1.6000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8640 (55)
Enter (49) or (54) in (55)												
Total storage loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (56)
If cylinder contains dedicated solar storage	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	247.3055	218.7762	231.0170	197.3672	184.9688	165.4633	162.5287	170.4402	179.1663	204.5910	219.2762	244.5580 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												608.1428 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												608.1428
Solar input	-0.0000	-16.2309	-57.6685	-78.6624	-101.8201	-93.6768	-92.8939	-81.7052	-56.9060	-28.5790	-0.0000	-0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	247.3055	202.5453	173.3484	118.7048	83.1487	71.7866	69.6348	88.7350	122.2603	176.0120	219.2762	244.5580 (64)
Electric shower(s)												Total per year (kWh/year) = Sum(64)m = 1817.3156 (64)
Heat gains from water heating, kWh/month	105.6258	93.8756	99.5573	85.1092	78.9175	71.7649	71.3474	74.4130	79.6889	90.7707	95.5513	104.7122 (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
	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0931	20.5111	16.6807	12.6284	9.4399	7.9695	8.6114	11.1934	15.0237	19.0761	22.2646	23.7349 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.9701	139.6958	133.8136	118.2073	106.0719	99.6734	95.8970	100.0174	110.6790	122.0036	132.7101	140.7423 (72)
Total internal gains	546.8117	544.9381	527.7092	492.0491	456.5261	429.6731	413.8559	417.5756	439.5840	470.9624	505.0564	533.5431 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	4.1000	10.6334	0.7000	0.7000	0.7700	14.8042 (74)						
South	3.3100	46.7521	0.7000	0.7000	0.7700	52.5482 (78)						
South	1.9700	46.7521	0.7000	0.7000	0.7700	31.2749 (78)						
Solar gains	98.6274	165.5723	222.9456	274.8622	309.9777	309.5630	297.6253	270.5535	240.4746	181.7476	117.6219	84.7724 (83)
Total gains	645.4391	710.5105	750.6549	766.9113	766.5039	739.2362	711.4812	688.1291	680.0586	652.7100	622.6783	618.3155 (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	54.2669	54.3751	54.4816	54.9873	55.0829	55.5327	55.5327	55.6168	55.3586	55.0829	54.8898	54.6892
alpha	4.6178	4.6250	4.6321	4.6658	4.6722	4.7022	4.7022	4.7078	4.6906	4.6722	4.6593	4.6459
util living area	0.9624	0.9411	0.9034	0.8323	0.7117	0.5391	0.3935	0.4235	0.6191	0.8357	0.9372	0.9680 (86)
Living	20.0304	20.2117	20.4488	20.7022	20.8857	20.9756	20.9955	20.9936	20.9531	20.7399	20.3483	19.9864
Non living	19.0079	19.2330	19.5230	19.8267	20.0264	20.1154	20.1291	20.1294	20.0957	19.8764	19.4117	18.9579
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5040	20.2117	20.4488	20.7022	20.8857	20.9756	20.9955	20.9936	20.9531	20.7399	20.3483	20.1282 (87)
Th 2	20.1125	20.1141	20.1157	20.1231	20.1245	20.1310	20.1310	20.1322	20.1285	20.1245	20.1217	20.1188 (88)
util rest of house	0.9547	0.9294	0.8847	0.8008	0.6619	0.4718	0.3173	0.3457	0.5520	0.7989	0.9228	0.9613 (89)
MIT 2	19.6721	19.2330	19.5230	19.8267	20.0264	20.1154	20.1291	20.1294	20.0957	19.8764	19.4117	19.1671 (90)
Living area fraction									flA = Living area / (4) =			0.3809 (91)
MIT	19.9890	19.6058	19.8756	20.1601	20.3537	20.4430	20.4591	20.4585	20.4222	20.2053	19.7684	19.5332 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9890	19.6058	19.8756	20.1601	20.3537	20.4430	20.4591	20.4585	20.4222	20.2053	19.7684	19.5332 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9534	0.9216	0.8789	0.8022	0.6755	0.4965	0.3463	0.3753	0.5753	0.8026	0.9161	0.9560 (94)
Useful gains	615.3930	654.8230	659.7755	615.2074	517.8041	366.9976	246.3667	258.2335	391.2403	523.8779	570.4220	591.0980 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.1000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1029.6502	963.2024	874.3682	729.3089	559.5187	374.7299	247.4953	259.8918	406.7399	621.0476	821.9800	998.5271 (97)
Space heating kWh	308.2073	207.2309	159.6570	82.1531	31.0356	0.0000	0.0000	0.0000	0.0000	72.2943	181.1218	303.1273 (98a)
Space heating requirement - total per year (kWh/year)												1344.8273
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	308.2073	207.2309	159.6570	82.1531	31.0356	0.0000	0.0000	0.0000	0.0000	72.2943	181.1218	303.1273 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1344.8273
Space heating per m2										(98c) / (4) =		19.7769 (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 %)												331.8363 (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	308.2073	207.2309	159.6570	82.1531	31.0356	0.0000	0.0000	0.0000	0.0000	72.2943	181.1218	303.1273 (98)
Space heating efficiency (main heating system 1)	331.8363	331.8363	331.8363	331.8363	331.8363	0.0000	0.0000	0.0000	0.0000	331.8363	331.8363	331.8363 (210)
Space heating fuel (main heating system)	92.8793	62.4497	48.1132	24.7571	9.3527	0.0000	0.0000	0.0000	0.0000	21.7861	54.5817	91.3484 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	247.3055	202.5453	173.3484	118.7048	83.1487	71.7866	69.6348	88.7350	122.2603	176.0120	219.2762	244.5580 (64)
Efficiency of water heater												185.7698 (216)

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(217)m	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	185.7698	(217)
Fuel for water heating, kWh/month	133.1247	109.0303	93.3136	63.8989	44.7590	38.6428	37.4845	47.7661	65.8128	94.7474	118.0365	131.6458	(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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)	
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6972	18.8594	20.7751	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-36.2847	-52.8153	-77.0717	-86.0952	-90.3435	-83.0716	-81.8788	-78.2623	-70.7964	-60.1055	-40.2907	-31.1104	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1												405.2682	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												185.7698		
Water heating fuel used												978.2622	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
pump for solar water heating												80.0000	(230g)	
Total electricity for the above, kWh/year												80.0000	(231)	
Electricity for lighting (calculated in Appendix L)												163.1327	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												-788.1260	(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												838.5371	(238)	

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	405.2682	16.4900	66.8287	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	978.2622	16.4900	161.3154	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	163.1327	16.4900	26.9006	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-788.1260	16.4900	-129.9620	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-129.9620	(252)
Total energy cost			138.2748	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.4405	(257)
SAP value		92.8591	
SAP rating (Section 12)		93	(258)
SAP band		A	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	405.2682	0.1563	63.3620	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	978.2622	0.1460	142.8112	(264)
Space and water heating			206.1731	(265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970	(267)
Energy for lighting	163.1327	0.1443	23.5451	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-788.1260	0.1347	-106.1827	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-106.1827	(269)
Total CO2, kg/year			134.6325	(272)
CO2 emissions per m2			1.9800	(273)
EI value			98.4035	
EI rating			98	(274)
EI band			A	

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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	34.0000 (1b)	x 2.4600 (2b)	= 83.6400 (1b) - (3b)
First floor	34.0000 (1c)	x 2.7600 (2c)	= 93.8400 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	68.0000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 177.4800 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1127 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3127 (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) = 0.2658 (21)
Wind speed	Jan 4.5000 Feb 4.2000 Mar 4.2000 Apr 4.0000 May 4.0000 Jun 3.7000 Jul 3.7000 Aug 3.5000 Sep 3.6000 Oct 3.9000 Nov 3.8000 Dec 4.1000 (22)
Wind factor	Jan 1.1250 Feb 1.0500 Mar 1.0500 Apr 1.0000 May 1.0000 Jun 0.9250 Jul 0.9250 Aug 0.8750 Sep 0.9000 Oct 0.9750 Nov 0.9500 Dec 1.0250 (22a)
Adj infilt rate	Jan 0.2990 Feb 0.2791 Mar 0.2791 Apr 0.2658 May 0.2658 Jun 0.2459 Jul 0.2459 Aug 0.2326 Sep 0.2392 Oct 0.2591 Nov 0.2525 Dec 0.2724 (22b)
Effective ac	Jan 0.5447 Feb 0.5389 Mar 0.5389 Apr 0.5353 May 0.5353 Jun 0.5302 Jul 0.5302 Aug 0.5270 Sep 0.5286 Oct 0.5336 Nov 0.5319 Dec 0.5371 (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					
Solid Door			2.1000	1.2000	2.5200		(26)					
Window (Uw = 1.30)			7.4100	1.2357	9.1568		(27)					
Full Glz Door (Uw = 1.40)			1.9700	1.3258	2.6117		(27)					
Heat Loss Floor 1			34.0000	0.1200	4.0800	75.0000	2550.0000 (28a)					
External Wall 1	48.5460	11.4800	37.0660	0.1700	6.3012	70.0000	2594.6201 (29a)					
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000 (30)					
Total net area of external elements Aum(A, m ²)			116.5460				(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.7298		(33)					
Party Wall 1			76.2000	0.0000	0.0000	70.0000	5333.9998 (32)					
TF			124.3000			9.0000	1118.7000 (32c)					
Internal Floor 1			34.0000			18.0000	612.0000 (32d)					
Internal Ceiling 1			34.0000			9.0000	306.0000 (32e)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12821.3199 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.5488 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				9.0000	0.0500	0.4500						
E3 Sill				7.1000	0.0200	0.1420						
E4 Jamb				21.0000	0.0100	0.2100						
E5 Ground floor (normal)				9.3000	0.0200	0.1860						
E6 Intermediate floor within a dwelling				9.3000	0.0000	0.0000						
E10 Eaves (insulation at ceiling level)				9.3000	0.0400	0.3720						
E12 Gable (insulation at ceiling level)				7.3000	0.0500	0.3650						
E18 Party wall between dwellings				20.9000	0.0500	1.0450						
P1 Party wall - Ground floor				14.6000	0.0700	1.0220						
P2 Party wall - Intermediate floor within a dwelling				14.6000	0.0000	0.0000						
P4 Party wall - Roof (insulation at ceiling level)				14.6000	0.1000	1.4600						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.2520 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	32.9818 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 31.9024	Feb 31.5649	Mar 31.5649	Apr 31.3529	May 31.3529	Jun 31.0542	Jul 31.0542	Aug 30.8680	Sep 30.9598	Oct 31.2508	Nov 31.1512	Dec 31.4576 (38)
Heat transfer coeff	64.8842	64.5467	64.5467	64.3347	64.3347	64.0360	64.0360	63.8498	63.9416	64.2326	64.1330	64.4394 (39)
Average = Sum(39)m / 12 =												64.2763
HLP	Jan 0.9542	Feb 0.9492	Mar 0.9492	Apr 0.9461	May 0.9461	Jun 0.9417	Jul 0.9417	Aug 0.9390	Sep 0.9403	Oct 0.9446	Nov 0.9431	Dec 0.9476 (40)
HLP (average)												0.9452
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.1966 (42)
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Hot water usage for mixer showers	61.0495	60.1320	58.7951	56.2372	54.3495	52.2444	51.0478	52.3746	53.8290	56.0893	58.7022	60.8156 (42a)
Hot water usage for baths	26.3765	25.9848	25.4331	24.4160	23.6544	22.8099	22.3538	22.9015	23.4980	24.4016	25.4397	26.2873 (42b)
Hot water usage for other uses	37.1254	35.7754	34.4254	33.0754	31.7254	30.3754	30.3754	31.7254	33.0754	34.4254	35.7754	37.1254 (42c)
Average daily hot water use (litres/day)												114.4912 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	124.5515	121.8923	118.6537	113.7286	109.7293	105.4297	103.7769	107.0015	110.4024	114.9163	119.9173	124.2284 (44)
Distribution loss (46)m = 0.15 x (45)m	197.2591	173.5730	182.3663	155.6888	147.7167	129.6381	125.5092	132.4902	136.1372	155.9404	170.8442	194.5116 (45)
Water storage loss:	29.5889	26.0359	27.3549	23.3533	22.1575	19.4457	18.8264	19.8735	20.4206	23.3911	25.6266	29.1767 (46)
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8640 (55)
Total storage loss	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (56)
If cylinder contains dedicated solar storage	26.7840	24.1920	26.7840	25.9200	26.7840	25.9200	26.7840	26.7840	25.9200	26.7840	25.9200	26.7840 (57)
Primary loss	23.2624	21.0112	21.8667	15.7584	10.4681	9.9053	10.2355	11.1660	17.1091	21.8667	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	247.3055	218.7762	231.0170	197.3672	184.9688	165.4633	162.5287	170.4402	179.1663	204.5910	219.2762	244.5580 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Aperture area of solar collector												3.0000 (H1)
Zero-loss collector efficiency												0.8000 (H2)
Collector linear heat loss coefficient												1.8000 (H3)
Collector 2nd order heat loss coefficient												0.0000 (H4)
Collector loop efficiency												0.9000 (H5)
Incidence angle modifier												1.0000 (H6)
Overshading factor												0.8000 (H8)
Overall heat loss coefficient of system												6.5000 (H10)
Heat loss coefficient of collector loop												3.9667 (H11)
Dedicated solar storage volume												75.0000 (H12)
Effective solar volume												75.0000 (H14)
Reference volume												225.0000 (H15)
Storage tank correction coefficient												1.3161 (H16)
Heat delivered to hot water												711.3279 (H24)
Heat delivered to space heating												0.0000 (H29)
Solar input												711.3279
Solar input	-3.8181	-21.2356	-66.4587	-88.9654	-106.1349	-107.3167	-102.3926	-95.6836	-69.7960	-40.1392	-9.3871	-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	243.4874	197.5406	164.5582	108.4018	78.8339	58.1466	60.1361	74.7566	109.3703	164.4518	209.8891	244.5580 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	105.6258	93.8756	99.5573	85.1092	78.9175	71.7649	71.3474	74.4130	79.6889	90.7707	95.5513	104.7122 (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	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964	131.7964 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.0931	20.5111	16.6807	12.6284	9.4399	7.9695	8.6114	11.1934	15.0237	19.0761	22.2646	23.7349 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	287.4401	290.4229	282.9065	266.9050	246.7060	227.7218	215.0392	212.0564	219.5728	235.5743	255.7733	274.7575 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762	50.3762 (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)	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643	-87.8643 (71)
Water heating gains (Table 5)	141.9701	139.6958	133.8136	118.2073	106.0719	99.6734	95.8970	100.0174	110.6790	122.0036	132.7101	140.7423 (72)
Total internal gains	546.8117	544.9381	527.7092	492.0491	456.5261	429.6731	413.8559	417.5756	439.5840	470.9624	505.0564	533.5431 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	4.1000	13.4839	0.7000	0.7000	0.7700	18.7728 (74)						
South	3.3100	56.7559	0.7000	0.7000	0.7700	63.7923 (78)						
South	1.9700	56.7559	0.7000	0.7000	0.7700	37.9670 (78)						
Solar gains	120.5320	172.2312	234.6920	293.8632	314.6448	346.0711	320.3371	301.4563	266.2441	201.5649	143.2566	98.0947 (83)
Total gains	667.3438	717.1693	762.4012	785.9123	771.1709	775.7443	734.1931	719.0319	705.8281	672.5272	648.3130	631.6378 (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	54.8898	55.1767	55.1767	55.3586	55.3586	55.6168	55.6168	55.7790	55.6989	55.4466	55.5327	55.2686
alpha	4.6593	4.6784	4.6784	4.6906	4.6906	4.7078	4.7078	4.7186	4.7133	4.6964	4.7022	4.6846
util living area	0.9471	0.9253	0.8741	0.7826	0.6367	0.4324	0.3045	0.3099	0.5131	0.7673	0.9041	0.9546 (86)
Living	20.2085	20.3492	20.5799	20.7968	20.9382	20.9919	20.9988	20.9987	20.9821	20.8463	20.5313	20.1751
Non living	19.2365	19.4113	19.6872	19.9358	20.0805	20.1280	20.1319	20.1341	20.1229	19.9947	19.6398	19.2006

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24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.5951	20.3492	20.5799	20.7968	20.9382	20.9919	20.9988	20.9987	20.9821	20.8463	20.5313	20.2905	(87)
Th 2	20.1217	20.1259	20.1259	20.1285	20.1285	20.1322	20.1322	20.1345	20.1334	20.1298	20.1310	20.1272	(88)
util rest of house													
	0.9361	0.9105	0.8502	0.7442	0.5794	0.3638	0.2294	0.2338	0.4413	0.7193	0.8827	0.9449	(89)
MIT 2	19.7688	19.4113	19.6872	19.9358	20.0805	20.1280	20.1319	20.1341	20.1229	19.9947	19.6398	19.3675	(90)
Living area fraction									FLA = Living area / (4) =			0.3809	(91)
MIT	20.0835	19.7685	20.0272	20.2638	20.4072	20.4571	20.4621	20.4634	20.4502	20.3190	19.9794	19.7191	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0835	19.7685	20.0272	20.2638	20.4072	20.4571	20.4621	20.4634	20.4502	20.3190	19.9794	19.7191	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9356	0.9036	0.8472	0.7505	0.5983	0.3897	0.2580	0.2628	0.4680	0.7304	0.8785	0.9396	(94)
Useful gains	624.3790	648.0397	645.9239	589.8217	461.3648	302.3423	189.4381	188.9594	330.3265	491.1843	569.5232	593.4555	(95)
Ext temp.	5.3000	5.8000	7.5000	9.9000	12.9000	15.7000	17.5000	17.5000	15.2000	11.8000	8.3000	5.4000	(96)
Heat loss rate W													
	959.2161	901.6231	808.5924	666.7505	482.9723	304.6233	189.6787	189.2157	335.7057	547.1988	749.0319	922.7140	(97)
Space heating kWh	249.1188	170.4080	121.0254	55.3887	16.0760	0.0000	0.0000	0.0000	0.0000	41.6748	129.2463	244.9683	(98a)
Space heating requirement - total per year (kWh/year)												1027.9062	
Solar heating kWh													
	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(98b)
Solar heating contribution - total per year (kWh/year)												0.0000	
Space heating kWh	249.1188	170.4080	121.0254	55.3887	16.0760	0.0000	0.0000	0.0000	0.0000	41.6748	129.2463	244.9683	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1027.9062	
Space heating per m2										(98c) / (4) =		15.1163	(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 %)													332.2399	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating requirement	249.1188	170.4080	121.0254	55.3887	16.0760	0.0000	0.0000	0.0000	0.0000	41.6748	129.2463	244.9683	(98)	
Space heating efficiency (main heating system 1)	332.2399	332.2399	332.2399	332.2399	332.2399	0.0000	0.0000	0.0000	0.0000	332.2399	332.2399	332.2399	(210)	
Space heating fuel (main heating system)	74.9816	51.2907	36.4271	16.6713	4.8387	0.0000	0.0000	0.0000	0.0000	12.5436	38.9015	73.7324	(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	243.4874	197.5406	164.5582	108.4018	78.8339	58.1466	60.1361	74.7566	109.3703	164.4518	209.8891	244.5580	(64)	
Efficiency of water heater (217)m	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	185.8323	(216)	
Fuel for water heating, kWh/month	131.0253	106.3004	88.5520	58.3331	42.4221	31.2898	32.3604	40.2280	58.8543	88.4947	112.9454	131.6014	(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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)	
Lighting	20.2133	16.2158	14.6006	10.6970	8.2627	6.7507	7.5375	9.7975	12.7260	16.6972	18.8594	20.7751	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-43.5350	-55.2431	-80.2024	-88.8312	-90.3587	-86.1546	-84.0078	-81.9547	-75.3231	-64.9821	-47.6378	-35.8129	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													309.3868	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													185.8323	
Water heating fuel used													922.4070	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
pump for solar water heating													80.0000	(230g)
Total electricity for the above, kWh/year													80.0000	(231)
Electricity for lighting (calculated in Appendix L)													163.1327	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-834.0434	(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													640.8830	(238)

Full SAP Calculation Printout



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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	309.3868	26.0600	80.6262 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	922.4070	26.0600	240.3793 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Pump for solar water heating	80.0000	26.0600	20.8480 (249)
Energy for lighting	163.1327	26.0600	42.5124 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-834.0434	26.0600	-217.3517
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-217.3517 (252)
Total energy cost			167.0141 (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	309.3868	0.1572	48.6230 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	922.4070	0.1468	135.4286 (264)
Space and water heating			184.0516 (265)
Pumps, fans and electric keep-hot	80.0000	0.1387	11.0970 (267)
Energy for lighting	163.1327	0.1443	23.5451 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-834.0434	0.1352	-112.7364
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-112.7364 (269)
Total CO2, kg/year			105.9572 (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	309.3868	1.5818	489.3872 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	922.4070	1.5432	1423.4124 (278)
Space and water heating			1912.7996 (279)
Pumps, fans and electric keep-hot	80.0000	1.5128	121.0240 (281)
Energy for lighting	163.1327	1.5338	250.2183 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-834.0434	1.4996	-1250.7194
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1250.7194 (283)
Total Primary energy kWh/year			1033.3225 (286)

Predicted Energy Assessment



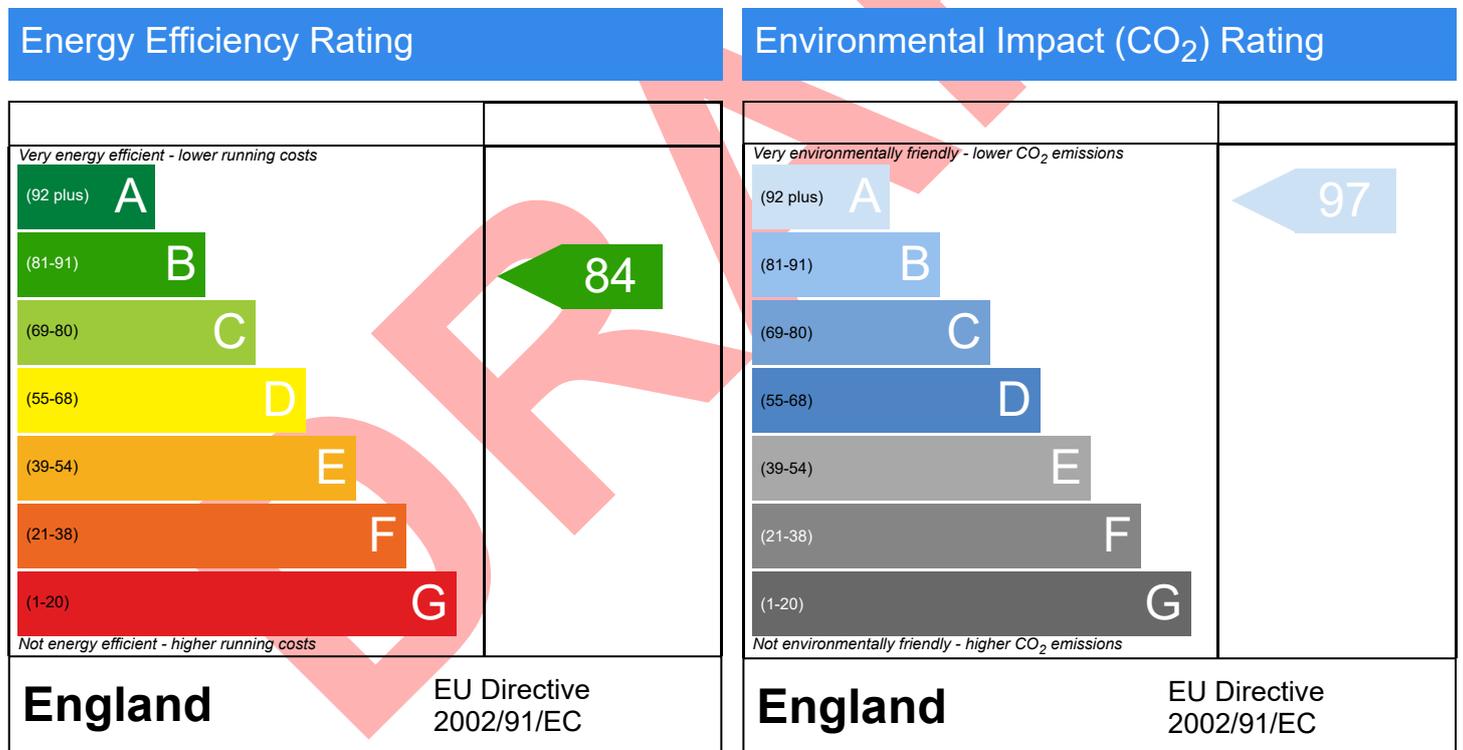
Plot 53, Hoe Lane, ROMSEY, SO52 9NH

Dwelling type:
Date of assessment:
Produced by:
Total floor area:
DRRN:

House, Mid-Terrace
13/12/2024
Rob Carswell
68 m²

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.