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 12:40:21

Project Information			
Assessed By	Rob Carswell	Building Type	House, End-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_052	Plot Reference	r2
Address	Plot 52 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	*12.58 kgCO_2/m^2*	
Dwelling carbon dioxide emission rate	4.38 kgCO_2/m^2	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*65.91 kWh$_{PE}$/m^2*	
Dwelling primary energy	46.34 kWh$_{PE}$/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*37.6 kWh/m^2*	
Dwelling fabric energy efficiency	32.2 kWh/m^2	OK

2a Fabric U-values				
Element	***Maximum permitted average U-Value [W/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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^2K]**
Exposed wall: Walls (1)	75.17	0.17
Party wall: Party Wall (1)	38.1	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^2K]**
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	E16: Corner (normal)	Calculated by person with suitable expertise	0.04	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	327.6%
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: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

Summary for Input Data

elmhurst energy

Property Reference	0214-0522-03_052	**Issued on Date**	13/12/2024
Assessment Reference	r2	**Prop Type Ref**	Type G
Property	Plot 52, Hoe Lane, ROMSEY, SO52 9NH		

SAP Rating	83 B	**DER**	4.38	**TER**	12.58
Environmental	97 A	**% DER < TER**			65.18
CO_2 Emissions (t/year)	0.27	**DFEE**	32.18	**TFEE**	37.61
Compliance Check	See BREL	**% DFEE < TFEE**			14.44
% DPER < TPER	29.69	**DPER**	46.34	**TPER**	65.91

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

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

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, End-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	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	188.56	kJ/m²K
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:	16.60 m	34.00 m²	2.46 m
1st Storey:	16.60 m	34.00 m²	2.76 m

8.0 Living Area	25.90	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	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	86.65	75.17	0.00	None	11.48	Calculate Wall Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	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	38.10	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
TF	Plasterboard on timber frame	9.00	124.30

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	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

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	34.00

Summary for Input Data

elmhurst energy

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	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

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	16.60	0.02	0.02	Xtratherm	No
E6 Intermediate floor within a dwelling	Independently assessed	16.60	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
E16 Corner (normal)	Independently assessed	10.40	0.04	0.04	Xtratherm	No
E18 Party wall between dwellings	Independently assessed	10.40	0.05	0.05	Xtratherm	No
P1 Party wall - Ground floor	Independently assessed	7.30	0.07	0.07	Xtratherm	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	7.30	0.00	0.00		No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	7.30	0.10	0.10	Xtratherm	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	2
Number of passive vents	0
Number of flueless gas fires	0

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.00	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

Summary for Input Data

elmhurst energy

No Fixed Lighting	No

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	327.61	
In Summer	185.11	
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	None	
26.0 Heat Networks	None	

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

27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
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

29.0 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	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**			65.18
CO_2 Emissions (t/year)	0.27	**DFEE**	32.18	**TFEE**	37.61
Compliance Check	See BREL	**% DFEE < TFEE**			14.44
% DPER < TPER	29.69	**DPER**	46.34	**TPER**	65.91

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

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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)

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2. Ventilation rate

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	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)

	Air changes per hour	
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		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892 (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	0.3688	0.3615	0.3543	0.3182	0.3109	0.2748	0.2748	0.2675	0.2892	0.3109	0.3254	0.3399	(22b)
Effective ac	0.5680	0.5654	0.5628	0.5506	0.5483	0.5378	0.5378	0.5358	0.5418	0.5483	0.5529	0.5578	(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	
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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320	
E6 Intermediate floor within a dwelling	16.6000	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	
E16 Corner (normal)	10.4000	0.0400	0.4160	
E18 Party wall between dwellings	10.4000	0.0500	0.5200	
P1 Party wall - Ground floor	7.3000	0.0700	0.5110	
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0480 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.2668	33.1121	32.9605	32.2485	32.1153	31.4952	31.4952	31.3804	31.7341	32.1153	32.3848	32.6665	(38)
Heat transfer coeff	71.5226	71.3679	71.2163	70.5044	70.3711	69.7510	69.7510	69.6362	69.9899	70.3711	70.6406	70.9224	(39)
Average = Sum(39)m / 12 =												70.5037	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0518	1.0495	1.0473	1.0368	1.0349	1.0258	1.0258	1.0241	1.0293	1.0349	1.0388	1.0430	(40)
HLP (average)												1.0368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)
12Total per year (kWh/year) 2491 (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	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)

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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	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)

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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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.7968	49.9047	50.0109	50.5159	50.6116	51.0615	51.0615	51.1457	50.8873	50.6116	50.4185	50.2182	
alpha	4.3198	4.3270	4.3341	4.3677	4.3741	4.4041	4.4041	4.4097	4.3925	4.3741	4.3612	4.3479	
util living area	0.9748	0.9569	0.9292	0.8651	0.7512	0.5757	0.4249	0.4580	0.6645	0.8727	0.9548	0.9784	(86)
Living	19.7680	19.9861	20.2499	20.5783	20.8256	20.9588	20.9913	20.9878	20.9217	20.6230	20.1516	19.7294	
Non living	18.6271	18.9007	19.2283	19.6276	19.9028	20.0355	20.0584	20.0580	20.0036	19.6885	19.1179	18.5838	
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	20.3698	19.9861	20.2499	20.5783	20.8256	20.9588	20.9913	20.9878	20.9217	20.6230	20.1516	19.9071	(87)
Th 2	20.0404	20.0423	20.0441	20.0528	20.0544	20.0619	20.0619	20.0633	20.0590	20.0544	20.0511	20.0477	(88)
util rest of house	0.9692	0.9475	0.9137	0.8358	0.7003	0.5012	0.3372	0.3688	0.5920	0.8393	0.9434	0.9735	(89)
MIT 2	19.4770	18.9007	19.2283	19.6276	19.9028	20.0355	20.0584	20.0580	20.0036	19.6885	19.1179	18.8476	(90)
Living area fraction										fLA = Living area / (4) =		0.3809	(91)
MIT	19.8170	19.3141	19.6174	19.9897	20.2543	20.3872	20.4137	20.4122	20.3533	20.0444	19.5116	19.2512	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8170	19.3141	19.6174	19.9897	20.2543	20.3872	20.4137	20.4122	20.3533	20.0444	19.5116	19.2512	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9677	0.9388	0.9056	0.8336	0.7117	0.5278	0.3705	0.4026	0.6157	0.8389	0.9354	0.9684	(94)
Useful gains	574.4815	630.4814	641.4235	619.7127	537.7573	390.4341	263.8201	276.2174	411.4588	523.1187	547.8671	552.0960	(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	1109.8172	1028.7029	934.1753	781.8725	601.9735	403.6616	266.0105	279.3929	437.6693	664.6152	876.7646	1067.4641	(97)
Space heating kWh	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98a)
Space heating requirement - total per year (kWh/year)												1773.7473	
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	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1773.7473	
Space heating per m2											(98c) / (4) =	26.0845	(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 %)												327.6099	(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	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98)
Space heating efficiency (main heating system 1)	327.6099	327.6099	327.6099	327.6099	327.6099	0.0000	0.0000	0.0000	0.0000	327.6099	327.6099	327.6099	(210)
Space heating fuel (main heating system)	121.5744	81.6840	66.4837	35.6384	14.5834	0.0000	0.0000	0.0000	0.0000	32.1338	72.2830	117.0398	(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												185.1079	(216)
(217)m	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	(217)
Fuel for water heating, kWh/month	133.6007	118.1885	125.5553	110.2713	106.8367	96.1980	94.8396	98.6109	99.7090	111.2793	118.4586	132.1165	(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												541.4205	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												185.1079	
Water heating fuel used												1345.6643	(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	2050.2174	(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	541.4205	0.1560	84.4418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1345.6643	0.1409	189.6043	(264)
Space and water heating			274.0461	(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			297.5912	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3800	(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	541.4205	1.5774	854.0215	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1345.6643	1.5210	2046.7525	(278)
Space and water heating			2900.7739	(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			3150.9922	(286)
Dwelling Primary energy Rate (DPER)			46.3400	(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

	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)

	Air changes per hour		
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		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3355	(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	0.4277	0.4194	0.4110	0.3690	0.3606	0.3187	0.3187	0.3103	0.3355	0.3606	0.3774	0.3942	(22b)
Effective ac	0.5915	0.5879	0.5844	0.5681	0.5650	0.5508	0.5508	0.5482	0.5563	0.5650	0.5712	0.5777	(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	86.6520	11.4800	75.1720	0.1800	13.5310			(29a)
Plane	34.0000		34.0000	0.1100	3.7400			(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.5314			(33)
Party Wall 1			38.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5550 (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	0.0500	0.3550
E4 Jamb	21.0000	0.0500	1.0500
E5 Ground floor (normal)	16.6000	0.1600	2.6560
E6 Intermediate floor within a dwelling	16.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.3000	0.0600	0.5580
E12 Gable (insulation at ceiling level)	7.3000	0.0600	0.4380
E16 Corner (normal)	10.4000	0.0900	0.9360
E18 Party wall between dwellings	10.4000	0.0600	0.6240
P1 Party wall - Ground floor	7.3000	0.0800	0.5840
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1200	0.8760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.5270 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 43.0584 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.6422	34.4342	34.2302	33.2723	33.0931	32.2588	32.2588	32.1043	32.5802	33.0931	33.4557	33.8347	(38)
Heat transfer coeff	77.7007	77.4926	77.2887	76.3308	76.1515	75.3172	75.3172	75.1627	75.6386	76.1515	76.5141	76.8931	(39)

Average = Sum(39)m / 12 = 76.3299

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1427	1.1396	1.1366	1.1225	1.1199	1.1076	1.1076	1.1053	1.1123	1.1199	1.1252	1.1308	(40)
HLP (average)												1.1225	
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)

	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(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	(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	(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	246.5017	218.0502	231.6090	203.3430	196.9594	177.2923	174.7519	181.7329	183.7914	205.1830	218.4984	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	(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	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)
									Total per year (kWh/year) = Sum(64)m =			2222.1461	(64)
12Total per year (kWh/year)												2222	(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	104.9828	93.2948	100.0309	89.8899	88.5100	81.2280	81.1259	83.4471	83.3890	91.2443	94.9290	104.0693	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	(72)
Total internal gains													
	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)

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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	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)

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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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.8374	45.9605	46.0817	46.6600	46.7698	47.2879	47.2879	47.3851	47.0870	46.7698	46.5482	46.3188	
alpha	4.0558	4.0640	4.0721	4.1107	4.1180	4.1525	4.1525	4.1590	4.1391	4.1180	4.1032	4.0879	
util living area													
	0.9778	0.9636	0.9422	0.8908	0.7941	0.6298	0.4735	0.5075	0.7134	0.8947	0.9613	0.9807	(86)
MIT	19.5798	19.7950	20.0730	20.4408	20.7417	20.9286	20.9827	20.9769	20.8758	20.5107	19.9969	19.5479	(87)
Th 2	19.9661	19.9686	19.9711	19.9825	19.9846	19.9946	19.9946	19.9965	19.9908	19.9846	19.9803	19.9758	(88)
util rest of house													
	0.9726	0.9553	0.9284	0.8642	0.7440	0.5480	0.3712	0.4046	0.6377	0.8639	0.9509	0.9762	(89)
MIT 2	18.3381	18.6098	18.9581	19.4129	19.7566	19.9482	19.9877	19.9864	19.9014	19.5049	18.8751	18.3046	(90)
Living area fraction									fLA = Living area / (4) =			0.3809	(91)
MIT	18.8110	19.0612	19.3827	19.8044	20.1318	20.3216	20.3667	20.3637	20.2726	19.8880	19.3024	18.7782	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8110	19.0612	19.3827	19.8044	20.1318	20.3216	20.3667	20.3637	20.2726	19.8880	19.3024	18.7782	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9649	0.9461	0.9189	0.8588	0.7519	0.5758	0.4098	0.4433	0.6603	0.8605	0.9423	0.9691	(94)
Useful gains	565.4098	621.6857	632.3609	616.6576	546.4170	407.6748	279.2961	291.7834	424.8136	522.8102	542.8085	546.3538	(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													
	1127.5159	1097.3901	995.6877	832.3442	642.0934	430.9365	283.6954	297.9191	466.8835	707.2942	933.6550	1120.9621	(97)
Space heating kWh													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(98a)
Space heating requirement - total per year (kWh/year)												2080.8472	
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													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2080.8472	
Space heating per m2											(98c) / (4) =	30.6007	(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													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(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)													
	453.0953	346.3417	292.8658	168.2496	77.1216	0.0000	0.0000	0.0000	0.0000	148.7064	304.8857	463.1728	(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												79.8000	(216)
(217)m	85.4903	85.1792	84.6727	83.7067	82.1891	79.8000	79.8000	79.8000	79.8000	83.4076	84.8826	85.5575	(217)
Fuel for water heating, kWh/month													
	255.6927	227.0120	243.0090	217.3551	215.3734	200.7823	198.9390	206.4161	208.1857	221.0406	229.6275	252.8847	(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)													
(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	2254.4391	(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	2676.3182	(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	3511.5382	(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	2254.4391	0.2100	473.4322	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2676.3182	0.2100	562.0268	(264)
Space and water heating			1035.4590	(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			855.1984	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5800	(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	2254.4391	1.1300	2547.5161	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2676.3182	1.1300	3024.2396	(278)
Space and water heating			5571.7557	(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			4481.8852	(286)
Target Primary Energy Rate (TPER)			65.9100	(287)

Full SAP Calculation Printout

Property Reference	0214-0522-03_052	**Issued on Date**	13/12/2024
Assessment Reference	r2	**Prop Type Ref**	Type G
Property	Plot 52, Hoe Lane, ROMSEY, SO52 9NH		

SAP Rating	83 B	**DER**	4.38	**TER**	12.58
Environmental	97 A	**% DER < TER**			65.18
CO_2 Emissions (t/year)	0.27	**DFEE**	32.18	**TFEE**	37.61
Compliance Check	See BREL	**% DFEE < TFEE**			14.44
% DPER < TPER	29.69	**DPER**	46.34	**TPER**	65.91

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 (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)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	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		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892 (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	0.3688	0.3615	0.3543	0.3182	0.3109	0.2748	0.2748	0.2675	0.2892	0.3109	0.3254	0.3399	(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	0.5680	0.5654	0.5628	0.5506	0.5483	0.5378	0.5378	0.5358	0.5418	0.5483	0.5529	0.5578	(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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =			12821.7401	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.5550	(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)	16.6000	0.0200	0.3320	
E6 Intermediate floor within a dwelling	16.6000	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	
E16 Corner (normal)	10.4000	0.0400	0.4160	
E18 Party wall between dwellings	10.4000	0.0500	0.5200	
P1 Party wall - Ground floor	7.3000	0.0700	0.5110	
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0480 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.2668	33.1121	32.9605	32.2485	32.1153	31.4952	31.4952	31.3804	31.7341	32.1153	32.3848	32.6665	(38)
Heat transfer coeff	71.5226	71.3679	71.2163	70.5044	70.3711	69.7510	69.7510	69.6362	69.9899	70.3711	70.6406	70.9224	(39)
Average = Sum(39)m / 12 =												70.5037	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0518	1.0495	1.0473	1.0368	1.0349	1.0258	1.0258	1.0241	1.0293	1.0349	1.0388	1.0430	(40)
HLP (average)												1.0368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.1966 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		966.6705	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	85.4858	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)
										Total per year (kWh/year) = Sum(64)m =		821.6699	(64)
12Total per year (kWh/year)												822	(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)
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)

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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	496.8621	575.8699	615.2503	656.6599	672.6000	660.7365	635.7294	607.9862	587.9205	538.8630	494.9172	474.1435	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.7968	49.9047	50.0109	50.5159	50.6116	51.0615	51.0615	51.1457	50.8873	50.6116	50.4185	50.2182	
alpha	4.3198	4.3270	4.3341	4.3677	4.3741	4.4041	4.4041	4.4097	4.3925	4.3741	4.3612	4.3479	
util living area	0.9867	0.9742	0.9543	0.9027	0.8026	0.6313	0.4725	0.5116	0.7269	0.9144	0.9744	0.9890	(86)
MIT	19.5909	19.8228	20.1076	20.4773	20.7698	20.9411	20.9868	20.9813	20.8882	20.5196	19.9971	19.5511	(87)
Th 2	20.0404	20.0423	20.0441	20.0528	20.0544	20.0619	20.0619	20.0633	20.0590	20.0544	20.0511	20.0477	(88)
util rest of house	0.9835	0.9682	0.9433	0.8789	0.7554	0.5538	0.3765	0.4142	0.6553	0.8885	0.9673	0.9863	(89)
MIT 2	18.7655	18.9950	19.2745	19.6327	19.8940	20.0317	20.0577	20.0568	19.9950	19.6796	19.1758	18.7317	(90)
Living area fraction									fLA = Living area / (4) =			0.3809	(91)
MIT	19.0799	19.3103	19.5918	19.9544	20.2276	20.3780	20.4116	20.4089	20.3352	19.9996	19.4886	19.0438	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0799	19.3103	19.5918	19.9544	20.2276	20.3780	20.4116	20.4089	20.3352	19.9996	19.4886	19.0438	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9793	0.9625	0.9370	0.8761	0.7648	0.5810	0.4129	0.4510	0.6777	0.8868	0.9620	0.9826	(94)
Useful gains	486.5813	554.2769	576.4950	575.3061	514.3857	383.8813	262.5037	274.2146	398.4115	477.8404	476.1310	465.9036	(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	1057.0934	1028.4328	932.3492	779.3841	600.0963	403.0242	265.8601	279.1669	436.4012	661.4579	875.1385	1052.7589	(97)
Space heating kWh	424.4610	318.6328	264.7555	146.9362	63.7687	0.0000	0.0000	0.0000	0.0000	136.6114	287.2854	436.6203	(98a)
Space heating requirement - total per year (kWh/year)												2079.0713	
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	424.4610	318.6328	264.7555	146.9362	63.7687	0.0000	0.0000	0.0000	0.0000	136.6114	287.2854	436.6203	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2079.0713	
Space heating per m2										(98c) / (4) =		30.5746	(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	655.6596	516.1576	529.2350	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8547	0.9152	0.8971	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	560.4151	472.3812	474.7797	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	120.3898	169.8221	145.4689	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	30.0974	42.4555	36.3672	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												108.9202	(107)
Energy for space heating												30.5746	(99)
Energy for space cooling												1.6018	(108)
Total												32.1763	(109)
Fabric Energy Efficiency (DFEE)												32.2	(109)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	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)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	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		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3355 (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	0.4277	0.4194	0.4110	0.3690	0.3606	0.3187	0.3187	0.3103	0.3355	0.3606	0.3774	0.3942	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5915	0.5879	0.5844	0.5681	0.5650	0.5508	0.5508	0.5482	0.5563	0.5650	0.5712	0.5777	(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	86.6520	11.4800	75.1720	0.1800	13.5310			(29a)
Plane	34.0000		34.0000	0.1100	3.7400			(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.5314			(33)
Party Wall 1			38.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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	0.0500	0.3550
E4 Jamb	21.0000	0.0500	1.0500
E5 Ground floor (normal)	16.6000	0.1600	2.6560
E6 Intermediate floor within a dwelling	16.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.3000	0.0600	0.5580
E12 Gable (insulation at ceiling level)	7.3000	0.0600	0.4380
E16 Corner (normal)	10.4000	0.0900	0.9360
E18 Party wall between dwellings	10.4000	0.0600	0.6240
P1 Party wall - Ground floor	7.3000	0.0800	0.5840
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1200	0.8760

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.5270 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	43.0584 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.6422	34.4342	34.2302	33.2723	33.0931	32.2588	32.2588	32.1043	32.5802	33.0931	33.4557	33.8347	(38)
Heat transfer coeff	77.7007	77.4926	77.2887	76.3308	76.1515	75.3172	75.3172	75.1627	75.6386	76.1515	76.5141	76.8931	(39)

Average = Sum(39)m / 12 =		76.3299

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1427	1.1396	1.1366	1.1225	1.1199	1.1076	1.1076	1.1053	1.1123	1.1199	1.1252	1.1308	(40)
HLP (average)												1.1225	
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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	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 conte	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)

Energy content (annual)	Total = Sum(45)m =	966.6705

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	85.4858	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)

	Total per year (kWh/year) = Sum(64)m =	821.6699 (64)
12Total per year (kWh/year)		822 (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)
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)

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)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.8374	45.9605	46.0817	46.6600	46.7698	47.2879	47.2879	47.3851	47.0870	46.7698	46.5482	46.3188	
alpha	4.0558	4.0640	4.0721	4.1107	4.1180	4.1525	4.1525	4.1590	4.1391	4.1180	4.1032	4.0879	
util living area													
	0.9882	0.9785	0.9633	0.9234	0.8422	0.6863	0.5257	0.5653	0.7731	0.9310	0.9782	0.9901	(86)
MIT	19.4001	19.6264	19.9216	20.3255	20.6693	20.9016	20.9747	20.9657	20.8303	20.3948	19.8373	19.3674	(87)
Th 2	19.9661	19.9686	19.9711	19.9825	19.9846	19.9946	19.9946	19.9965	19.9908	19.9846	19.9803	19.9758	(88)
util rest of house													
	0.9853	0.9732	0.9539	0.9027	0.7978	0.6037	0.4151	0.4548	0.7011	0.9082	0.9719	0.9876	(89)
MIT 2	18.5209	18.7460	19.0377	19.4352	19.7501	19.9431	19.9864	19.9844	19.8916	19.5083	18.9651	18.4957	(90)
Living area fraction									fLA = Living area / (4) =			0.3809	(91)
MIT	18.8557	19.0814	19.3744	19.7743	20.1002	20.3082	20.3628	20.3581	20.2491	19.8460	19.2973	18.8278	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8557	19.0814	19.3744	19.7743	20.1002	20.3082	20.3628	20.3581	20.2491	19.8460	19.2973	18.8278	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9811	0.9674	0.9471	0.8977	0.8034	0.6311	0.4569	0.4962	0.7212	0.9044	0.9665	0.9839	(94)
Useful gains	477.7741	541.0677	561.5764	564.8059	515.4688	397.4233	276.8470	288.2354	406.6739	470.9199	466.9529	458.1630	(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													
	1130.9900	1098.9510	995.0444	830.0419	639.6910	429.9224	283.4056	297.5048	465.1121	704.0944	933.2659	1124.7737	(97)
Space heating kWh													
	485.9926	374.8976	322.5001	190.9699	92.4213	0.0000	0.0000	0.0000	0.0000	173.4818	335.7454	495.9583	(98a)
Space heating requirement - total per year (kWh/year)												2471.9671	
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													
	485.9926	374.8976	322.5001	190.9699	92.4213	0.0000	0.0000	0.0000	0.0000	173.4818	335.7454	495.9583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2471.9671	
Space heating per m2										(98c) / (4) =		36.3525	(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	707.9821	557.3476	571.2369	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7963	0.8703	0.8483	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	563.7501	485.0386	484.5991	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	91.9370	134.5233	114.6357	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	22.9843	33.6308	28.6589	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												85.2740	(107)
Energy for space heating												36.3525	(99)

Energy for space cooling	1.2540 (108)
Total	37.6065 (109)
Fabric Energy Efficiency (TFEE)	37.6 (109)

Full SAP Calculation Printout

Property Reference	0214-0522-03_052	**Issued on Date**	13/12/2024
Assessment Reference	r2	**Prop Type Ref**	Type G
Property	Plot 52, Hoe Lane, ROMSEY, SO52 9NH		

SAP Rating	83 B	**DER**	4.38	**TER**	12.58
Environmental	97 A	**% DER < TER**			65.18
CO_2 Emissions (t/year)	0.27	**DFEE**	32.18	**TFEE**	37.61
Compliance Check	See BREL	**% DFEE < TFEE**			14.44
% DPER < TPER	29.69	**DPER**	46.34	**TPER**	65.91

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

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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)

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2. Ventilation rate

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	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)

	Air changes per hour	
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		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892 (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	0.3688	0.3615	0.3543	0.3182	0.3109	0.2748	0.2748	0.2675	0.2892	0.3109	0.3254	0.3399	(22b)
Effective ac	0.5680	0.5654	0.5628	0.5506	0.5483	0.5378	0.5378	0.5358	0.5418	0.5483	0.5529	0.5578	(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	
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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320	
E6 Intermediate floor within a dwelling	16.6000	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	
E16 Corner (normal)	10.4000	0.0400	0.4160	
E18 Party wall between dwellings	10.4000	0.0500	0.5200	
P1 Party wall - Ground floor	7.3000	0.0700	0.5110	
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0480 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.2668	33.1121	32.9605	32.2485	32.1153	31.4952	31.4952	31.3804	31.7341	32.1153	32.3848	32.6665	(38)
Heat transfer coeff	71.5226	71.3679	71.2163	70.5044	70.3711	69.7510	69.7510	69.6362	69.9899	70.3711	70.6406	70.9224	(39)
Average = Sum(39)m / 12 =												70.5037	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0518	1.0495	1.0473	1.0368	1.0349	1.0258	1.0258	1.0241	1.0293	1.0349	1.0388	1.0430	(40)
HLP (average)												1.0368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)
12Total per year (kWh/year) 2491 (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	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)

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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	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)

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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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	49.7968	49.9047	50.0109	50.5159	50.6116	51.0615	51.0615	51.1457	50.8873	50.6116	50.4185	50.2182	
alpha	4.3198	4.3270	4.3341	4.3677	4.3741	4.4041	4.4041	4.4097	4.3925	4.3741	4.3612	4.3479	
util living area	0.9748	0.9569	0.9292	0.8651	0.7512	0.5757	0.4249	0.4580	0.6645	0.8727	0.9548	0.9784	(86)
Living	19.7680	19.9861	20.2499	20.5783	20.8256	20.9588	20.9913	20.9878	20.9217	20.6230	20.1516	19.7294	
Non living	18.6271	18.9007	19.2283	19.6276	19.9028	20.0355	20.0584	20.0580	20.0036	19.6885	19.1179	18.5838	
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	20.3698	19.9861	20.2499	20.5783	20.8256	20.9588	20.9913	20.9878	20.9217	20.6230	20.1516	19.9071	(87)
Th 2	20.0404	20.0423	20.0441	20.0528	20.0544	20.0619	20.0619	20.0633	20.0590	20.0544	20.0511	20.0477	(88)
util rest of house	0.9692	0.9475	0.9137	0.8358	0.7003	0.5012	0.3372	0.3688	0.5920	0.8393	0.9434	0.9735	(89)
MIT 2	19.4770	18.9007	19.2283	19.6276	19.9028	20.0355	20.0584	20.0580	20.0036	19.6885	19.1179	18.8476	(90)
Living area fraction										fLA = Living area / (4) =		0.3809	(91)
MIT	19.8170	19.3141	19.6174	19.9897	20.2543	20.3872	20.4137	20.4122	20.3533	20.0444	19.5116	19.2512	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8170	19.3141	19.6174	19.9897	20.2543	20.3872	20.4137	20.4122	20.3533	20.0444	19.5116	19.2512	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9677	0.9388	0.9056	0.8336	0.7117	0.5278	0.3705	0.4026	0.6157	0.8389	0.9354	0.9684	(94)
Useful gains	574.4815	630.4814	641.4235	619.7127	537.7573	390.4341	263.8201	276.2174	411.4588	523.1187	547.8671	552.0960	(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	1109.8172	1028.7029	934.1753	781.8725	601.9735	403.6616	266.0105	279.3929	437.6693	664.6152	876.7646	1067.4641	(97)
Space heating kWh	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98a)
Space heating requirement - total per year (kWh/year)												1773.7473	
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	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1773.7473	
Space heating per m2											(98c) / (4) =	26.0845	(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 %)												327.6099	(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	398.2897	267.6049	217.8073	116.7551	47.7768	0.0000	0.0000	0.0000	0.0000	105.2734	236.8062	383.4338	(98)
Space heating efficiency (main heating system 1)	327.6099	327.6099	327.6099	327.6099	327.6099	0.0000	0.0000	0.0000	0.0000	327.6099	327.6099	327.6099	(210)
Space heating fuel (main heating system)	121.5744	81.6840	66.4837	35.6384	14.5834	0.0000	0.0000	0.0000	0.0000	32.1338	72.2830	117.0398	(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												185.1079	(216)
(217)m	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	(217)
Fuel for water heating, kWh/month	133.6007	118.1885	125.5553	110.2713	106.8367	96.1980	94.8396	98.6109	99.7090	111.2793	118.4586	132.1165	(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												541.4205	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												185.1079	
Water heating fuel used												1345.6643	(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	2050.2174	(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	541.4205	0.1560	84.4418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1345.6643	0.1409	189.6043	(264)
Space and water heating			274.0461	(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			297.5912	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3800	(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	541.4205	1.5774	854.0215	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1345.6643	1.5210	2046.7525	(278)
Space and water heating			2900.7739	(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			3150.9922	(286)
Dwelling Primary energy Rate (DPER)			46.3400	(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

	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)

	Air changes per hour		
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		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3355	(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	0.4277	0.4194	0.4110	0.3690	0.3606	0.3187	0.3187	0.3103	0.3355	0.3606	0.3774	0.3942	(22b)
Effective ac	0.5915	0.5879	0.5844	0.5681	0.5650	0.5508	0.5508	0.5482	0.5563	0.5650	0.5712	0.5777	(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	86.6520	11.4800	75.1720	0.1800	13.5310			(29a)
Plane	34.0000		34.0000	0.1100	3.7400			(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.5314			(33)
Party Wall 1			38.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 188.5550 (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	0.0500	0.3550
E4 Jamb	21.0000	0.0500	1.0500
E5 Ground floor (normal)	16.6000	0.1600	2.6560
E6 Intermediate floor within a dwelling	16.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.3000	0.0600	0.5580
E12 Gable (insulation at ceiling level)	7.3000	0.0600	0.4380
E16 Corner (normal)	10.4000	0.0900	0.9360
E18 Party wall between dwellings	10.4000	0.0600	0.6240
P1 Party wall - Ground floor	7.3000	0.0800	0.5840
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1200	0.8760

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.5270 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 43.0584 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.6422	34.4342	34.2302	33.2723	33.0931	32.2588	32.2588	32.1043	32.5802	33.0931	33.4557	33.8347	(38)
Heat transfer coeff	77.7007	77.4926	77.2887	76.3308	76.1515	75.3172	75.3172	75.1627	75.6386	76.1515	76.5141	76.8931	(39)

Average = Sum(39)m / 12 = 76.3299

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1427	1.1396	1.1366	1.1225	1.1199	1.1076	1.1076	1.1053	1.1123	1.1199	1.1252	1.1308	(40)
HLP (average)												1.1225	
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)

	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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):												1.5520	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8381	(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	(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	(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	246.5017	218.0502	231.6090	203.3430	196.9594	177.2923	174.7519	181.7329	183.7914	205.1830	218.4984	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	(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	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)
									Total per year (kWh/year) = Sum(64)m =			2222.1461	(64)
12Total per year (kWh/year)												2222	(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	104.9828	93.2948	100.0309	89.8899	88.5100	81.2280	81.1259	83.4471	83.3890	91.2443	94.9290	104.0693	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-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	(72)
Total internal gains													
	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)

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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	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)

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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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	45.8374	45.9605	46.0817	46.6600	46.7698	47.2879	47.2879	47.3851	47.0870	46.7698	46.5482	46.3188	
alpha	4.0558	4.0640	4.0721	4.1107	4.1180	4.1525	4.1525	4.1590	4.1391	4.1180	4.1032	4.0879	
util living area													
	0.9778	0.9636	0.9422	0.8908	0.7941	0.6298	0.4735	0.5075	0.7134	0.8947	0.9613	0.9807	(86)
MIT	19.5798	19.7950	20.0730	20.4408	20.7417	20.9286	20.9827	20.9769	20.8758	20.5107	19.9969	19.5479	(87)
Th 2	19.9661	19.9686	19.9711	19.9825	19.9846	19.9946	19.9946	19.9965	19.9908	19.9846	19.9803	19.9758	(88)
util rest of house													
	0.9726	0.9553	0.9284	0.8642	0.7440	0.5480	0.3712	0.4046	0.6377	0.8639	0.9509	0.9762	(89)
MIT 2	18.3381	18.6098	18.9581	19.4129	19.7566	19.9482	19.9877	19.9864	19.9014	19.5049	18.8751	18.3046	(90)
Living area fraction									fLA = Living area / (4) =			0.3809	(91)
MIT	18.8110	19.0612	19.3827	19.8044	20.1318	20.3216	20.3667	20.3637	20.2726	19.8880	19.3024	18.7782	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8110	19.0612	19.3827	19.8044	20.1318	20.3216	20.3667	20.3637	20.2726	19.8880	19.3024	18.7782	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9649	0.9461	0.9189	0.8588	0.7519	0.5758	0.4098	0.4433	0.6603	0.8605	0.9423	0.9691	(94)
Useful gains	565.4098	621.6857	632.3609	616.6576	546.4170	407.6748	279.2961	291.7834	424.8136	522.8102	542.8085	546.3538	(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													
	1127.5159	1097.3901	995.6877	832.3442	642.0934	430.9365	283.6954	297.9191	466.8835	707.2942	933.6550	1120.9621	(97)
Space heating kWh													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(98a)
Space heating requirement - total per year (kWh/year)												2080.8472	
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													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2080.8472	
Space heating per m2											(98c) / (4) =	30.6007	(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													
	418.2070	319.6734	270.3152	155.2944	71.1833	0.0000	0.0000	0.0000	0.0000	137.2560	281.4095	427.5085	(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)													
	453.0953	346.3417	292.8658	168.2496	77.1216	0.0000	0.0000	0.0000	0.0000	148.7064	304.8857	463.1728	(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												79.8000	(216)
(217)m	85.4903	85.1792	84.6727	83.7067	82.1891	79.8000	79.8000	79.8000	79.8000	83.4076	84.8826	85.5575	(217)
Fuel for water heating, kWh/month													
	255.6927	227.0120	243.0090	217.3551	215.3734	200.7823	198.9390	206.4161	208.1857	221.0406	229.6275	252.8847	(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)													
(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	2254.4391	(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	2676.3182	(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	3511.5382	(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	2254.4391	0.2100	473.4322	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2676.3182	0.2100	562.0268	(264)
Space and water heating			1035.4590	(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			855.1984	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5800	(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	2254.4391	1.1300	2547.5161	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2676.3182	1.1300	3024.2396	(278)
Space and water heating			5571.7557	(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			4481.8852	(286)
Target Primary Energy Rate (TPER)			65.9100	(287)

Full SAP Calculation Printout

Property Reference	0214-0522-03_052	**Issued on Date**	13/12/2024
Assessment Reference	r2	**Prop Type Ref**	Type G
Property	Plot 52, Hoe Lane, ROMSEY, SO52 9NH		

SAP Rating	83 B	**DER**	4.38	**TER**	12.58
Environmental	97 A	**% DER < TER**			65.18
CO_2 Emissions (t/year)	0.27	**DFEE**	32.18	**TFEE**	37.61
Compliance Check	See BREL	**% DFEE < TFEE**			14.44
% DPER < TPER	29.69	**DPER**	46.34	**TPER**	65.91

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

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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)

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2. Ventilation rate

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		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)

		Air changes per hour	
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		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892	(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	0.3688	0.3615	0.3543	0.3182	0.3109	0.2748	0.2748	0.2675	0.2892	0.3109	0.3254	0.3399	(22b)
Effective ac	0.5680	0.5654	0.5628	0.5506	0.5483	0.5378	0.5378	0.5358	0.5418	0.5483	0.5529	0.5578	(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	
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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320	
E6 Intermediate floor within a dwelling	16.6000	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	
E16 Corner (normal)	10.4000	0.0400	0.4160	
E18 Party wall between dwellings	10.4000	0.0500	0.5200	
P1 Party wall - Ground floor	7.3000	0.0700	0.5110	
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.0480 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.2668	33.1121	32.9605	32.2485	32.1153	31.4952	31.4952	31.3804	31.7341	32.1153	32.3848	32.6665	(38)

Heat transfer coeff

	71.5226	71.3679	71.2163	70.5044	70.3711	69.7510	69.7510	69.6362	69.9899	70.3711	70.6406	70.9224	(39)

Average = Sum(39)m / 12 = 70.5037

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0518	1.0495	1.0473	1.0368	1.0349	1.0258	1.0258	1.0241	1.0293	1.0349	1.0388	1.0430	(40)
HLP (average)												1.0368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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)

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

Primary loss / Combi loss

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)
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)
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)
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)
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)

WWHRS / PV diverter / Solar input / FGHRS

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)
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)

Pumps, fans

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)

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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	752.1557	774.4153	780.2612	753.2436	725.4887	701.1360	686.0618	654.2108	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	49.7968	49.9047	50.0109	50.5159	50.6116	51.0615	51.0615	51.1457	50.8873	50.6116	50.4185	50.2182	
alpha	4.3198	4.3270	4.3341	4.3677	4.3741	4.4041	4.4041	4.4097	4.3925	4.3741	4.3612	4.3479	
util living area	0.9665	0.9483	0.9157	0.8508	0.7362	0.5670	0.4175	0.4489	0.6514	0.8565	0.9450	0.9714	(86)
Living	19.8583	20.0486	20.3111	20.6100	20.8393	20.9611	20.9919	20.9888	20.9276	20.6554	20.2103	19.8152	
Non living	18.7396	18.9772	19.3010	19.6626	19.9158	20.0371	20.0586	20.0585	20.0081	19.7234	19.1890	18.6912	
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	20.4159	20.0486	20.3111	20.6100	20.8393	20.9611	20.9919	20.9888	20.9276	20.6554	20.2103	19.9810	(87)
Th 2	20.0404	20.0423	20.0441	20.0528	20.0544	20.0619	20.0619	20.0633	20.0590	20.0544	20.0511	20.0477	(88)
util rest of house	0.9593	0.9375	0.8980	0.8199	0.6846	0.4930	0.3311	0.3611	0.5792	0.8207	0.9317	0.9651	(89)
MIT 2	19.5218	18.9772	19.3010	19.6626	19.9158	20.0371	20.0586	20.0585	20.0081	19.7234	19.1890	18.9356	(90)
Living area fraction										fLA = Living area / (4) =		0.3809	(91)
MIT	19.8624	19.3853	19.6857	20.0235	20.2675	20.3891	20.4141	20.4128	20.3583	20.0784	19.5780	19.3338	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8624	19.3853	19.6857	20.0235	20.2675	20.3891	20.4141	20.4128	20.3583	20.0784	19.5780	19.3338	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9578	0.9286	0.8904	0.8188	0.6969	0.5195	0.3639	0.3944	0.6032	0.8217	0.9237	0.9593	(94)
Useful gains	618.1806	659.7721	669.6988	634.0919	543.7498	391.3406	263.9966	276.5065	413.8006	537.5765	575.1504	593.1704	(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	1113.0596	1033.7849	939.0384	784.2534	602.9070	403.7942	266.0367	279.4355	438.0194	667.0050	881.4543	1073.3229	(97)
Space heating kWh	368.1900	251.3366	200.3887	108.1163	44.0130	0.0000	0.0000	0.0000	0.0000	96.2948	220.5389	357.2335	(98a)
Space heating requirement - total per year (kWh/year)												1646.1116	
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	368.1900	251.3366	200.3887	108.1163	44.0130	0.0000	0.0000	0.0000	0.0000	96.2948	220.5389	357.2335	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1646.1116	
Space heating per m2										(98c) / (4) =		24.2075	(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 %)												327.6099	(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	368.1900	251.3366	200.3887	108.1163	44.0130	0.0000	0.0000	0.0000	0.0000	96.2948	220.5389	357.2335	(98)
Space heating efficiency (main heating system 1)	327.6099	327.6099	327.6099	327.6099	327.6099	0.0000	0.0000	0.0000	0.0000	327.6099	327.6099	327.6099	(210)
Space heating fuel (main heating system)	112.3867	76.7182	61.1669	33.0015	13.4346	0.0000	0.0000	0.0000	0.0000	29.3931	67.3175	109.0423	(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												185.1079	(216)
(217)m	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	(217)
Fuel for water heating, kWh/month	133.6007	118.1885	125.5553	110.2713	106.8367	96.1980	94.8396	98.6109	99.7090	111.2793	118.4586	132.1165	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
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	(232)
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	(233a)
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	(234a)
(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	(235a)
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	(235c)
(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	(233b)
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	(234b)
(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	(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)
(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	
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	
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	
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	
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	
Annual totals kWh/year													
Space heating fuel - main system 1												502.4609	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												185.1079	
Water heating fuel used												1345.6643	(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	2011.2578	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	502.4609	16.4900	82.8558	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1345.6643	16.4900	221.9000	(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			331.6564	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.0566	(257)
SAP value		82.8724	
SAP rating (Section 12)		83	(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	502.4609	0.1560	78.3814	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1345.6643	0.1409	189.6043	(264)
Space and water heating			267.9857	(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			291.5308	(272)
CO2 emissions per m2			4.2900	(273)
EI value			96.5429	
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 (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)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	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		1	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892 (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	0.3254	0.3037	0.3037	0.2892	0.2892	0.2675	0.2675	0.2531	0.2603	0.2820	0.2748	0.2965	(22b)
Effective ac	0.5529	0.5461	0.5461	0.5418	0.5418	0.5358	0.5358	0.5320	0.5339	0.5398	0.5378	0.5439	(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	
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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320
E6 Intermediate floor within a dwelling	16.6000	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
E16 Corner (normal)	10.4000	0.0400	0.4160
E18 Party wall between dwellings	10.4000	0.0500	0.5200
P1 Party wall - Ground floor	7.3000	0.0700	0.5110
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.0480 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	32.3848	31.9852	31.9852	31.7341	31.7341	31.3804	31.3804	31.1599	31.2686	31.6131	31.4952	31.8581	(38)
Heat transfer coeff	70.6406	70.2410	70.2410	69.9899	69.9899	69.6362	69.6362	69.4157	69.5244	69.8689	69.7510	70.1139	(39)
Average = Sum(39)m / 12 =												69.9207	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0388	1.0330	1.0330	1.0293	1.0293	1.0241	1.0241	1.0208	1.0224	1.0275	1.0258	1.0311	(40)
HLP (average)												1.0282	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.1966 (42)

Hot water usage for mixer showers

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

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

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 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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.4185	50.7054	50.7054	50.8873	50.8873	51.1457	51.1457	51.3082	51.2280	50.9754	51.0615	50.7973	
alpha	4.3612	4.3804	4.3804	4.3925	4.3925	4.4097	4.4097	4.4205	4.4152	4.3984	4.4041	4.3865	
util living area													
	0.9535	0.9349	0.8903	0.8059	0.6642	0.4585	0.3242	0.3302	0.5455	0.7949	0.9168	0.9599	(86)
Living	20.0512	20.2018	20.4611	20.7234	20.9083	20.9859	20.9976	20.9975	20.9700	20.7847	20.4132	20.0199	
Non living	18.9887	19.1772	19.4906	19.7952	19.9875	20.0561	20.0627	20.0653	20.0472	19.8697	19.4443	18.9556	
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	20.5146	20.2018	20.4611	20.7234	20.9083	20.9859	20.9976	20.9975	20.9700	20.7847	20.4132	20.1570	(87)
Th 2	20.0511	20.0560	20.0560	20.0590	20.0590	20.0633	20.0633	20.0660	20.0647	20.0605	20.0619	20.0575	(88)
util rest of house													
	0.9433	0.9211	0.8675	0.7674	0.6031	0.3812	0.2382	0.2430	0.4656	0.7466	0.8967	0.9509	(89)
MIT 2	19.6276	19.1772	19.4906	19.7952	19.9875	20.0561	20.0627	20.0653	20.0472	19.8697	19.4443	19.1542	(90)
Living area fraction										fLA = Living area / (4) =		0.3809	(91)
MIT	19.9654	19.5675	19.8602	20.1488	20.3382	20.4103	20.4188	20.4204	20.3987	20.2182	19.8134	19.5361	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9654	19.5675	19.8602	20.1488	20.3382	20.4103	20.4188	20.4204	20.3987	20.2182	19.8134	19.5361	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9423	0.9128	0.8622	0.7713	0.6219	0.4102	0.2710	0.2762	0.4949	0.7554	0.8905	0.9449	(94)
Useful gains	628.8163	654.6158	658.6455	611.9731	488.1848	323.9902	202.7811	202.2178	352.2764	509.1578	577.3197	596.8119	(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													
	1035.9747	967.0400	868.1942	717.3106	520.6014	328.0060	203.2542	202.7206	361.4348	588.1698	803.0688	991.1389	(97)
Space heating kWh													
	302.9258	209.9491	155.9042	75.8430	24.1180	0.0000	0.0000	0.0000	0.0000	58.7849	162.5393	293.3793	(98a)
Space heating requirement - total per year (kWh/year)												1283.4437	
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													
	302.9258	209.9491	155.9042	75.8430	24.1180	0.0000	0.0000	0.0000	0.0000	58.7849	162.5393	293.3793	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1283.4437	
Space heating per m2											(98c) / (4) =	18.8742	(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 %)	328.0033	(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													
	302.9258	209.9491	155.9042	75.8430	24.1180	0.0000	0.0000	0.0000	0.0000	58.7849	162.5393	293.3793	(98)
Space heating efficiency (main heating system 1)													
	328.0033	328.0033	328.0033	328.0033	328.0033	0.0000	0.0000	0.0000	0.0000	328.0033	328.0033	328.0033	(210)
Space heating fuel (main heating system)													
	92.3545	64.0082	47.5313	23.1226	7.3530	0.0000	0.0000	0.0000	0.0000	17.9221	49.5542	89.4440	(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												185.1700 (216)
(217)m	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700 (217)
Fuel for water heating, kWh/month												
	133.5559	118.1488	125.5131	110.2343	106.8008	96.1657	94.8078	98.5779	99.6755	111.2420	118.4188	132.0722 (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	391.2899 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	185.1700
Water heating fuel used	1345.2128 (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	1899.6353 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	391.2899	26.0600	101.9701	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1345.2128	26.0600	350.5625	(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			495.0450	(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	391.2899	0.1568	61.3440	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1345.2128	0.1409	189.5407	(264)
Space and water heating			250.8847	(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			274.4298	(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	391.2899	1.5804	618.3860	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1345.2128	1.5210	2046.0658	(278)
Space and water heating			2664.4518	(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			2914.6701	(286)

SAP 10 EPC IMPROVEMENTS

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r2

Current energy efficiency rating:	B 83
Current environmental impact rating:	A 97

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 (15.4%)
U Solar photovoltaic panels	+ 6.7	-£ 218	-113 kg (48.8%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£88	0.62 kg/m²	B 85	A 97
Solar photovoltaic panels	£218	1.67 kg/m²	A 92	A 98
Total Savings	£307	2.29 kg/m²		
Potential energy efficiency rating:			A 92	
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	£495	£407	£88
Space heating	£102	£123	-£21
Water heating	£351	£241	£109
Lighting	£43	£43	£0
Generated (PV)	-£0	-£218	£218
Total cost of fuels	£495	£189	£306
Total cost of uses	£496	£189	£306
Delivered energy	28 kWh/m²	11 kWh/m²	17 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.1 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	2 kg/m²	2 kg/m²
Primary energy	43 kWh/m²	17 kWh/m²	26 kWh/m²

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	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)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	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		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892	(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	0.3688	0.3615	0.3543	0.3182	0.3109	0.2748	0.2748	0.2675	0.2892	0.3109	0.3254	0.3399	(22b)
Effective ac	0.5680	0.5654	0.5628	0.5506	0.5483	0.5378	0.5378	0.5358	0.5418	0.5483	0.5529	0.5578	(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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320
E6 Intermediate floor within a dwelling	16.6000	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
E16 Corner (normal)	10.4000	0.0400	0.4160
E18 Party wall between dwellings	10.4000	0.0500	0.5200
P1 Party wall - Ground floor	7.3000	0.0700	0.5110
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.0480 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.2668	33.1121	32.9605	32.2485	32.1153	31.4952	31.4952	31.3804	31.7341	32.1153	32.3848	32.6665	(38)
Heat transfer coeff	71.5226	71.3679	71.2163	70.5044	70.3711	69.7510	69.7510	69.6362	69.9899	70.3711	70.6406	70.9224	(39)
Average = Sum(39)m / 12 =												70.5037	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0518	1.0495	1.0473	1.0368	1.0349	1.0258	1.0258	1.0241	1.0293	1.0349	1.0388	1.0430	(40)
HLP (average)												1.0368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	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)
										Total per year (kWh/year) = Sum(64)m =		1817.3156	(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)

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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	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)

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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)

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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	49.7968	49.9047	50.0109	50.5159	50.6116	51.0615	51.0615	51.1457	50.8873	50.6116	50.4185	50.2182	
alpha	4.3198	4.3270	4.3341	4.3677	4.3741	4.4041	4.4041	4.4097	4.3925	4.3741	4.3612	4.3479	
util living area	0.9665	0.9483	0.9162	0.8543	0.7446	0.5761	0.4252	0.4568	0.6558	0.8573	0.9450	0.9714	(86)
Living	19.8583	20.0486	20.3091	20.6025	20.8318	20.9587	20.9912	20.9880	20.9257	20.6539	20.2103	19.8152	
Non living	18.7396	18.9772	19.2986	19.6544	19.9087	20.0355	20.0584	20.0581	20.0067	19.7218	19.1890	18.6912	
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	20.4159	20.0486	20.3091	20.6025	20.8318	20.9587	20.9912	20.9880	20.9257	20.6539	20.2103	19.9810	(87)
Th 2	20.0404	20.0423	20.0441	20.0528	20.0544	20.0619	20.0619	20.0633	20.0590	20.0544	20.0511	20.0477	(88)
util rest of house	0.9593	0.9375	0.8986	0.8237	0.6933	0.5015	0.3375	0.3678	0.5835	0.8216	0.9317	0.9651	(89)
MIT 2	19.5218	18.9772	19.2986	19.6544	19.9087	20.0355	20.0584	20.0581	20.0067	19.7218	19.1890	18.9356	(90)
Living area fraction									fLA = Living area / (4) =			0.3809	(91)
MIT	19.8624	19.3853	19.6835	20.0155	20.2603	20.3871	20.4137	20.4123	20.3567	20.0768	19.5780	19.3338	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8624	19.3853	19.6835	20.0155	20.2603	20.3871	20.4137	20.4123	20.3567	20.0768	19.5780	19.3338	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9578	0.9286	0.8909	0.8224	0.7051	0.5281	0.3708	0.4015	0.6074	0.8226	0.9237	0.9593	(94)
Useful gains	618.1806	659.7721	668.7620	630.7083	540.4715	390.3947	263.8116	276.2572	413.0343	536.8955	575.1504	593.1704	(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	1113.0596	1033.7849	938.8777	783.6946	602.3970	403.6559	266.0093	279.3988	437.9050	666.8929	881.4543	1073.3229	(97)
Space heating kWh	368.1900	251.3366	200.9660	110.1501	46.0726	0.0000	0.0000	0.0000	0.0000	96.7181	220.5389	357.2335	(98a)
Space heating requirement - total per year (kWh/year)												1651.2058	
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	368.1900	251.3366	200.9660	110.1501	46.0726	0.0000	0.0000	0.0000	0.0000	96.7181	220.5389	357.2335	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1651.2058	
Space heating per m2											(98c) / (4) =	24.2824	(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 %)	327.6099	(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	368.1900	251.3366	200.9660	110.1501	46.0726	0.0000	0.0000	0.0000	0.0000	96.7181	220.5389	357.2335	(98)
Space heating efficiency (main heating system 1)	327.6099	327.6099	327.6099	327.6099	327.6099	0.0000	0.0000	0.0000	0.0000	327.6099	327.6099	327.6099	(210)
Space heating fuel (main heating system)	112.3867	76.7182	61.3431	33.6223	14.0633	0.0000	0.0000	0.0000	0.0000	29.5223	67.3175	109.0423	(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												185.1079	(216)
(217)m	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	185.1079	(217)
Fuel for water heating, kWh/month													
	133.6007	109.4201	93.6472	64.1273	44.9191	38.7809	37.6185	47.9369	66.0481	95.0862	118.4586	132.1165	(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	-36.5249	-53.2543	-77.8945	-87.0914	-91.1357	-83.0975	-81.9040	-78.2891	-70.8224	-60.5287	-40.5490	-31.2882	(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	504.0158	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	185.1079	
Water heating fuel used	981.7602	(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	-792.3796	(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	936.5290	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	504.0158	16.4900	83.1122	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	981.7602	16.4900	161.8923	(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	-792.3796	16.4900	-130.6634	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-130.6634	(252)
Total energy cost			154.4336	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	0.4920 (257)
SAP value		92.0247
SAP rating (Section 12)		92 (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	504.0158	0.1559	78.5977	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	981.7602	0.1460	143.3218	(264)
Space and water heating			221.9195	(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	-792.3796	0.1348	-106.8026	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-106.8026	(269)
Total CO2, kg/year			149.7589	(272)
CO2 emissions per m2			2.2000	(273)
EI value			98.2241	
EI rating			98	(274)
EI band			A	

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.0000 (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)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	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		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2892	(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	0.3254	0.3037	0.3037	0.2892	0.2892	0.2675	0.2675	0.2531	0.2603	0.2820	0.2748	0.2965	(22b)
Effective ac	0.5529	0.5461	0.5461	0.5418	0.5418	0.5358	0.5358	0.5320	0.5339	0.5398	0.5378	0.5439	(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	86.6520	11.4800	75.1720	0.1700	12.7792	70.0000	5262.0402	(29a)
Plane	34.0000		34.0000	0.0900	3.0600	9.0000	306.0000	(30)
Total net area of external elements Aum(A, m2)			154.6520					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	34.2078			(33)
Party Wall 1			38.1000	0.0000	0.0000	70.0000	2666.9999	(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) =	12821.7401 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		188.5550 (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)	16.6000	0.0200	0.3320
E6 Intermediate floor within a dwelling	16.6000	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
E16 Corner (normal)	10.4000	0.0400	0.4160
E18 Party wall between dwellings	10.4000	0.0500	0.5200
P1 Party wall - Ground floor	7.3000	0.0700	0.5110
P2 Party wall - Intermediate floor within a dwelling	7.3000	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	7.3000	0.1000	0.7300

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		4.0480 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	38.2558 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	32.3848	31.9852	31.9852	31.7341	31.7341	31.3804	31.3804	31.1599	31.2686	31.6131	31.4952	31.8581	(38)
Heat transfer coeff	70.6406	70.2410	70.2410	69.9899	69.9899	69.6362	69.6362	69.4157	69.5244	69.8689	69.7510	70.1139	(39)
Average = Sum(39)m / 12 =												69.9207	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0388	1.0330	1.0330	1.0293	1.0293	1.0241	1.0241	1.0208	1.0224	1.0275	1.0258	1.0311	(40)
HLP (average)												1.0282	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	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)
								Total per year (kWh/year) = Sum(64)m =				1714.1304	(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)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(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)

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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)

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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	50.4185	50.7054	50.7054	50.8873	50.8873	51.1457	51.1457	51.3082	51.2280	50.9754	51.0615	50.7973	
alpha	4.3612	4.3804	4.3804	4.3925	4.3925	4.4097	4.4097	4.4205	4.4152	4.3984	4.4041	4.3865	
util living area													

	0.9535	0.9349	0.8909	0.8098	0.6729	0.4662	0.3302	0.3360	0.5496	0.7959	0.9168	0.9599	(86)
Living	20.0512	20.2018	20.4593	20.7175	20.9034	20.9850	20.9975	20.9973	20.9691	20.7836	20.4132	20.0199	
Non living	18.9887	19.1772	19.4885	19.7890	19.9835	20.0556	20.0626	20.0653	20.0467	19.8686	19.4443	18.9556	
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	20.5146	20.2018	20.4593	20.7175	20.9034	20.9850	20.9975	20.9973	20.9691	20.7836	20.4132	20.1570	(87)
Th 2	20.0511	20.0560	20.0560	20.0590	20.0590	20.0633	20.0633	20.0660	20.0647	20.0605	20.0619	20.0575	(88)
util rest of house													
	0.9433	0.9211	0.8682	0.7716	0.6118	0.3878	0.2428	0.2473	0.4693	0.7477	0.8967	0.9509	(89)
MIT 2	19.6276	19.1772	19.4885	19.7890	19.9835	20.0556	20.0626	20.0653	20.0467	19.8686	19.4443	19.1542	(90)
Living area fraction										fLA = Living area / (4) =		0.3809	(91)
MIT	19.9654	19.5675	19.8583	20.1427	20.3339	20.4096	20.4187	20.4203	20.3980	20.2171	19.8134	19.5361	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9654	19.5675	19.8583	20.1427	20.3339	20.4096	20.4187	20.4203	20.3980	20.2171	19.8134	19.5361	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9423	0.9128	0.8628	0.7753	0.6304	0.4172	0.2761	0.2812	0.4986	0.7564	0.8905	0.9449	(94)
Useful gains	628.8163	654.6158	657.8229	609.3145	486.1535	323.6686	202.7366	202.1731	351.9585	508.6735	577.3197	596.8119	(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													
	1035.9747	967.0400	868.0561	716.8842	520.2960	327.9592	203.2471	202.7136	361.3885	588.0931	803.0688	991.1389	(97)
Space heating kWh													
	302.9258	209.9491	156.4135	77.4502	25.4020	0.0000	0.0000	0.0000	0.0000	59.0881	162.5393	293.3793	(98a)
Space heating requirement - total per year (kWh/year)												1287.1474	
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													
	302.9258	209.9491	156.4135	77.4502	25.4020	0.0000	0.0000	0.0000	0.0000	59.0881	162.5393	293.3793	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1287.1474	
Space heating per m2											(98c) / (4) =	18.9286	(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 %)	328.0033	(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													
	302.9258	209.9491	156.4135	77.4502	25.4020	0.0000	0.0000	0.0000	0.0000	59.0881	162.5393	293.3793	(98)
Space heating efficiency (main heating system 1)													
	328.0033	328.0033	328.0033	328.0033	328.0033	0.0000	0.0000	0.0000	0.0000	328.0033	328.0033	328.0033	(210)
Space heating fuel (main heating system)													
	92.3545	64.0082	47.6866	23.6126	7.7444	0.0000	0.0000	0.0000	0.0000	18.0145	49.5542	89.4440	(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												185.1700	(216)
(217)m	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	185.1700	(217)
Fuel for water heating, kWh/month													
	131.4940	106.6807	88.8687	58.5418	42.5738	31.4017	32.4761	40.3719	59.0648	88.8113	113.3494	132.0722	(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	-43.8442	-55.6923	-81.0166	-89.7372	-90.8844	-86.1789	-84.0319	-81.9811	-75.3506	-65.3611	-47.9512	-36.0246	(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	392.4190	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	185.1700	
Water heating fuel used	925.7063	(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	-838.0541	(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			723.2039 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	392.4190	26.0600	102.2644	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	925.7063	26.0600	241.2391	(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	-838.0541	26.0600	-218.3969	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-218.3969	(252)
Total energy cost			188.4669	(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	392.4190	0.1567	61.5020	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	925.7063	0.1468	135.9130	(264)
Space and water heating			197.4151	(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	-838.0541	0.1352	-113.3275	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-113.3275	(269)
Total CO2, kg/year			118.7296	(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	392.4190	1.5802	620.1003	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	925.7063	1.5432	1428.5038	(278)
Space and water heating			2048.6040	(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	-838.0541	1.4998	-1256.9189	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1256.9189	(283)
Total Primary energy kWh/year			1162.9275	(286)

Predicted Energy Assessment

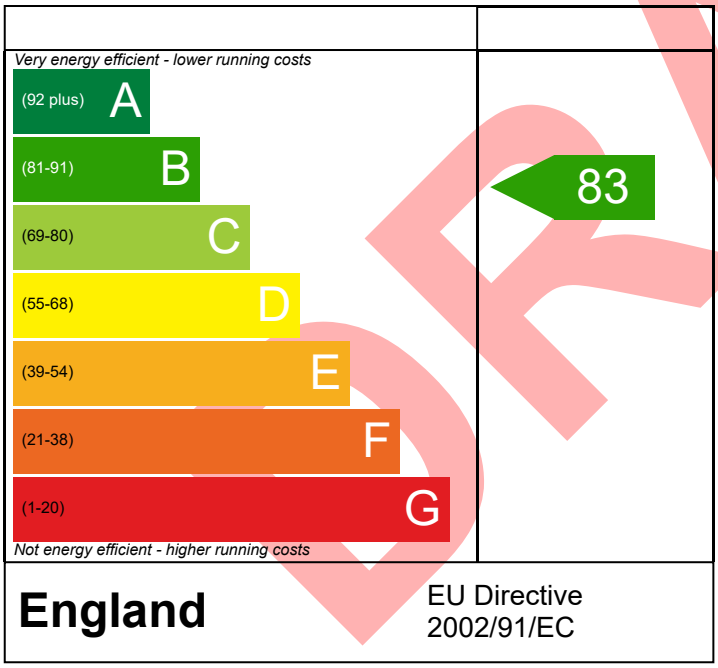
Plot 52, Hoe Lane, ROMSEY, SO52 9NH

Dwelling type:	House, End-Terrace
Date of assessment:	13/12/2024
Produced by:	Rob Carswell
Total floor area:	68 m²
DRRN:	

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.

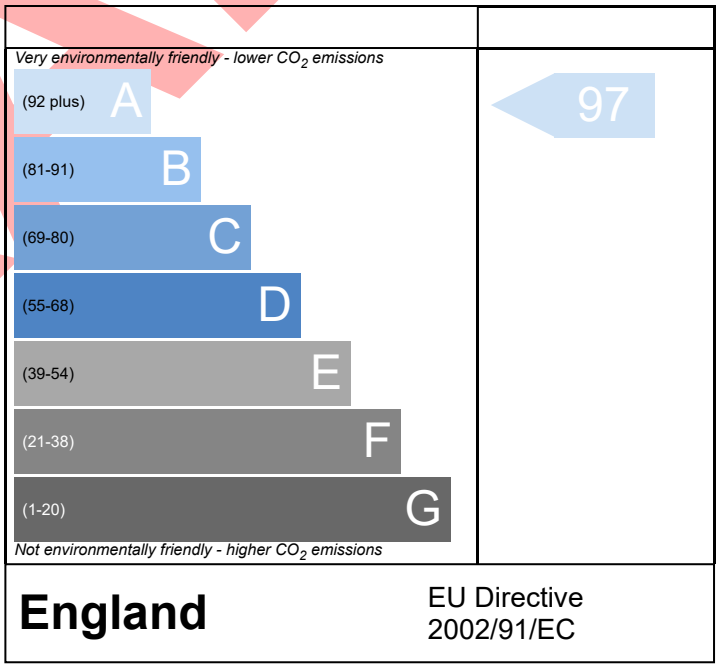
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



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.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.