Building Regulations England Part L (BREL) Compliance Report

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

Date: Mon 04 May 2026 13:50:53

Project Information			
Assessed By	Chris Law	Building Type	House, End-terrace
OCDEA Registration	EES/027443	Assessment Date	2026-05-04

Dwelling Details			
Assessment Type	As designed	Total Floor Area	91 m^2
Site Reference	Unit 1	Plot Reference	00001
Address			

Client Details	
Name	Hannah Beattie
Company	D Woodman Developments Limited
Address	7 Broad Hey, Romiley, Stockport, SK6 4NL

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	*11.25 $kgCO_2/m^2$*	
Dwelling carbon dioxide emission rate	3.84 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*58.82 kWh_{PE}/m^2*	
Dwelling primary energy	40.72 kWh_{PE}/m^2	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	*34.9 kWh/m^2*	
Dwelling fabric energy efficiency	29.9 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*	0.19	Walls (1) (0.2)	OK
Party walls	*0.2*	N/A	N/A	**N/A**
Curtain walls	*1.6*	N/A	N/A	**N/A**
Floors	*0.18*	0.12	Heatloss Floor (0.12)	OK
Roofs	*0.16*	0.15	Roof (1) (0.15)	OK
Windows, doors, and roof windows	*1.6*	1.2	Window (1.2)	OK
Rooflights	*2.2*	1.2	Rooflight, North East (1.2)	OK

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)	75.03	0.2
Exposed wall: Walls (2)	12	0.16
Ground floor: Heatloss Floor , Heatloss Floor	33	0.12
Exposed roof: Roof (1)	28.23	0.15
Exposed roof: Roof (2)	8	0.15

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	**Area [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
Window, Window	10.81	North East	1.0	1.2
Window, Window	9.23	South West	1.0	1.2
External Door, External Door	1.93	North East	N/A	1.2
Rooflight, Rooflight	0.77	North East	1.0	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))				
Building part **1**: 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)	Not government-approved scheme	0.031 **(!)**	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E3: Sill	Not government-approved scheme	0.028 **(!)**	
External wall	E4: Jamb	Not government-approved scheme	0.023 **(!)**	
External wall	E5: Ground floor (normal)	Not government-approved scheme	0.058	
External wall	E6: Intermediate floor within a dwelling	Not government-approved scheme	0.001 **(!)**	
External wall	E11: Eaves (insulation at rafter level)	Not government-approved scheme	0.02 **(!)**	
External wall	E13: Gable (insulation at rafter level)	Not government-approved scheme	0.035 **(!)**	
External wall	E14: Flat roof	SAP table default	0.16	
External wall	E16: Corner (normal)	Not government-approved scheme	0.039 **(!)**	
External wall	E18: Party wall between dwellings	Not government-approved scheme	0.039 **(!)**	
Party wall	P1: Ground floor	Not government-approved scheme	0.044	
Party wall	P2: Intermediate floor within a dwelling	SAP table default	0 **(!)**	
Party wall	P5: Roof (insulation at rafter level)	Not government-approved scheme	0.038 **(!)**	

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	3 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	247.3%
Emitter type	Both radiators and underfloor
Flow temperature	45°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM plus 5kW + AI
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: Cylinder	
Capacity	200 litres
Declared heat loss	1.2 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	80 lm/W	**OK**
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	*1.5 W/(l/s)*	
Specific fan power	0.9 W/(l/s)	**OK**
Minimum permitted heat recovery efficiency	*73%*	
Heat recovery efficiency	84%	**OK**
Manufacturer/Model	HRV1.6 Q Plus Eco	
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

Plot Reference	Unit 1	**Issued on Date**	04/05/2026
Assessment Reference	00001	**Plot Type Ref**	
Plot Address		**SAP Version**	10.2

SAP Rating	83 B	**DER**	3.84	**TER**	11.25
Environmental	97 A	**% DER < TER**			65.87
CO_2 Emissions (t/year)	0.34	**DFEE**	29.88	**TFEE**	34.86
Compliance Check	See BREL	**% DFEE < TFEE**			14.28
% DPER < TPER	30.78	**DPER**	40.72	**TPER**	58.82

Assessor Details	Mr. Chris Law	**Assessor ID**	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

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

Orientation	Northeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, End-Terrace	
2.0 Number of Storeys	3	
3.0 Date Built	2024	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	160.09	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:	18.00 m	33.00 m²	2.40 m
1st Storey:	18.00 m	33.00 m²	2.40 m
2nd Storey:	6.00 m	25.00 m²	2.00 m

8.0 Living Area	12.00	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	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.20	140.00	97.00	75.03	0.00	None	21.97	Enter Gross Area
Dwarf Wall	Timber Frame	Timber framed wall (one layer of plasterboard)	0.16	9.00	12.00	12.00	0.00	None	0.00	Enter Gross Area

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
External Roof Warm	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	29.00	28.23	None	0.00	Enter Gross Area	0.77
External Roof Flat	External Flat Roof	Plasterboard, insulated flat roof	0.15	9.00	8.00	8.00	None	0.00	Enter Gross Area	0.00

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.12	None	0.00	110.00	33.00

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double glazed			0.76		1.00	1.20
External Door	Manufacturer	Half Glazed Door	Double glazed			0.76		1.00	1.20
Rooflight	Manufacturer	Roof Light	Double glazed			0.76		1.00	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch

Window	Window	External Wall	North East	10.81	
Window	Window	External Wall	South West	9.23	
External Door	External Door	External Wall	North East	1.93	
Rooflight	Rooflight	External Roof Warm	North East	0.77	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)	Non Gov Approved Schemes	16.53	0.03	0.03	No
E3 Sill	Non Gov Approved Schemes	15.61	0.03	0.03	No
E4 Jamb	Non Gov Approved Schemes	31.96	0.02	0.02	No
E5 Ground floor (normal)	Non Gov Approved Schemes	18.00	0.06	0.06	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	18.00	0.00	0.00	No
E11 Eaves (insulation at rafter level)	Non Gov Approved Schemes	10.76	0.02	0.02	No
E13 Gable (insulation at rafter level)	Non Gov Approved Schemes	6.23	0.04	0.04	No
E14 Flat roof	Table K1 - Default	10.79	0.16	0.16	No
E16 Corner (normal)	Non Gov Approved Schemes	4.80	0.04	0.04	No
E18 Party wall between dwellings	Non Gov Approved Schemes	9.60	0.04	0.04	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	6.23	0.04	0.04	No
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	6.23	0.00	0.00	No
P5 Party wall - Roof (insulation at rafter level)	Non Gov Approved Schemes	6.23	0.04	0.04	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes	
Approved Installation	Yes	
Mechanical Ventilation data Type	Database	
Type	Balanced mechanical ventilation with heat recovery	
MV Reference Number	500567	
Configuration	4	
Manufacturer SFP	0.90	
Duct Type	Rigid	
MVHR Efficiency	84.00	
Wet Rooms	4	
SFP from Installer Commissioning Certificate	No	
MVHR System Location	Inside heated envelope (installed exclusively)	
Duct Installation Specification	Level 2	

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	0	
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}	3.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	

Summary for Input Data

	Name	Efficacy	Power	Capacity	Count
	Lighting	80.00	25.00	2000.00	12

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	104416	
Fuel Type	Electricity	
In Winter	247.31	
In Summer	169.37	
Model Name	aroTHERM plus 5kW + AI	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Controls SAP Code	2207	
Controls description	Time and temperature zone control by arrangement	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators and Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	
25.0 Main Heating 2	None	
26.0 Heat Networks	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	
Cold Water Source	From mains	
Bath Count	1	
Immersion Only Heating Hot Water	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	
Cylinder Volume	200.00	L
Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	
31.0 Thermal Store	None	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

Summary for Input Data

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating	£4,000 - £7,000	£85	B 85	A 97
Photovoltaic	£8,000 - £10,000	£234	A 92	A 98
Wind turbine			0	0

Full SAP Calculation Printout

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Compliance Check	See BREL	**% DFEE < TFEE**			14.28
% DPER < TPER	30.78	**DPER**	40.72	**TPER**	58.82

Assessor Details	Mr. Chris Law	**Assessor ID**	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

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)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	67.2000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.3266	0.3234	0.3202	0.3043	0.3011	0.2851	0.2851	0.2819	0.2915	0.3011	0.3074	0.3138	(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	
Main dwelling								
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 14568.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181
E14 Flat roof	10.7900	0.1600	1.7264
E16 Corner (normal)	4.8000	0.0390	0.1872
E18 Party wall between dwellings	9.6000	0.0390	0.3744
P1 Party wall - Ground floor	6.2300	0.0440	0.2741
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	22.4584	22.2391	22.0199	20.9239	20.7047	19.6086	19.6086	19.3894	20.0470	20.7047	21.1431	21.5815	(38)
Heat transfer coeff	80.9018	80.6826	80.4634	79.3673	79.1481	78.0521	78.0521	77.8329	78.4905	79.1481	79.5865	80.0250	(39)
Average = Sum(39)m / 12 =												79.3125	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8890	0.8866	0.8842	0.8722	0.8698	0.8577	0.8577	0.8553	0.8625	0.8698	0.8746	0.8794	(40)
HLP (average)												0.8716	
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 2.6392 (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													
	78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)
Hot water usage for other uses													
	41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)
Average daily hot water use (litres/day)												111.0834	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m													
	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6480	(55)
Total storage loss													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
										Total per year (kWh/year) = Sum(64)m =		2355.1164	(64)
12Total per year (kWh/year)												2355	(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													
	98.2000	87.1635	93.3317	83.7260	82.3121	75.4157	75.2976	77.5634	77.6210	85.0705	88.6552	97.3392	(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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	131.9892	129.7075	125.4458	116.2861	110.6346	104.7440	101.2064	104.2519	107.8069	114.3420	123.1322	130.8322	(72)
Total internal gains													
	556.9913	570.2283	546.6482	528.1278	501.4971	483.7460	465.5287	466.0744	479.9792	495.8750	525.6444	545.2049	(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

Northeast				10.8100		11.2829		0.7600		1.0000		0.7700	64.2384 (75)
Southwest				9.2300		36.7938		0.7600		1.0000		0.7700	178.8643 (79)
Northeast				0.7700		26.0000		0.7600		1.0000		1.0000	13.6937 (82)
Solar gains	256.7964	463.8719	703.0132	982.4192	1199.7345	1234.1439	1171.9614	1003.6526	799.0111	531.2864	312.4471	216.5911	(83)
Total gains	813.7876	1034.1002	1249.6614	1510.5470	1701.2316	1717.8899	1637.4901	1469.7270	1278.9904	1027.1614	838.0915	761.7960	(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	50.0204	50.1563	50.2930	50.9875	51.1287	51.8467	51.8467	51.9927	51.5571	51.1287	50.8471	50.5685	
alpha	4.3347	4.3438	4.3529	4.3992	4.4086	4.4564	4.4564	4.4662	4.4371	4.4086	4.3898	4.3712	
util living area	0.9527	0.8925	0.7842	0.6012	0.4265	0.2899	0.2096	0.2433	0.4180	0.7155	0.9077	0.9620	(86)
Living	20.1673	20.4312	20.6818	20.8603	20.9159	20.9287	20.9303	20.9301	20.9210	20.8126	20.4708	20.1185	
Non living	19.2100	19.5337	19.8295	20.0346	20.0916	20.1133	20.1144	20.1165	20.1035	19.9925	19.5963	19.1561	
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	20.5740	20.4312	20.6818	20.8603	20.9159	20.9287	20.9303	20.9301	20.9210	20.8126	20.4708	20.2418	(87)
Th 2	20.1768	20.1789	20.1809	20.1912	20.1933	20.2036	20.2036	20.2057	20.1995	20.1933	20.1892	20.1850	(88)
util rest of house	0.9445	0.8766	0.7583	0.5675	0.3911	0.2542	0.1717	0.2014	0.3713	0.6760	0.8910	0.9553	(89)
MIT 2	19.7914	19.5337	19.8295	20.0346	20.0916	20.1133	20.1144	20.1165	20.1035	19.9925	19.5963	19.3415	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	19.8946	19.6521	19.9419	20.1435	20.2003	20.2208	20.2220	20.2238	20.2113	20.1007	19.7116	19.4602	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8946	19.6521	19.9419	20.1435	20.2003	20.2208	20.2220	20.2238	20.2113	20.1007	19.7116	19.4602	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9413	0.8652	0.7502	0.5654	0.3914	0.2549	0.1726	0.2024	0.3720	0.6712	0.8797	0.9481	(94)
Useful gains	765.9996	894.6992	937.5196	854.0813	665.9297	437.9702	282.6094	297.4254	475.7949	689.4439	737.2965	722.2371	(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	1261.6314	1190.2365	1081.5826	892.3642	672.7849	438.7159	282.7026	297.6150	479.6768	751.9606	1003.7170	1221.2003	(97)
Space heating kWh	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98a)
Space heating requirement - total per year (kWh/year)												1316.7617	
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	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1316.7617	
Space heating per m2										(98c) / (4) =		14.4699	(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 %) 247.3139 (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	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98)
Space heating efficiency (main heating system 1)	247.3139	247.3139	247.3139	247.3139	247.3139	0.0000	0.0000	0.0000	0.0000	247.3139	247.3139	247.3139	(210)
Space heating fuel (main heating system)	149.1021	80.3032	43.3388	11.1452	2.0623	0.0000	0.0000	0.0000	0.0000	18.8070	77.5625	150.1042	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
Efficiency of water heater												169.3657	(216)
(217)m	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	(217)
Fuel for water heating, kWh/month	138.3910	122.2756	129.7462	113.8497	110.1782	99.0926	97.7220	101.7457	103.0087	115.0763	122.6027	136.8625	(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	24.2929	21.9420	24.2929	23.5092	24.2929	23.5092	24.2929	24.2929	23.5092	24.2929	23.5092	24.2929	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(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	532.4254	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	169.3657	
Water heating fuel used	1390.5513	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)		
mechanical ventilation fans (SFP = 1.1250)	286.0290	(230a)
Total electricity for the above, kWh/year	286.0290	(231)
Electricity for lighting (calculated in Appendix L)	203.7594	(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	2412.7650	(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	532.4254	0.1585	84.3857	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1390.5513	0.1409	195.9698	(264)
Space and water heating			280.3555	(265)
Pumps, fans and electric keep-hot	286.0290	0.1387	39.6757	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Total CO2, kg/year			349.4400	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8400	(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	532.4254	1.5866	844.7539	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1390.5513	1.5211	2115.1786	(278)
Space and water heating			2959.9325	(279)
Pumps, fans and electric keep-hot	286.0290	1.5128	432.7047	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)
Total Primary energy kWh/year			3705.1701	(286)
Dwelling Primary energy Rate (DPER)			40.7200	(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)	
Main dwelling						
Ground floor	33.0000	(1b) x	2.4000	(2b) =	79.2000	(1b) - (3b)
First floor	33.0000	(1c) x	2.4000	(2c) =	79.2000	(1c) - (3c)
Second floor	25.0000	(1d) x	2.0000	(2d) =	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.4000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1440	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3940	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3349	(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	0.4269	0.4186	0.4102	0.3683	0.3600	0.3181	0.3181	0.3097	0.3349	0.3600	0.3767	0.3935 (22b)
Effective ac	0.5911	0.5876	0.5841	0.5678	0.5648	0.5506	0.5506	0.5480	0.5561	0.5648	0.5710	0.5774 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Semi-glazed door			1.9300	1.0000	1.9300			(26a)
TER Opening Type			20.0400	1.1450	22.9466			(27)
TER Roof Light			0.7700	1.5918	1.5570			(27a)
Heatloss Floor			33.0000	0.1300	4.2900			(28a)
External Wall	97.0000	21.9700	75.0300	0.1800	13.5054			(29a)
Dwarf Wall	12.0000		12.0000	0.1800	2.1600			(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1100	3.1053			(30)
External Roof Flat	8.0000		8.0000	0.1100	0.8800			(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		50.3743			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0500	0.8265
E3 Sill	15.6100	0.0500	0.7805
E4 Jamb	31.9600	0.0500	1.5980
E5 Ground floor (normal)	18.0000	0.1600	2.8800
E6 Intermediate floor within a dwelling	18.0000	0.0000	0.0000
E11 Eaves (insulation at rafter level)	10.7600	0.0400	0.4304
E13 Gable (insulation at rafter level)	6.2300	0.0800	0.4984
E14 Flat roof	10.7900	0.0800	0.8632
E16 Corner (normal)	4.8000	0.0900	0.4320
E18 Party wall between dwellings	9.6000	0.0600	0.5760
P1 Party wall - Ground floor	6.2300	0.0800	0.4984
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0800	0.4984

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.8818 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 60.2561 (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	40.6540	40.4106	40.1721	39.0515	38.8418	37.8658	37.8658	37.6851	38.2418	38.8418	39.2660	39.7094	(38)
Heat transfer coeff	100.9101	100.6667	100.4281	99.3075	99.0979	98.1219	98.1219	97.9411	98.4978	99.0979	99.5220	99.9654	(39)
Average = Sum(39)m / 12 =												99.3065	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1089	1.1062	1.1036	1.0913	1.0890	1.0783	1.0783	1.0763	1.0824	1.0890	1.0936	1.0985	(40)
HLP (average)												1.0913	
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 2.6392 (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

78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 111.0834 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)

Water storage loss (or HIU loss):

Store volume 200.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6525 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.8924 (55)

Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(64)
									Total per year (kWh/year) = Sum(64)m =			2444.3139	(64)
12Total per year (kWh/year)												2444	(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

104.2605	92.6375	99.3922	89.5910	88.3727	81.2807	81.3581	83.6240	83.4860	91.1310	94.5202	103.3997	(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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	140.1351	137.8534	133.5917	124.4320	118.7805	112.8899	109.3523	112.3978	115.9528	122.4879	131.2781	138.9781	(72)
Total internal gains													
	568.1371	581.3742	557.7941	539.2737	512.6430	491.8919	473.6746	474.2203	488.1251	507.0209	536.7903	556.3508	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	10.8100	11.2829	0.6300	0.7000	0.7700	37.2752	(75)
Southwest	9.2300	36.7938	0.6300	0.7000	0.7700	103.7883	(79)
Northeast	0.7700	26.0000	0.6300	0.7000	1.0000	7.9459	(82)

Solar gains	149.0095	269.1678	407.9327	570.0616	696.1617	716.1282	680.0460	582.3826	463.6367	308.2859	181.3016	125.6799	(83)
Total gains	717.1466	850.5419	965.7268	1109.3354	1208.8047	1208.0201	1153.7206	1056.6030	951.7618	815.3068	718.0918	682.0306	(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	40.1025	40.1994	40.2949	40.7496	40.8358	41.2420	41.2420	41.3181	41.0846	40.8358	40.6618	40.4814	
alpha	3.6735	3.6800	3.6863	3.7166	3.7224	3.7495	3.7495	3.7545	3.7390	3.7224	3.7108	3.6988	
util living area													
	0.9746	0.9534	0.9132	0.8183	0.6710	0.4974	0.3683	0.4163	0.6414	0.8695	0.9558	0.9785	(86)
MIT	19.3595	19.6521	20.0435	20.5089	20.8153	20.9545	20.9885	20.9820	20.8841	20.4622	19.8361	19.3121	(87)
Th 2	19.9936	19.9958	19.9979	20.0080	20.0098	20.0186	20.0186	20.0203	20.0152	20.0098	20.0060	20.0020	(88)
util rest of house													
	0.9694	0.9443	0.8965	0.7858	0.6191	0.4285	0.2887	0.3319	0.5702	0.8377	0.9455	0.9741	(89)
MIT 2	18.0974	18.4655	18.9510	19.5117	19.8486	19.9885	20.0136	20.0118	19.9293	19.4745	18.7086	18.0432	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	18.2638	18.6219	19.0951	19.6432	19.9761	20.1159	20.1422	20.1397	20.0552	19.6048	18.8573	18.2105	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2638	18.6219	19.0951	19.6432	19.9761	20.1159	20.1422	20.1397	20.0552	19.6048	18.8573	18.2105	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9571	0.9281	0.8781	0.7723	0.6172	0.4356	0.2989	0.3424	0.5733	0.8223	0.9299	0.9629	(94)
Useful gains	686.3797	789.3505	848.0339	856.7926	746.0470	526.1770	344.8550	361.7633	545.5990	670.4183	667.7270	656.7310	(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	1409.0900	1381.3416	1264.8995	1066.8846	820.1413	541.2283	347.5659	366.2746	586.5773	892.3527	1170.1110	1400.5673	(97)
Space heating kWh	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(98a)
Space heating requirement - total per year (kWh/year)												2532.3050	
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	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2532.3050	
Space heating per m2											(98c) / (4) =	27.8275	(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	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(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)	582.5531	431.0054	336.0218	163.8855	59.7250	0.0000	0.0000	0.0000	0.0000	178.8940	391.8922	599.5821	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.7970	85.4305	84.7570	83.4402	81.6294	79.8000	79.8000	79.8000	79.8000	83.6062	85.2173	85.8757	(217)
Fuel for water heating, kWh/month	282.0175	250.4203	268.2034	239.8769	237.8796	219.4990	216.8962	225.4360	227.8104	242.1774	252.2708	278.7446	(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	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.6442	-46.9715	-68.8913	-79.0791	-86.6436	-81.3451	-80.3172	-75.1327	-66.2344	-54.4098	-36.2140	-28.1108	(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	-15.6743	-33.2530	-66.6196	-100.8379	-134.1048	-135.0468	-133.4861	-112.6961	-82.1529	-47.8466	-21.0198	-12.3763	(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	2743.5590	(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	2941.2321	(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)	203.7594	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1631.1077	(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	4343.4428	(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	2743.5590	0.2100	576.1474	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2941.2321	0.2100	617.6587	(264)
Space and water heating			1193.8061	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-735.9937	0.1342	-98.7443	
PV Unit electricity exported	-895.1140	0.1257	-112.4829	
Total			-211.2272	(269)
Total CO2, kg/year			1023.9170	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2500	(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	2743.5590	1.1300	3100.2217	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2941.2321	1.1300	3323.5922	(278)
Space and water heating			6423.8139	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-735.9937	1.4958	-1100.9184	
PV Unit electricity exported	-895.1140	0.4613	-412.8794	
Total			-1513.7978	(283)
Total Primary energy kWh/year			5352.6499	(286)
Target Primary Energy Rate (TPER)			58.8200	(287)

Full SAP Calculation Printout

Plot Reference	Unit 1	**Issued on Date**	04/05/2026
Assessment Reference	00001	**Plot Type Ref**	
Plot Address		**SAP Version**	10.2

SAP Rating	83 B	**DER**	3.84	**TER**	11.25
Environmental	97 A	**% DER < TER**			65.87
CO_2 Emissions (t/year)	0.34	**DFEE**	29.88	**TFEE**	34.86
Compliance Check	See BREL	**% DFEE < TFEE**			14.28
% DPER < TPER	30.78	**DPER**	40.72	**TPER**	58.82

Assessor Details	Mr. Chris Law	**Assessor ID**	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(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	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1440	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.2940	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2499	(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	0.3186	0.3123	0.3061	0.2748	0.2686	0.2374	0.2374	0.2311	0.2499	0.2686	0.2811	0.2936	(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	0.5507	0.5488	0.5468	0.5378	0.5361	0.5282	0.5282	0.5267	0.5312	0.5361	0.5395	0.5431	(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	
Main dwelling								
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14568.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124

E3 Sill	15.6100	0.0280	0.4371	
E4 Jamb	31.9600	0.0230	0.7351	
E5 Ground floor (normal)	18.0000	0.0580	1.0440	
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180	
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152	
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181	
E14 Flat roof	10.7900	0.1600	1.7264	
E16 Corner (normal)	4.8000	0.0390	0.1872	
E18 Party wall between dwellings	9.6000	0.0390	0.3744	
P1 Party wall - Ground floor	6.2300	0.0440	0.2741	
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000	
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	37.8758	37.7403	37.6074	36.9835	36.8668	36.3234	36.3234	36.2228	36.5327	36.8668	37.1030	37.3498	(38)
Heat transfer coeff	96.3192	96.1837	96.0509	95.4270	95.3103	94.7669	94.7669	94.6662	94.9762	95.3103	95.5464	95.7933	(39)
Average = Sum(39)m / 12 =												95.4264	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0585	1.0570	1.0555	1.0486	1.0474	1.0414	1.0414	1.0403	1.0437	1.0474	1.0500	1.0527	(40)
HLP (average)												1.0486	
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 2.6392 (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

29.5675	29.1284	28.5100	27.3698	26.5161	25.5694	25.0581	25.6721	26.3407	27.3537	28.5173	29.4675	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 65.2843 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	71.2251	69.2712	67.1380	64.4830	62.1145	59.6530	59.1416	61.2705	63.4539	65.9817	68.6602	71.1252	(44)
Energy conte	112.8032	98.6413	103.1886	88.2740	83.6180	73.3503	71.5267	75.8657	78.2450	89.5365	97.8190	111.3649	(45)
Energy content (annual)										Total = Sum(45)m =		1084.2332	

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 (or HIU 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

95.8827	83.8451	87.7103	75.0329	71.0753	62.3477	60.7977	64.4858	66.5083	76.1061	83.1461	94.6601	(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

95.8827	83.8451	87.7103	75.0329	71.0753	62.3477	60.7977	64.4858	66.5083	76.1061	83.1461	94.6601	(64)
									Total per year (kWh/year) = Sum(64)m =		921.5982	(64)
12Total per year (kWh/year)											922	(64)

Electric shower(s)

54.8329	48.8566	53.3495	50.9108	51.8661	49.4752	51.1244	51.8661	50.9108	53.3495	52.3463	54.8329	(64a)
				Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							623.7213	(64a)

Heat gains from water heating, kWh/month

37.6789	33.1754	35.2650	31.4859	30.7354	27.9557	27.9805	29.0880	29.3548	32.3639	33.8731	37.3733	(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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)	50.6437	49.3682	47.3991	43.7305	41.3110	38.8274	37.6082	39.0968	40.7705	43.4999	47.0460	50.2329	(72)
Total internal gains	475.6458	489.8889	468.6015	455.5722	432.1735	417.8294	401.9306	400.9192	412.9428	425.0328	449.5582	464.6056	(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	
Northeast	10.8100	11.2829	0.7600	1.0000	0.7700	64.2384	(75)
Southwest	9.2300	36.7938	0.7600	1.0000	0.7700	178.8643	(79)
Northeast	0.7700	26.0000	0.7600	1.0000	1.0000	13.6937	(82)

Solar gains	256.7964	463.8719	703.0132	982.4192	1199.7345	1234.1439	1171.9614	1003.6526	799.0111	531.2864	312.4471	216.5911	(83)
Total gains	732.4421	953.7608	1171.6147	1437.9914	1631.9079	1651.9733	1573.8920	1404.5718	1211.9540	956.3192	762.0053	681.1967	(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	42.0139	42.0730	42.1312	42.4067	42.4586	42.7021	42.7021	42.7475	42.6080	42.4586	42.3537	42.2445	
alpha	3.8009	3.8049	3.8087	3.8271	3.8306	3.8468	3.8468	3.8498	3.8405	3.8306	3.8236	3.8163	
util living area	0.9720	0.9327	0.8544	0.6984	0.5179	0.3622	0.2638	0.3077	0.5161	0.8070	0.9453	0.9780	(86)
MIT	19.4890	19.8890	20.3394	20.7459	20.9303	20.9861	20.9969	20.9944	20.9494	20.6290	19.9735	19.4082	(87)
Th 2	20.0349	20.0361	20.0373	20.0430	20.0440	20.0490	20.0490	20.0499	20.0471	20.0440	20.0419	20.0397	(88)
util rest of house	0.9664	0.9206	0.8312	0.6603	0.4709	0.3101	0.2073	0.2452	0.4525	0.7683	0.9333	0.9735	(89)
MIT 2	18.6737	19.0620	19.4868	19.8508	19.9987	20.0421	20.0479	20.0479	20.0192	19.7646	19.1545	18.5980	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	18.7812	19.1711	19.5992	19.9688	20.1216	20.1666	20.1731	20.1727	20.1419	19.8786	19.2625	18.7049	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7812	19.1711	19.5992	19.9688	20.1216	20.1666	20.1731	20.1727	20.1419	19.8786	19.2625	18.7049	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9570	0.9076	0.8193	0.6572	0.4748	0.3166	0.2147	0.2533	0.4590	0.7609	0.9211	0.9653	(94)
Useful gains	700.9467	865.5924	959.8963	945.0890	774.8398	523.0632	337.8883	355.7788	556.2549	727.6441	701.9074	657.5680	(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	1394.8191	1372.6451	1258.1891	1056.2635	802.6636	527.5282	338.6092	357.1482	573.8334	884.3422	1162.0864	1389.4685	(97)
Space heating kWh	516.2410	340.7394	221.9298	80.0456	20.7009	0.0000	0.0000	0.0000	0.0000	116.5834	331.3289	544.5339	(98a)
Space heating requirement - total per year (kWh/year)												2172.1029	
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	516.2410	340.7394	221.9298	80.0456	20.7009	0.0000	0.0000	0.0000	0.0000	116.5834	331.3289	544.5339	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2172.1029	
Space heating per m2										(98c) / (4) =		23.8693	(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	890.8086	701.2748	719.4634	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9687	0.9829	0.9733	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	862.9228	689.2772	700.2552	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1865.2966	1777.3662	1584.6889	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	721.7091	809.5382	658.0187	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	180.4273	202.3845	164.5047	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												547.3165	(107)
Energy for space heating												23.8693	(99)
Energy for space cooling												6.0145	(108)
Total												29.8837	(109)
Fabric Energy Efficiency (DFEE)												29.9	(109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		33.0000	(1b)	x 2.4000	(2b) =	79.2000	(1b) - (3b)
First floor		33.0000	(1c)	x 2.4000	(2c) =	79.2000	(1c) - (3c)
Second floor		25.0000	(1d)	x 2.0000	(2d) =	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.4000	(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	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1440 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3940 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3349 (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	0.4269	0.4186	0.4102	0.3683	0.3600	0.3181	0.3181	0.3097	0.3349	0.3600	0.3767	0.3935	(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	0.5911	0.5876	0.5841	0.5678	0.5648	0.5506	0.5506	0.5480	0.5561	0.5648	0.5710	0.5774	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Semi-glazed door			1.9300	1.0000	1.9300			(26a)
TER Opening Type			20.0400	1.1450	22.9466			(27)
TER Roof Light			0.7700	1.5918	1.5570			(27a)
Heatloss Floor			33.0000	0.1300	4.2900			(28a)
External Wall	97.0000	21.9700	75.0300	0.1800	13.5054			(29a)
Dwarf Wall	12.0000		12.0000	0.1800	2.1600			(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1100	3.1053			(30)
External Roof Flat	8.0000		8.0000	0.1100	0.8800			(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		50.3743			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0500	0.8265
E3 Sill	15.6100	0.0500	0.7805
E4 Jamb	31.9600	0.0500	1.5980
E5 Ground floor (normal)	18.0000	0.1600	2.8800
E6 Intermediate floor within a dwelling	18.0000	0.0000	0.0000
E11 Eaves (insulation at rafter level)	10.7600	0.0400	0.4304
E13 Gable (insulation at rafter level)	6.2300	0.0800	0.4984
E14 Flat roof	10.7900	0.0800	0.8632
E16 Corner (normal)	4.8000	0.0900	0.4320
E18 Party wall between dwellings	9.6000	0.0600	0.5760
P1 Party wall - Ground floor	6.2300	0.0800	0.4984
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0800	0.4984

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		9.8818 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	60.2561 (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	40.6540	40.4106	40.1721	39.0515	38.8418	37.8658	37.8658	37.6851	38.2418	38.8418	39.2660	39.7094	(38)
Heat transfer coeff	100.9101	100.6667	100.4281	99.3075	99.0979	98.1219	98.1219	97.9411	98.4978	99.0979	99.5220	99.9654	(39)
Average = Sum(39)m / 12 =												99.3065	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1089	1.1062	1.1036	1.0913	1.0890	1.0783	1.0783	1.0763	1.0824	1.0890	1.0936	1.0985	(40)
HLP (average)												1.0913	
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		2.6392 (42)

Hot water usage for mixer showers

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

29.5675	29.1284	28.5100	27.3698	26.5161	25.5694	25.0581	25.6721	26.3407	27.3537	28.5173	29.4675	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day)		65.2843 (43)

Daily hot water use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
71.2251	69.2712	67.1380	64.4830	62.1145	59.6530	59.1416	61.2705	63.4539	65.9817	68.6602	71.1252	(44)
Energy conte 112.8032	98.6413	103.1886	88.2740	83.6180	73.3503	71.5267	75.8657	78.2450	89.5365	97.8190	111.3649	(45)

Energy content (annual)	Total = Sum(45)m =	1084.2332

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 (or HIU 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

95.8827	83.8451	87.7103	75.0329	71.0753	62.3477	60.7977	64.4858	66.5083	76.1061	83.1461	94.6601	(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

	95.8827	83.8451	87.7103	75.0329	71.0753	62.3477	60.7977	64.4858	66.5083	76.1061	83.1461	94.6601 (64)
										Total per year (kWh/year) = Sum(64)m =		921.5982 (64)
12Total per year (kWh/year)												922 (64)
Electric shower(s)												
	54.8329	48.8566	53.3495	50.9108	51.8661	49.4752	51.1244	51.8661	50.9108	53.3495	52.3463	54.8329 (64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		623.7213 (64a)
Heat gains from water heating, kWh/month												
	37.6789	33.1754	35.2650	31.4859	30.7354	27.9557	27.9805	29.0880	29.3548	32.3639	33.8731	37.3733 (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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	50.6437	49.3682	47.3991	43.7305	41.3110	38.8274	37.6082	39.0968	40.7705	43.4999	47.0460	50.2329	(72)
Total internal gains													
	475.6458	489.8889	468.6015	455.5722	432.1735	417.8294	401.9306	400.9192	412.9428	425.0328	449.5582	464.6056	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	10.8100	11.2829	0.6300	0.7000	0.7700	37.2752	(75)
Southwest	9.2300	36.7938	0.6300	0.7000	0.7700	103.7883	(79)
Northeast	0.7700	26.0000	0.6300	0.7000	1.0000	7.9459	(82)

Solar gains	149.0095	269.1678	407.9327	570.0616	696.1617	716.1282	680.0460	582.3826	463.6367	308.2859	181.3016	125.6799	(83)
Total gains	624.6552	759.0567	876.5342	1025.6338	1128.3352	1133.9577	1081.9766	983.3019	876.5795	733.3187	630.8598	590.2854	(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	40.1025	40.1994	40.2949	40.7496	40.8358	41.2420	41.2420	41.3181	41.0846	40.8358	40.6618	40.4814	
alpha	3.6735	3.6800	3.6863	3.7166	3.7224	3.7495	3.7495	3.7545	3.7390	3.7224	3.7108	3.6988	
util living area													
	0.9834	0.9664	0.9325	0.8455	0.7023	0.5251	0.3913	0.4446	0.6793	0.8984	0.9697	0.9863	(86)
MIT	19.2187	19.5233	19.9359	20.4411	20.7841	20.9455	20.9859	20.9776	20.8590	20.3783	19.7115	19.1701	(87)
Th 2	19.9936	19.9958	19.9979	20.0080	20.0098	20.0186	20.0186	20.0203	20.0152	20.0098	20.0060	20.0020	(88)
util rest of house													
	0.9799	0.9595	0.9186	0.8157	0.6509	0.4539	0.3074	0.3555	0.6081	0.8713	0.9623	0.9834	(89)
MIT 2	18.3775	18.6786	19.0812	19.5626	19.8610	19.9902	20.0138	20.0119	19.9322	19.5190	18.8749	18.3356	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	18.4885	18.7900	19.1939	19.6785	19.9828	20.1162	20.1420	20.1393	20.0544	19.6323	18.9852	18.4457	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.4885	18.7900	19.1939	19.6785	19.9828	20.1162	20.1420	20.1393	20.0544	19.6323	18.9852	18.4457	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9727	0.9488	0.9051	0.8045	0.6494	0.4613	0.3181	0.3667	0.6112	0.8589	0.9522	0.9771	(94)
Useful gains	607.5751	720.1865	793.3145	825.0983	732.7850	523.0382	344.1938	360.5408	535.7430	629.8513	600.7304	576.7678	(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													
	1431.7598	1398.2624	1274.8248	1070.3847	820.8031	541.2554	347.5471	366.2285	586.4979	895.0863	1182.8427	1424.0754	(97)
Space heating kWh													
	613.1934	455.6670	358.2437	176.6062	65.4854	0.0000	0.0000	0.0000	0.0000	197.3349	419.1208	630.3969	(98a)
Space heating requirement - total per year (kWh/year)												2916.0482	
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													
	613.1934	455.6670	358.2437	176.6062	65.4854	0.0000	0.0000	0.0000	0.0000	197.3349	419.1208	630.3969	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2916.0482	
Space heating per m2											(98c) / (4) =	32.0445	(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	922.3456	726.1019	744.3526	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8938	0.9353	0.9112	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	824.4088	679.0991	678.2569	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1267.2884	1209.4542	1098.1552	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	318.8733	394.5842	312.4043	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	79.7183	98.6461	78.1011	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												256.4655 (107)
Energy for space heating												32.0445 (99)
Energy for space cooling												2.8183 (108)
Total												34.8628 (109)
Fabric Energy Efficiency (TFEE)												34.9 (109)

Full SAP Calculation Printout

Plot Reference	Unit 1	**Issued on Date**	04/05/2026
Assessment Reference	00001	**Plot Type Ref**	
Plot Address		**SAP Version**	10.2

SAP Rating	83 B	**DER**	3.84	**TER**	11.25
Environmental	97 A	**% DER < TER**			65.87
CO_2 Emissions (t/year)	0.34	**DFEE**	29.88	**TFEE**	34.86
Compliance Check	See BREL	**% DFEE < TFEE**			14.28
% DPER < TPER	30.78	**DPER**	40.72	**TPER**	58.82

Assessor Details	Mr. Chris Law	**Assessor ID**	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

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)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	67.2000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.3266	0.3234	0.3202	0.3043	0.3011	0.2851	0.2851	0.2819	0.2915	0.3011	0.3074	0.3138	(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	
Main dwelling								
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 14568.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181
E14 Flat roof	10.7900	0.1600	1.7264
E16 Corner (normal)	4.8000	0.0390	0.1872
E18 Party wall between dwellings	9.6000	0.0390	0.3744
P1 Party wall - Ground floor	6.2300	0.0440	0.2741
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	22.4584	22.2391	22.0199	20.9239	20.7047	19.6086	19.6086	19.3894	20.0470	20.7047	21.1431	21.5815	(38)
Heat transfer coeff	80.9018	80.6826	80.4634	79.3673	79.1481	78.0521	78.0521	77.8329	78.4905	79.1481	79.5865	80.0250	(39)
Average = Sum(39)m / 12 =												79.3125	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8890	0.8866	0.8842	0.8722	0.8698	0.8577	0.8577	0.8553	0.8625	0.8698	0.8746	0.8794	(40)
HLP (average)												0.8716	
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 2.6392 (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													
	78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)
Hot water usage for other uses													
	41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)
Average daily hot water use (litres/day)												111.0834	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m													
	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6480	(55)
Total storage loss													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
										Total per year (kWh/year) = Sum(64)m =		2355.1164	(64)
12Total per year (kWh/year)												2355	(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													
	98.2000	87.1635	93.3317	83.7260	82.3121	75.4157	75.2976	77.5634	77.6210	85.0705	88.6552	97.3392	(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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	131.9892	129.7075	125.4458	116.2861	110.6346	104.7440	101.2064	104.2519	107.8069	114.3420	123.1322	130.8322	(72)
Total internal gains													
	556.9913	570.2283	546.6482	528.1278	501.4971	483.7460	465.5287	466.0744	479.9792	495.8750	525.6444	545.2049	(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

Northeast				10.8100		11.2829		0.7600		1.0000		0.7700	64.2384 (75)
Southwest				9.2300		36.7938		0.7600		1.0000		0.7700	178.8643 (79)
Northeast				0.7700		26.0000		0.7600		1.0000		1.0000	13.6937 (82)
Solar gains	256.7964	463.8719	703.0132	982.4192	1199.7345	1234.1439	1171.9614	1003.6526	799.0111	531.2864	312.4471	216.5911	(83)
Total gains	813.7876	1034.1002	1249.6614	1510.5470	1701.2316	1717.8899	1637.4901	1469.7270	1278.9904	1027.1614	838.0915	761.7960	(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	50.0204	50.1563	50.2930	50.9875	51.1287	51.8467	51.8467	51.9927	51.5571	51.1287	50.8471	50.5685	
alpha	4.3347	4.3438	4.3529	4.3992	4.4086	4.4564	4.4564	4.4662	4.4371	4.4086	4.3898	4.3712	
util living area	0.9527	0.8925	0.7842	0.6012	0.4265	0.2899	0.2096	0.2433	0.4180	0.7155	0.9077	0.9620	(86)
Living	20.1673	20.4312	20.6818	20.8603	20.9159	20.9287	20.9303	20.9301	20.9210	20.8126	20.4708	20.1185	
Non living	19.2100	19.5337	19.8295	20.0346	20.0916	20.1133	20.1144	20.1165	20.1035	19.9925	19.5963	19.1561	
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	20.5740	20.4312	20.6818	20.8603	20.9159	20.9287	20.9303	20.9301	20.9210	20.8126	20.4708	20.2418	(87)
Th 2	20.1768	20.1789	20.1809	20.1912	20.1933	20.2036	20.2036	20.2057	20.1995	20.1933	20.1892	20.1850	(88)
util rest of house	0.9445	0.8766	0.7583	0.5675	0.3911	0.2542	0.1717	0.2014	0.3713	0.6760	0.8910	0.9553	(89)
MIT 2	19.7914	19.5337	19.8295	20.0346	20.0916	20.1133	20.1144	20.1165	20.1035	19.9925	19.5963	19.3415	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	19.8946	19.6521	19.9419	20.1435	20.2003	20.2208	20.2220	20.2238	20.2113	20.1007	19.7116	19.4602	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8946	19.6521	19.9419	20.1435	20.2003	20.2208	20.2220	20.2238	20.2113	20.1007	19.7116	19.4602	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9413	0.8652	0.7502	0.5654	0.3914	0.2549	0.1726	0.2024	0.3720	0.6712	0.8797	0.9481	(94)
Useful gains	765.9996	894.6992	937.5196	854.0813	665.9297	437.9702	282.6094	297.4254	475.7949	689.4439	737.2965	722.2371	(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	1261.6314	1190.2365	1081.5826	892.3642	672.7849	438.7159	282.7026	297.6150	479.6768	751.9606	1003.7170	1221.2003	(97)
Space heating kWh	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98a)
Space heating requirement - total per year (kWh/year)												1316.7617	
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	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1316.7617	
Space heating per m2										(98c) / (4) =		14.4699	(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 %) 247.3139 (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	368.7501	198.6010	107.1829	27.5637	5.1003	0.0000	0.0000	0.0000	0.0000	46.5124	191.8228	371.2286	(98)
Space heating efficiency (main heating system 1)	247.3139	247.3139	247.3139	247.3139	247.3139	0.0000	0.0000	0.0000	0.0000	247.3139	247.3139	247.3139	(210)
Space heating fuel (main heating system)	149.1021	80.3032	43.3388	11.1452	2.0623	0.0000	0.0000	0.0000	0.0000	18.8070	77.5625	150.1042	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
Efficiency of water heater												169.3657	(216)
(217)m	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	(217)
Fuel for water heating, kWh/month	138.3910	122.2756	129.7462	113.8497	110.1782	99.0926	97.7220	101.7457	103.0087	115.0763	122.6027	136.8625	(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	24.2929	21.9420	24.2929	23.5092	24.2929	23.5092	24.2929	24.2929	23.5092	24.2929	23.5092	24.2929	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(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	532.4254	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	169.3657	
Water heating fuel used	1390.5513	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)		
mechanical ventilation fans (SFP = 1.1250)	286.0290	(230a)
Total electricity for the above, kWh/year	286.0290	(231)
Electricity for lighting (calculated in Appendix L)	203.7594	(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	2412.7650	(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	532.4254	0.1585	84.3857	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1390.5513	0.1409	195.9698	(264)
Space and water heating			280.3555	(265)
Pumps, fans and electric keep-hot	286.0290	0.1387	39.6757	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Total CO2, kg/year			349.4400	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.8400	(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	532.4254	1.5866	844.7539	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1390.5513	1.5211	2115.1786	(278)
Space and water heating			2959.9325	(279)
Pumps, fans and electric keep-hot	286.0290	1.5128	432.7047	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)
Total Primary energy kWh/year			3705.1701	(286)
Dwelling Primary energy Rate (DPER)			40.7200	(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)	
Main dwelling						
Ground floor	33.0000	(1b) x	2.4000	(2b) =	79.2000	(1b) - (3b)
First floor	33.0000	(1c) x	2.4000	(2c) =	79.2000	(1c) - (3c)
Second floor	25.0000	(1d) x	2.0000	(2d) =	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.4000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1440	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3940	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3349	(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	0.4269	0.4186	0.4102	0.3683	0.3600	0.3181	0.3181	0.3097	0.3349	0.3600	0.3767	0.3935 (22b)
Effective ac	0.5911	0.5876	0.5841	0.5678	0.5648	0.5506	0.5506	0.5480	0.5561	0.5648	0.5710	0.5774 (25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Semi-glazed door			1.9300	1.0000	1.9300			(26a)
TER Opening Type			20.0400	1.1450	22.9466			(27)
TER Roof Light			0.7700	1.5918	1.5570			(27a)
Heatloss Floor			33.0000	0.1300	4.2900			(28a)
External Wall	97.0000	21.9700	75.0300	0.1800	13.5054			(29a)
Dwarf Wall	12.0000		12.0000	0.1800	2.1600			(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1100	3.1053			(30)
External Roof Flat	8.0000		8.0000	0.1100	0.8800			(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		50.3743			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0500	0.8265
E3 Sill	15.6100	0.0500	0.7805
E4 Jamb	31.9600	0.0500	1.5980
E5 Ground floor (normal)	18.0000	0.1600	2.8800
E6 Intermediate floor within a dwelling	18.0000	0.0000	0.0000
E11 Eaves (insulation at rafter level)	10.7600	0.0400	0.4304
E13 Gable (insulation at rafter level)	6.2300	0.0800	0.4984
E14 Flat roof	10.7900	0.0800	0.8632
E16 Corner (normal)	4.8000	0.0900	0.4320
E18 Party wall between dwellings	9.6000	0.0600	0.5760
P1 Party wall - Ground floor	6.2300	0.0800	0.4984
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0800	0.4984

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.8818 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 60.2561 (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	40.6540	40.4106	40.1721	39.0515	38.8418	37.8658	37.8658	37.6851	38.2418	38.8418	39.2660	39.7094	(38)
Heat transfer coeff	100.9101	100.6667	100.4281	99.3075	99.0979	98.1219	98.1219	97.9411	98.4978	99.0979	99.5220	99.9654	(39)
Average = Sum(39)m / 12 =												99.3065	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1089	1.1062	1.1036	1.0913	1.0890	1.0783	1.0783	1.0763	1.0824	1.0890	1.0936	1.0985	(40)
HLP (average)												1.0913	
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 2.6392 (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

78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 111.0834 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)

Water storage loss (or HIU loss):

Store volume 200.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6525 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.8924 (55)

Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(64)
									Total per year (kWh/year) = Sum(64)m =			2444.3139	(64)
12Total per year (kWh/year)												2444	(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

104.2605	92.6375	99.3922	89.5910	88.3727	81.2807	81.3581	83.6240	83.4860	91.1310	94.5202	103.3997	(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	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	131.9581	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	121.5092	134.5280	121.5092	125.5595	121.5092	125.5595	121.5092	121.5092	125.5595	121.5092	125.5595	121.5092	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	240.9055	243.4053	237.1058	223.6948	206.7659	190.8551	180.2257	177.7259	184.0254	197.4364	214.3653	230.2761	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	36.1958	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	140.1351	137.8534	133.5917	124.4320	118.7805	112.8899	109.3523	112.3978	115.9528	122.4879	131.2781	138.9781	(72)
Total internal gains													
	568.1371	581.3742	557.7941	539.2737	512.6430	491.8919	473.6746	474.2203	488.1251	507.0209	536.7903	556.3508	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	10.8100	11.2829	0.6300	0.7000	0.7700	37.2752	(75)
Southwest	9.2300	36.7938	0.6300	0.7000	0.7700	103.7883	(79)
Northeast	0.7700	26.0000	0.6300	0.7000	1.0000	7.9459	(82)

Solar gains	149.0095	269.1678	407.9327	570.0616	696.1617	716.1282	680.0460	582.3826	463.6367	308.2859	181.3016	125.6799	(83)
Total gains	717.1466	850.5419	965.7268	1109.3354	1208.8047	1208.0201	1153.7206	1056.6030	951.7618	815.3068	718.0918	682.0306	(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	40.1025	40.1994	40.2949	40.7496	40.8358	41.2420	41.2420	41.3181	41.0846	40.8358	40.6618	40.4814	
alpha	3.6735	3.6800	3.6863	3.7166	3.7224	3.7495	3.7495	3.7545	3.7390	3.7224	3.7108	3.6988	
util living area													
	0.9746	0.9534	0.9132	0.8183	0.6710	0.4974	0.3683	0.4163	0.6414	0.8695	0.9558	0.9785	(86)
MIT	19.3595	19.6521	20.0435	20.5089	20.8153	20.9545	20.9885	20.9820	20.8841	20.4622	19.8361	19.3121	(87)
Th 2	19.9936	19.9958	19.9979	20.0080	20.0098	20.0186	20.0186	20.0203	20.0152	20.0098	20.0060	20.0020	(88)
util rest of house													
	0.9694	0.9443	0.8965	0.7858	0.6191	0.4285	0.2887	0.3319	0.5702	0.8377	0.9455	0.9741	(89)
MIT 2	18.0974	18.4655	18.9510	19.5117	19.8486	19.9885	20.0136	20.0118	19.9293	19.4745	18.7086	18.0432	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	18.2638	18.6219	19.0951	19.6432	19.9761	20.1159	20.1422	20.1397	20.0552	19.6048	18.8573	18.2105	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2638	18.6219	19.0951	19.6432	19.9761	20.1159	20.1422	20.1397	20.0552	19.6048	18.8573	18.2105	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9571	0.9281	0.8781	0.7723	0.6172	0.4356	0.2989	0.3424	0.5733	0.8223	0.9299	0.9629	(94)
Useful gains	686.3797	789.3505	848.0339	856.7926	746.0470	526.1770	344.8550	361.7633	545.5990	670.4183	667.7270	656.7310	(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	1409.0900	1381.3416	1264.8995	1066.8846	820.1413	541.2283	347.5659	366.2746	586.5773	892.3527	1170.1110	1400.5673	(97)
Space heating kWh	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(98a)
Space heating requirement - total per year (kWh/year)												2532.3050	
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	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2532.3050	
Space heating per m2											(98c) / (4) =	27.8275	(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	537.6965	397.8180	310.1481	151.2663	55.1262	0.0000	0.0000	0.0000	0.0000	165.1192	361.7165	553.4142	(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)	582.5531	431.0054	336.0218	163.8855	59.7250	0.0000	0.0000	0.0000	0.0000	178.8940	391.8922	599.5821	(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	241.9626	213.9355	227.3212	200.1536	194.1797	175.1602	173.0832	179.8979	181.7927	202.4754	214.9783	239.3737	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.7970	85.4305	84.7570	83.4402	81.6294	79.8000	79.8000	79.8000	79.8000	83.6062	85.2173	85.8757	(217)
Fuel for water heating, kWh/month	282.0175	250.4203	268.2034	239.8769	237.8796	219.4990	216.8962	225.4360	227.8104	242.1774	252.2708	278.7446	(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	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-32.6442	-46.9715	-68.8913	-79.0791	-86.6436	-81.3451	-80.3172	-75.1327	-66.2344	-54.4098	-36.2140	-28.1108	(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	-15.6743	-33.2530	-66.6196	-100.8379	-134.1048	-135.0468	-133.4861	-112.6961	-82.1529	-47.8466	-21.0198	-12.3763	(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	2743.5590	(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	2941.2321	(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)	203.7594	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1631.1077	(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	4343.4428	(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	2743.5590	0.2100	576.1474	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2941.2321	0.2100	617.6587	(264)
Space and water heating			1193.8061	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-735.9937	0.1342	-98.7443	
PV Unit electricity exported	-895.1140	0.1257	-112.4829	
Total			-211.2272	(269)
Total CO2, kg/year			1023.9170	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.2500	(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	2743.5590	1.1300	3100.2217	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2941.2321	1.1300	3323.5922	(278)
Space and water heating			6423.8139	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-735.9937	1.4958	-1100.9184	
PV Unit electricity exported	-895.1140	0.4613	-412.8794	
Total			-1513.7978	(283)
Total Primary energy kWh/year			5352.6499	(286)
Target Primary Energy Rate (TPER)			58.8200	(287)

Full SAP Calculation Printout

Plot Reference	Unit 1	**Issued on Date**	04/05/2026
Assessment Reference	00001	**Plot Type Ref**	
Plot Address		**SAP Version**	10.2

SAP Rating	83 B	**DER**	3.84	**TER**	11.25
Environmental	97 A	**% DER < TER**			65.87
CO_2 Emissions (t/year)	0.34	**DFEE**	29.88	**TFEE**	34.86
Compliance Check	See BREL	**% DFEE < TFEE**			14.28
% DPER < TPER	30.78	**DPER**	40.72	**TPER**	58.82

Assessor Details	Mr. Chris Law	**Assessor ID**	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

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)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation		0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)		0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =		67.2000 (23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.3266	0.3234	0.3202	0.3043	0.3011	0.2851	0.2851	0.2819	0.2915	0.3011	0.3074	0.3138	(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	
Main dwelling								
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	14568.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181
E14 Flat roof	10.7900	0.1600	1.7264
E16 Corner (normal)	4.8000	0.0390	0.1872
E18 Party wall between dwellings	9.6000	0.0390	0.3744
P1 Party wall - Ground floor	6.2300	0.0440	0.2741
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	22.4584	22.2391	22.0199	20.9239	20.7047	19.6086	19.6086	19.3894	20.0470	20.7047	21.1431	21.5815	(38)
Heat transfer coeff	80.9018	80.6826	80.4634	79.3673	79.1481	78.0521	78.0521	77.8329	78.4905	79.1481	79.5865	80.0250	(39)
Average = Sum(39)m / 12 =												79.3125	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8890	0.8866	0.8842	0.8722	0.8698	0.8577	0.8577	0.8553	0.8625	0.8698	0.8746	0.8794	(40)
HLP (average)												0.8716	
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 2.6392 (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

78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 111.0834 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6480	(55)
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
										Total per year (kWh/year) = Sum(64)m =		2355.1164	(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	98.2000	87.1635	93.3317	83.7260	82.3121	75.4157	75.2976	77.5634	77.6210	85.0705	88.6552	97.3392	(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	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	28.8442	25.6192	20.8349	15.7734	11.7908	9.9543	10.7560	13.9810	18.7653	23.8268	27.8094	29.6459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	359.5604	363.2915	353.8893	333.8729	308.6059	284.8584	268.9937	265.2625	274.6648	294.6812	319.9482	343.6957	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	(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)	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)	131.9892	129.7075	125.4458	116.2861	110.6346	104.7440	101.2064	104.2519	107.8069	114.3420	123.1322	130.8322	(72)
Total internal gains	626.6512	624.8756	606.4274	572.1898	537.2886	505.8141	487.2134	489.7529	507.4944	539.1074	577.1472	610.4312	(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	
Northeast	10.8100	11.2829	0.7600	1.0000	0.7700	64.2384	(75)

Southwest			9.2300		36.7938		0.7600		1.0000		0.7700		178.8643 (79)
Northeast			0.7700		26.0000		0.7600		1.0000		1.0000		13.6937 (82)
Solar gains	256.7964	463.8719	703.0132	982.4192	1199.7345	1234.1439	1171.9614	1003.6526	799.0111	531.2864	312.4471	216.5911	(83)
Total gains	883.4476	1088.7475	1309.4406	1554.6089	1737.0231	1739.9580	1659.1748	1493.4055	1306.5055	1070.3938	889.5943	827.0223	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.0204	50.1563	50.2930	50.9875	51.1287	51.8467	51.8467	51.9927	51.5571	51.1287	50.8471	50.5685	
alpha	4.3347	4.3438	4.3529	4.3992	4.4086	4.4564	4.4564	4.4662	4.4371	4.4086	4.3898	4.3712	
util living area	0.9388	0.8769	0.7635	0.5871	0.4182	0.2863	0.2068	0.2394	0.4096	0.6954	0.8912	0.9503	(86)
Living	20.2388	20.4733	20.7079	20.8664	20.9169	20.9288	20.9303	20.9301	20.9217	20.8252	20.5134	20.1889	
Non living	19.2980	19.5836	19.8584	20.0406	20.0925	20.1134	20.1144	20.1165	20.1040	20.0051	19.6465	19.2433	
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	20.6106	20.4733	20.7079	20.8664	20.9169	20.9288	20.9303	20.9301	20.9217	20.8252	20.5134	20.3023	(87)
Th 2	20.1768	20.1789	20.1809	20.1912	20.1933	20.2036	20.2036	20.2057	20.1995	20.1933	20.1892	20.1850	(88)
util rest of house	0.9287	0.8596	0.7367	0.5536	0.3834	0.2510	0.1695	0.1982	0.3637	0.6556	0.8725	0.9419	(89)
MIT 2	19.8265	19.5836	19.8584	20.0406	20.0925	20.1134	20.1144	20.1165	20.1040	20.0051	19.6465	19.4130	(90)
Living area fraction									fLA = Living area / (4) =			0.1319	(91)
MIT	19.9299	19.7009	19.9705	20.1495	20.2012	20.2209	20.2220	20.2238	20.2118	20.1133	19.7608	19.5303	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9299	19.7009	19.9705	20.1495	20.2012	20.2209	20.2220	20.2238	20.2118	20.1133	19.7608	19.5303	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9253	0.8484	0.7294	0.5519	0.3837	0.2517	0.1703	0.1992	0.3644	0.6514	0.8614	0.9339	(94)
Useful gains	817.4453	923.6850	955.0626	857.9573	666.5196	438.0137	282.6152	297.4396	476.1433	697.2984	766.2822	772.3706	(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	1264.4849	1194.1756	1083.8780	892.8430	672.8566	438.7212	282.7034	297.6169	479.7196	752.9571	1007.6303	1226.8044	(97)
Space heating kWh	332.5974	181.7697	95.8386	25.1177	4.7147	0.0000	0.0000	0.0000	0.0000	41.4100	173.7706	338.0987	(98a)
Space heating requirement - total per year (kWh/year)												1193.3175	
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	332.5974	181.7697	95.8386	25.1177	4.7147	0.0000	0.0000	0.0000	0.0000	41.4100	173.7706	338.0987	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1193.3175	
Space heating per m2											(98c) / (4) =	13.1134	(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 %)												247.3139	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	332.5974	181.7697	95.8386	25.1177	4.7147	0.0000	0.0000	0.0000	0.0000	41.4100	173.7706	338.0987	(98)
Space heating efficiency (main heating system 1)	247.3139	247.3139	247.3139	247.3139	247.3139	0.0000	0.0000	0.0000	0.0000	247.3139	247.3139	247.3139	(210)
Space heating fuel (main heating system)	134.4839	73.4976	38.7518	10.1562	1.9064	0.0000	0.0000	0.0000	0.0000	16.7439	70.2632	136.7084	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
Efficiency of water heater												169.3657	(216)
(217)m	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	(217)
Fuel for water heating, kWh/month	138.3910	122.2756	129.7462	113.8497	110.1782	99.0926	97.7220	101.7457	103.0087	115.0763	122.6027	136.8625	(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	24.2929	21.9420	24.2929	23.5092	24.2929	23.5092	24.2929	24.2929	23.5092	24.2929	23.5092	24.2929	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(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												482.5114	(211)

Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	169.3657	
Water heating fuel used	1390.5513	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)		
mechanical ventilation fans (SFP = 1.1250)	286.0290	(230a)
Total electricity for the above, kWh/year	286.0290	(231)
Electricity for lighting (calculated in Appendix L)	203.7594	(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	2362.8511	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	482.5114	16.4900	79.5661	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1390.5513	16.4900	229.3019	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	286.0290	16.4900	47.1662	(249)
Energy for lighting	203.7594	16.4900	33.5999	(250)
Additional standing charges			0.0000	(251)
Total energy cost			389.6341	(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] =	1.0314	(257)
SAP value		83.2813	
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	482.5114	0.1585	76.4839	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1390.5513	0.1409	195.9698	(264)
Space and water heating			272.4537	(265)
Pumps, fans and electric keep-hot	286.0290	0.1387	39.6757	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Total CO2, kg/year			341.5382	(272)
CO2 emissions per m2			3.7500	(273)
EI value			96.6348	
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)	
Main dwelling						
Ground floor	33.0000	(1b)	x 2.4000	(2b) =	79.2000	(1b) - (3b)
First floor	33.0000	(1c)	x 2.4000	(2c) =	79.2000	(1c) - (3c)
Second floor	25.0000	(1d)	x 2.0000	(2d) =	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.4000	(5)

2. Ventilation rate

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

												Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =	0.0000	(8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												3.0000	(17)
Infiltration rate												0.1500	(18)
Number of sides sheltered												2	(19)
Shelter factor										(20) = 1 - [0.075 x (19)] =		0.8500	(20)
Infiltration rate adjusted to include shelter factor										(21) = (18) x (20) =		0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.8000	4.7000	4.6000	4.2000	4.1000	3.7000	3.7000	3.7000	3.7000	4.2000	4.3000	4.5000	(22)
Wind factor	1.2000	1.1750	1.1500	1.0500	1.0250	0.9250	0.9250	0.9250	0.9250	1.0500	1.0750	1.1250	(22a)
Adj infilt rate													
	0.1530	0.1498	0.1466	0.1339	0.1307	0.1179	0.1179	0.1179	0.1179	0.1339	0.1371	0.1434	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	67.2000	(23c)

Effective ac	0.3170	0.3138	0.3106	0.2979	0.2947	0.2819	0.2819	0.2819	0.2819	0.2979	0.3011	0.3074	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 14568.2700	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	160.0909	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181
E14 Flat roof	10.7900	0.1600	1.7264
E16 Corner (normal)	4.8000	0.0390	0.1872
E18 Party wall between dwellings	9.6000	0.0390	0.3744
P1 Party wall - Ground floor	6.2300	0.0440	0.2741
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	5.9787	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	58.4434	(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	21.8007	21.5815	21.3623	20.4855	20.2662	19.3894	19.3894	19.3894	19.3894	20.4855	20.7047	21.1431	(38)
Heat transfer coeff													
	80.2442	80.0250	79.8057	78.9289	78.7097	77.8329	77.8329	77.8329	77.8329	78.9289	79.1481	79.5865	(39)
Average = Sum(39)m / 12 =												78.8924	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8818	0.8794	0.8770	0.8674	0.8649	0.8553	0.8553	0.8553	0.8553	0.8674	0.8698	0.8746	(40)
HLP (average)												0.8669	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.6392	(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													
	78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)
Hot water usage for other uses													
	41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)
Average daily hot water use (litres/day)												111.0834	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m													
	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.6480	(55)
Total storage loss													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)
If cylinder contains dedicated solar storage													
	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(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													
	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
										Total per year (kWh/year) = Sum(64)m =		2355.1164	(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													
	98.2000	87.1635	93.3317	83.7260	82.3121	75.4157	75.2976	77.5634	77.6210	85.0705	88.6552	97.3392	(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	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	28.8442	25.6192	20.8349	15.7734	11.7908	9.9543	10.7560	13.9810	18.7653	23.8268	27.8094	29.6459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	359.5604	363.2915	353.8893	333.8729	308.6059	284.8584	268.9937	265.2625	274.6648	294.6812	319.9482	343.6957	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	131.9892	129.7075	125.4458	116.2861	110.6346	104.7440	101.2064	104.2519	107.8069	114.3420	123.1322	130.8322	(72)
Total internal gains													
	626.6512	624.8756	606.4274	572.1898	537.2886	505.8141	487.2134	489.7529	507.4944	539.1074	577.1472	610.4312	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	10.8100	10.4150	0.7600	1.0000	0.7700	59.2970	(75)
Southwest	9.2300	33.9635	0.7600	1.0000	0.7700	165.1055	(79)
Northeast	0.7700	24.0000	0.7600	1.0000	1.0000	12.6403	(82)

Solar gains	237.0428	438.1012	695.6902	995.5181	1193.4859	1252.6560	1153.3589	971.6892	799.0111	523.2366	293.5110	206.2773	(83)
Total gains	863.6940	1062.9769	1302.1175	1567.7079	1730.7745	1758.4701	1640.5722	1461.4420	1306.5055	1062.3440	870.6581	816.7084	(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	50.4304	50.5685	50.7074	51.2707	51.4135	51.9927	51.9927	51.9927	51.9927	51.2707	51.1287	50.8471	
alpha	4.3620	4.3712	4.3805	4.4180	4.4276	4.4662	4.4662	4.4662	4.4662	4.4180	4.4086	4.3898	
util living area													
	0.9377	0.8769	0.7568	0.5725	0.4046	0.2782	0.2180	0.2499	0.4065	0.6933	0.8879	0.9481	(86)
Living	20.2692	20.4888	20.7228	20.8745	20.9194	20.9292	20.9303	20.9300	20.9227	20.8283	20.5371	20.2247	
Non living	19.3413	19.6082	19.8813	20.0529	20.0990	20.1158	20.1166	20.1164	20.1111	20.0105	19.6792	19.2918	
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	20.6262	20.4888	20.7228	20.8745	20.9194	20.9292	20.9303	20.9300	20.9227	20.8283	20.5371	20.3332	(87)
Th 2	20.1830	20.1850	20.1871	20.1953	20.1974	20.2057	20.2057	20.2057	20.2057	20.1953	20.1933	20.1892	(88)
util rest of house													
	0.9272	0.8593	0.7295	0.5390	0.3698	0.2434	0.1805	0.2079	0.3612	0.6531	0.8683	0.9391	(89)
MIT 2	19.8475	19.6082	19.8813	20.0529	20.0990	20.1158	20.1166	20.1164	20.1111	20.0105	19.6792	19.4535	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	19.9501	19.7243	19.9923	20.1613	20.2072	20.2230	20.2239	20.2237	20.2181	20.1184	19.7923	19.5695	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9501	19.7243	19.9923	20.1613	20.2072	20.2230	20.2239	20.2237	20.2181	20.1184	19.7923	19.5695	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9239	0.8483	0.7226	0.5375	0.3702	0.2441	0.1813	0.2088	0.3619	0.6490	0.8573	0.9310	(94)
Useful gains	797.9656	901.6754	940.9024	842.6459	640.8042	429.2726	297.5064	305.1716	472.8430	689.4996	746.4437	760.3921	(95)
Ext temp.	4.7000	5.2000	6.7000	9.1000	12.0000	14.7000	16.4000	16.3000	14.1000	10.7000	7.5000	4.6000	(96)
Heat loss rate W													
	1223.7348	1162.3095	1060.8014	873.0530	645.9840	429.8744	297.6255	305.3937	476.1927	743.3810	972.9153	1191.3724	(97)
Space heating kWh													
	316.7723	175.1461	89.2048	21.8931	3.8538	0.0000	0.0000	0.0000	0.0000	40.0878	163.0596	320.6494	(98a)
Space heating requirement - total per year (kWh/year)												1130.6668	
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													
	316.7723	175.1461	89.2048	21.8931	3.8538	0.0000	0.0000	0.0000	0.0000	40.0878	163.0596	320.6494	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1130.6668	
Space heating per m2											(98c) / (4) =	12.4249	(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 %)	247.4871	(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	316.7723	175.1461	89.2048	21.8931	3.8538	0.0000	0.0000	0.0000	0.0000	40.0878	163.0596	320.6494	(98)
Space heating efficiency (main heating system 1)	247.4871	247.4871	247.4871	247.4871	247.4871	0.0000	0.0000	0.0000	0.0000	247.4871	247.4871	247.4871	(210)
Space heating fuel (main heating system)	127.9955	70.7698	36.0442	8.8461	1.5572	0.0000	0.0000	0.0000	0.0000	16.1979	65.8861	129.5620	(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	234.3869	207.0929	219.7455	192.8223	186.6040	167.8289	165.5075	172.3222	174.4614	194.8998	207.6470	231.7981	(64)
Efficiency of water heater												169.3841	(216)
(217)m	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	(217)
Fuel for water heating, kWh/month	138.3760	122.2623	129.7321	113.8373	110.1662	99.0819	97.7114	101.7346	102.9975	115.0638	122.5894	136.8476	(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	24.2929	21.9420	24.2929	23.5092	24.2929	23.5092	24.2929	24.2929	23.5092	24.2929	23.5092	24.2929	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(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	456.8588	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	169.3841	
Water heating fuel used	1390.4000	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)		
mechanical ventilation fans (SFP = 1.1250)	286.0290	(230a)
Total electricity for the above, kWh/year	286.0290	(231)
Electricity for lighting (calculated in Appendix L)	203.7594	(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	2337.0472	(238)

10a. Fuel costs - using BEDF prices (593)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	456.8588	27.6700	126.4128	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1390.4000	27.6700	384.7237	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	286.0290	27.6700	79.1442	(249)
Energy for lighting	203.7594	27.6700	56.3802	(250)
Additional standing charges			0.0000	(251)
Total energy cost			646.6610	(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	456.8588	0.1586	72.4421	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1390.4000	0.1409	195.9485	(264)
Space and water heating			268.3906	(265)
Pumps, fans and electric keep-hot	286.0290	0.1387	39.6757	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Total CO2, kg/year			337.4751	(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	456.8588	1.5869	724.9821	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1390.4000	1.5211	2114.9485	(278)
Space and water heating			2839.9306	(279)
Pumps, fans and electric keep-hot	286.0290	1.5128	432.7047	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)

Total Primary energy kWh/year 3585.1682 (286)

SAP 10 EPC IMPROVEMENTS

00001

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	+ 2.2	-£ 85	-38 kg (11.3%)
U Solar photovoltaic panels	+ 6.1	-£ 234	-113 kg (37.8%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£85	0.42 kg/m²	B 85	A 97
Solar photovoltaic panels	£234	1.24 kg/m²	A 92	A 98
Total Savings	£319	1.66 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 593 TEST (31 Mar 2026)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£647	£561	£85
Space heating	£206	£228	-£22
Water heating	£385	£277	£107
Lighting	£56	£56	£0
Generated (PV)	-£0	-£234	£234
Total cost of fuels	£647	£327	£319
Total cost of uses	£647	£327	£319
Delivered energy	26 kWh/m²	13 kWh/m²	13 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.2 tonnes	0.2 tonnes
CO2 emissions per m²	4 kg/m²	2 kg/m²	2 kg/m²
Primary energy	39 kWh/m²	21 kWh/m²	19 kWh/m²

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(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	0 * 10 =	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		3.0000 (17)
Infiltration rate		0.1500 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)

Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation 0.5000 (23a)

If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.5000 (23b)

If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 67.2000 (23c)

Effective ac	0.3266	0.3234	0.3202	0.3043	0.3011	0.2851	0.2851	0.2819	0.2915	0.3011	0.3074	0.3138	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.4647			(33)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 14568.2700 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 160.0909 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152
E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181
E14 Flat roof	10.7900	0.1600	1.7264
E16 Corner (normal)	4.8000	0.0390	0.1872
E18 Party wall between dwellings	9.6000	0.0390	0.3744
P1 Party wall - Ground floor	6.2300	0.0440	0.2741
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	22.4584	22.2391	22.0199	20.9239	20.7047	19.6086	19.6086	19.3894	20.0470	20.7047	21.1431	21.5815	(38)
Heat transfer coeff	80.9018	80.6826	80.4634	79.3673	79.1481	78.0521	78.0521	77.8329	78.4905	79.1481	79.5865	80.0250	(39)

Average = Sum(39)m / 12 = 79.3125

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8890	0.8866	0.8842	0.8722	0.8698	0.8577	0.8577	0.8553	0.8625	0.8698	0.8746	0.8794	(40)
HLP (average)												0.8716	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6392 (42)

Hot water usage for mixer showers

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

78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 111.0834 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)

Energy content (annual) Total = Sum(45)m = 1844.7004

Distribution loss (46)m = 0.15 x (45)m

28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)

Water storage loss (or HIU loss):

Store volume 200.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.2000 (48)

Temperature factor from Table 2b 0.5400 (49)

Enter (49) or (54) in (55) 0.6480 (55)

Total storage loss

20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)

If cylinder contains dedicated solar storage

20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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

234.3869	207.0929	218.3498	186.0687	173.8097	155.2222	152.4806	160.2258	169.0585	193.5040	207.6470	231.7981	(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												598.5355	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												598.5355	
Solar input	-0.0000	-16.2461	-57.2214	-77.6256	-99.8232	-91.6729	-90.8426	-80.2802	-56.3057	-28.5179	-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													
	234.3869	190.8469	161.1284	108.4431	73.9865	63.5493	61.6380	79.9456	112.7528	164.9862	207.6470	231.7981	(64)
										Total per year (kWh/year) = Sum(64)m =		1691.1086	(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													
	98.2000	87.1635	92.2151	78.3231	72.0767	65.3303	64.8760	67.8863	73.2987	83.9539	88.6552	97.3392	(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	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	28.8442	25.6192	20.8349	15.7734	11.7908	9.9543	10.7560	13.9810	18.7653	23.8268	27.8094	29.6459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	359.5604	363.2915	353.8893	333.8729	308.6059	284.8584	268.9937	265.2625	274.6648	294.6812	319.9482	343.6957	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	(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)													
	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)													
	131.9892	129.7075	123.9450	108.7821	96.8773	90.7365	87.1989	91.2450	101.8037	112.8412	123.1322	130.8322	(72)
Total internal gains													
	626.6512	624.8756	604.9266	564.6858	523.5313	491.8066	473.2059	476.7459	501.4912	537.6066	577.1472	610.4312	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	10.8100	11.2829	0.7600	1.0000	0.7700	64.2384	(75)
Southwest	9.2300	36.7938	0.7600	1.0000	0.7700	178.8643	(79)
Northeast	0.7700	26.0000	0.7600	1.0000	1.0000	13.6937	(82)

Solar gains	256.7964	463.8719	703.0132	982.4192	1199.7345	1234.1439	1171.9614	1003.6526	799.0111	531.2864	312.4471	216.5911	(83)
Total gains	883.4476	1088.7475	1307.9398	1547.1049	1723.2658	1725.9505	1645.1673	1480.3985	1300.5023	1068.8930	889.5943	827.0223	(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	50.0204	50.1563	50.2930	50.9875	51.1287	51.8467	51.8467	51.9927	51.5571	51.1287	50.8471	50.5685	
alpha	4.3347	4.3438	4.3529	4.3992	4.4086	4.4564	4.4564	4.4662	4.4371	4.4086	4.3898	4.3712	
util living area													
	0.9388	0.8769	0.7640	0.5895	0.4213	0.2886	0.2086	0.2415	0.4114	0.6961	0.8912	0.9503	(86)
Living	20.2388	20.4733	20.7073	20.8654	20.9165	20.9287	20.9303	20.9301	20.9216	20.8248	20.5134	20.1889	
Non living	19.2980	19.5836	19.8578	20.0396	20.0922	20.1133	20.1144	20.1165	20.1039	20.0047	19.6465	19.2433	
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	20.6106	20.4733	20.7073	20.8654	20.9165	20.9287	20.9303	20.9301	20.9216	20.8248	20.5134	20.3023	(87)
Th 2	20.1768	20.1789	20.1809	20.1912	20.1933	20.2036	20.2036	20.2057	20.1995	20.1933	20.1892	20.1850	(88)
util rest of house													
	0.9287	0.8596	0.7372	0.5560	0.3863	0.2530	0.1709	0.2000	0.3654	0.6563	0.8725	0.9419	(89)
MIT 2	19.8265	19.5836	19.8578	20.0396	20.0922	20.1133	20.1144	20.1165	20.1039	20.0047	19.6465	19.4130	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	19.9299	19.7009	19.9698	20.1485	20.2009	20.2208	20.2220	20.2238	20.2117	20.1129	19.7608	19.5303	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9299	19.7009	19.9698	20.1485	20.2009	20.2208	20.2220	20.2238	20.2117	20.1129	19.7608	19.5303	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9253	0.8484	0.7299	0.5541	0.3866	0.2538	0.1718	0.2009	0.3661	0.6521	0.8614	0.9339	(94)
Useful gains	817.4453	923.6850	954.6465	857.3260	666.2994	437.9864	282.6115	297.4320	476.0702	697.0421	766.2822	772.3706	(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													
	1264.4849	1194.1756	1083.8237	892.7651	672.8298	438.7178	282.7029	297.6159	479.7106	752.9246	1007.6303	1226.8044	(97)
Space heating kWh													
	332.5974	181.7697	96.1078	25.5162	4.8586	0.0000	0.0000	0.0000	0.0000	41.5766	173.7706	338.0987	(98a)
Space heating requirement - total per year (kWh/year)												1194.2957	
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													
	332.5974	181.7697	96.1078	25.5162	4.8586	0.0000	0.0000	0.0000	0.0000	41.5766	173.7706	338.0987	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1194.2957	
Space heating per m2											(98c) / (4) =	13.1241	(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 %)												247.3139	(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													
	332.5974	181.7697	96.1078	25.5162	4.8586	0.0000	0.0000	0.0000	0.0000	41.5766	173.7706	338.0987	(98)
Space heating efficiency (main heating system 1)													
	247.3139	247.3139	247.3139	247.3139	247.3139	0.0000	0.0000	0.0000	0.0000	247.3139	247.3139	247.3139	(210)
Space heating fuel (main heating system)													
	134.4839	73.4976	38.8607	10.3173	1.9646	0.0000	0.0000	0.0000	0.0000	16.8113	70.2632	136.7084	(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													
	234.3869	190.8469	161.1284	108.4431	73.9865	63.5493	61.6380	79.9456	112.7528	164.9862	207.6470	231.7981	(64)
Efficiency of water heater												169.3657	(216)
(217)m	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	169.3657	(217)
Fuel for water heating, kWh/month													
	138.3910	112.6833	95.1364	64.0290	43.6845	37.5220	36.3934	47.2029	66.5736	97.4142	122.6027	136.8625	(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	31.0874	28.0789	31.0874	30.0846	31.0874	30.0846	31.0874	31.0874	30.0846	31.0874	30.0846	31.0874	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-37.6572	-55.2494	-81.2112	-92.2458	-99.8625	-93.9811	-92.7995	-87.4393	-77.3880	-63.4608	-41.9530	-32.2308	(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												482.9069	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												169.3657	
Water heating fuel used												998.4955	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)													
mechanical ventilation fans (SFP = 1.1250)												286.0290	(230a)
pump for solar water heating												80.0000	(230g)
Total electricity for the above, kWh/year												366.0290	(231)
Electricity for lighting (calculated in Appendix L)												203.7594	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-855.4786	(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												1195.7122	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	482.9069	16.4900	79.6313	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	998.4955	16.4900	164.6519	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	286.0290	16.4900	47.1662	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	203.7594	16.4900	33.5999	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-855.4786	16.4900	-141.0684	
PV Unit electricity exported	0.0000	5.5900	0.0000	
Total			-141.0684	(252)
Total energy cost			197.1729	(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] =	0.5219	(257)
SAP value		91.5395	
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	482.9069	0.1585	76.5404	(261)

Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	998.4955	0.1463	146.0864	(264)
Space and water heating			222.6268	(265)
Pumps, fans and electric keep-hot	366.0290	0.1387	50.7727	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-855.4786	0.1342	-114.8085	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-114.8085	(269)
Total CO2, kg/year			187.9997	(272)
CO2 emissions per m2			2.0700	(273)
EI value			98.1476	
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)	
Main dwelling						
Ground floor	33.0000 (1b)	x	2.4000 (2b)	=	79.2000	(1b) - (3b)
First floor	33.0000 (1c)	x	2.4000 (2c)	=	79.2000	(1c) - (3c)
Second floor	25.0000 (1d)	x	2.0000 (2d)	=	50.0000	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.4000	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.1500	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.8000	4.7000	4.6000	4.2000	4.1000	3.7000	3.7000	3.7000	3.7000	4.2000	4.3000	4.5000	(22)
Wind factor	1.2000	1.1750	1.1500	1.0500	1.0250	0.9250	0.9250	0.9250	0.9250	1.0500	1.0750	1.1250	(22a)
Adj infilt rate	0.1530	0.1498	0.1466	0.1339	0.1307	0.1179	0.1179	0.1179	0.1179	0.1339	0.1371	0.1434	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	67.2000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.3170	0.3138	0.3106	0.2979	0.2947	0.2819	0.2819	0.2819	0.2819	0.2979	0.3011	0.3074	(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	
Main dwelling								
Window			20.0400	1.1450	22.9466			(27)
External Door			1.9300	1.2000	2.3160			(26a)
Rooflight			0.7700	1.1450	0.8817			(27a)
Heatloss Floor			33.0000	0.1200	3.9600	110.0000	3630.0000	(28a)
External Wall	97.0000	21.9700	75.0300	0.2000	15.0060	140.0000	10504.2000	(29a)
Dwarf Wall	12.0000		12.0000	0.1600	1.9200	9.0000	108.0000	(29a)
External Roof Warm	29.0000	0.7700	28.2300	0.1500	4.2345	9.0000	254.0700	(30)
External Roof Flat	8.0000		8.0000	0.1500	1.2000	9.0000	72.0000	(30)
Total net area of external elements Aum(A, m2)			179.0000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.4647			(33)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 14568.2700	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	160.0909	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.5300	0.0310	0.5124
E3 Sill	15.6100	0.0280	0.4371
E4 Jamb	31.9600	0.0230	0.7351
E5 Ground floor (normal)	18.0000	0.0580	1.0440
E6 Intermediate floor within a dwelling	18.0000	0.0010	0.0180
E11 Eaves (insulation at rafter level)	10.7600	0.0200	0.2152

E13 Gable (insulation at rafter level)	6.2300	0.0350	0.2181	
E14 Flat roof	10.7900	0.1600	1.7264	
E16 Corner (normal)	4.8000	0.0390	0.1872	
E18 Party wall between dwellings	9.6000	0.0390	0.3744	
P1 Party wall - Ground floor	6.2300	0.0440	0.2741	
P2 Party wall - Intermediate floor within a dwelling	6.2300	0.0000	0.0000	
P5 Party wall - Roof (insulation at rafter level)	6.2300	0.0380	0.2367	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.9787 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 58.4434 (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	21.8007	21.5815	21.3623	20.4855	20.2662	19.3894	19.3894	19.3894	19.3894	20.4855	20.7047	21.1431	(38)
Heat transfer coeff	80.2442	80.0250	79.8057	78.9289	78.7097	77.8329	77.8329	77.8329	77.8329	78.9289	79.1481	79.5865	(39)
Average = Sum(39)m / 12 =												78.8924	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8818	0.8794	0.8770	0.8674	0.8649	0.8553	0.8553	0.8553	0.8553	0.8674	0.8698	0.8746	(40)
HLP (average)												0.8669	
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 2.6392 (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

78.9648	77.7921	76.1406	73.0956	70.8156	68.2873	66.9217	68.5616	70.3472	73.0525	76.1602	78.6979	(42b)

Hot water usage for other uses

41.6577	40.1428	38.6280	37.1132	35.5984	34.0835	34.0835	35.5984	37.1132	38.6280	40.1428	41.6577	(42c)

Average daily hot water use (litres/day) 111.0834 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	120.6225	117.9349	114.7686	110.2088	106.4139	102.3709	101.0053	104.1600	107.4604	111.6805	116.3030	120.3555	(44)
Energy conte	191.0365	167.9377	176.3951	150.8703	143.2536	125.8769	122.1571	128.9718	132.5094	151.5494	165.6950	188.4477	(45)
Energy content (annual)										Total = Sum(45)m =		1844.7004	
Distribution loss (46)m = 0.15 x (45)m	28.6555	25.1907	26.4593	22.6306	21.4880	18.8815	18.3236	19.3458	19.8764	22.7324	24.8542	28.2671	(46)

Water storage loss (or HIU loss):
Store volume 200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.2000 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.6480 (55)
Total storage loss

20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(56)

If cylinder contains dedicated solar storage

20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880	(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

234.3869	207.0929	218.3498	186.0687	173.8097	155.2222	152.4806	160.2258	169.0585	193.5040	207.6470	231.7981	(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 592.1501 (H24)
Heat delivered to space heating 0.0000 (H29)
Solar input 592.1501

Solar input -0.0000	-13.5782	-56.5314	-79.1944	-99.5998	-93.2493	-89.0705	-77.0595	-56.3057	-27.5613	-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

234.3869	193.5148	161.8183	106.8743	74.2099	61.9729	63.4100	83.1663	112.7528	165.9427	207.6470	231.7981	(64)
								Total per year (kWh/year) = Sum(64)m =			1697.4939	(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

98.2000	87.1635	92.2151	78.3231	72.0767	65.3303	64.8760	67.8863	73.2987	83.9539	88.6552	97.3392	(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	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	158.3497	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	28.8442	25.6192	20.8349	15.7734	11.7908	9.9543	10.7560	13.9810	18.7653	23.8268	27.8094	29.6459	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	359.5604	363.2915	353.8893	333.8729	308.6059	284.8584	268.9937	265.2625	274.6648	294.6812	319.9482	343.6957	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	53.4741	(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)	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	-105.5665	(71)
Water heating gains (Table 5)	131.9892	129.7075	123.9450	108.7821	96.8773	90.7365	87.1989	91.2450	101.8037	112.8412	123.1322	130.8322	(72)
Total internal gains	626.6512	624.8756	604.9266	564.6858	523.5313	491.8066	473.2059	476.7459	501.4912	537.6066	577.1472	610.4312	(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	
Northeast	10.8100	10.4150	0.7600	1.0000	0.7700	59.2970	(75)
Southwest	9.2300	33.9635	0.7600	1.0000	0.7700	165.1055	(79)
Northeast	0.7700	24.0000	0.7600	1.0000	1.0000	12.6403	(82)

Solar gains	237.0428	438.1012	695.6902	995.5181	1193.4859	1252.6560	1153.3589	971.6892	799.0111	523.2366	293.5110	206.2773	(83)
Total gains	863.6940	1062.9769	1300.6167	1560.2039	1717.0171	1744.4626	1626.5648	1448.4351	1300.5023	1060.8432	870.6581	816.7084	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	50.4304	50.5685	50.7074	51.2707	51.4135	51.9927	51.9927	51.9927	51.9927	51.2707	51.1287	50.8471	
alpha	4.3620	4.3712	4.3805	4.4180	4.4276	4.4662	4.4662	4.4662	4.4662	4.4180	4.4086	4.3898	
util living area	0.9377	0.8769	0.7574	0.5748	0.4077	0.2804	0.2199	0.2522	0.4082	0.6940	0.8879	0.9481	(86)
Living	20.2692	20.4888	20.7222	20.8736	20.9191	20.9291	20.9303	20.9300	20.9226	20.8279	20.5371	20.2247	
Non living	19.3413	19.6082	19.8807	20.0521	20.0987	20.1158	20.1166	20.1164	20.1110	20.0101	19.6792	19.2918	
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	20.6262	20.4888	20.7222	20.8736	20.9191	20.9291	20.9303	20.9300	20.9226	20.8279	20.5371	20.3332	(87)
Th 2	20.1830	20.1850	20.1871	20.1953	20.1974	20.2057	20.2057	20.2057	20.2057	20.1953	20.1933	20.1892	(88)
util rest of house	0.9272	0.8593	0.7301	0.5412	0.3727	0.2453	0.1820	0.2097	0.3628	0.6538	0.8683	0.9391	(89)
MIT 2	19.8475	19.6082	19.8807	20.0521	20.0987	20.1158	20.1166	20.1164	20.1110	20.0101	19.6792	19.4535	(90)
Living area fraction										fLA = Living area / (4) =		0.1319	(91)
MIT	19.9501	19.7243	19.9916	20.1604	20.2069	20.2230	20.2239	20.2237	20.2180	20.1180	19.7923	19.5695	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9501	19.7243	19.9916	20.1604	20.2069	20.2230	20.2239	20.2237	20.2180	20.1180	19.7923	19.5695	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9239	0.8483	0.7231	0.5397	0.3731	0.2461	0.1829	0.2107	0.3635	0.6497	0.8573	0.9310	(94)
Useful gains	797.9656	901.6754	940.5044	842.0889	640.6211	429.2495	297.5013	305.1618	472.7739	689.2480	746.4437	760.3921	(95)
Ext temp.	4.7000	5.2000	6.7000	9.1000	12.0000	14.7000	16.4000	16.3000	14.1000	10.7000	7.5000	4.6000	(96)
Heat loss rate W	1223.7348	1162.3095	1060.7499	872.9847	645.9618	429.8715	297.6248	305.3924	476.1842	743.3493	972.9153	1191.3724	(97)
Space heating kWh	316.7723	175.1461	89.4627	22.2450	3.9735	0.0000	0.0000	0.0000	0.0000	40.2514	163.0596	320.6494	(98a)
Space heating requirement - total per year (kWh/year)												1131.5598	
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	316.7723	175.1461	89.4627	22.2450	3.9735	0.0000	0.0000	0.0000	0.0000	40.2514	163.0596	320.6494	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1131.5598	
Space heating per m2											(98c) / (4) =	12.4347	(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 %)	247.4871	(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	316.7723	175.1461	89.4627	22.2450	3.9735	0.0000	0.0000	0.0000	0.0000	40.2514	163.0596	320.6494	(98)
Space heating efficiency (main heating system 1)	247.4871	247.4871	247.4871	247.4871	247.4871	0.0000	0.0000	0.0000	0.0000	247.4871	247.4871	247.4871	(210)
Space heating fuel (main heating system)	127.9955	70.7698	36.1484	8.9883	1.6055	0.0000	0.0000	0.0000	0.0000	16.2640	65.8861	129.5620	(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	234.3869	193.5148	161.8183	106.8743	74.2099	61.9729	63.4100	83.1663	112.7528	165.9427	207.6470	231.7981	(64)
Efficiency of water heater												169.3841	(216)
(217)m	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	169.3841	(217)
Fuel for water heating, kWh/month	138.3760	114.2461	95.5334	63.0958	43.8116	36.5872	37.4357	49.0992	66.5663	97.9683	122.5894	136.8476	(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													
Pumps and Fa	31.0874	28.0789	31.0874	30.0846	31.0874	30.0846	31.0874	31.0874	30.0846	31.0874	30.0846	31.0874	(231)
Lighting	25.2472	20.2542	18.2367	13.3610	10.3204	8.4319	9.4146	12.2375	15.8953	20.8555	23.5562	25.9489	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-35.1077	-52.7799	-80.4913	-92.8055	-99.5397	-94.5977	-92.1479	-86.0298	-77.3874	-62.7531	-39.7825	-30.8469	(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	457.2196	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	169.3841	
Water heating fuel used	1002.1566	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1250)		
mechanical ventilation fans (SFP = 1.1250)	286.0290	(230a)
pump for solar water heating	80.0000	(230g)
Total electricity for the above, kWh/year	366.0290	(231)
Electricity for lighting (calculated in Appendix L)	203.7594	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-844.2694	(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	1184.8952	(238)

10a. Fuel costs - using BEDF prices (593)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	457.2196	27.6700	126.5127	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1002.1566	27.6700	277.2967	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	286.0290	27.6700	79.1442	(249)
Pump for solar water heating	80.0000	27.6700	22.1360	(249)
Energy for lighting	203.7594	27.6700	56.3802	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-844.2694	27.6700	-233.6094	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-233.6094	(252)
Total energy cost			327.8605	(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	457.2196	0.1586	72.4937	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1002.1566	0.1462	146.5640	(264)
Space and water heating			219.0577	(265)
Pumps, fans and electric keep-hot	366.0290	0.1387	50.7727	(267)
Energy for lighting	203.7594	0.1443	29.4088	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-844.2694	0.1340	-113.1193	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-113.1193	(269)
Total CO2, kg/year			186.1199	(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	457.2196	1.5868	725.5344	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1002.1566	1.5410	1544.3336	(278)
Space and water heating			2269.8680	(279)
Pumps, fans and electric keep-hot	366.0290	1.5128	553.7287	(281)
Energy for lighting	203.7594	1.5338	312.5329	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-844.2694	1.4952	-1262.3178	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1262.3178	(283)
Total Primary energy kWh/year			1873.8118	(286)

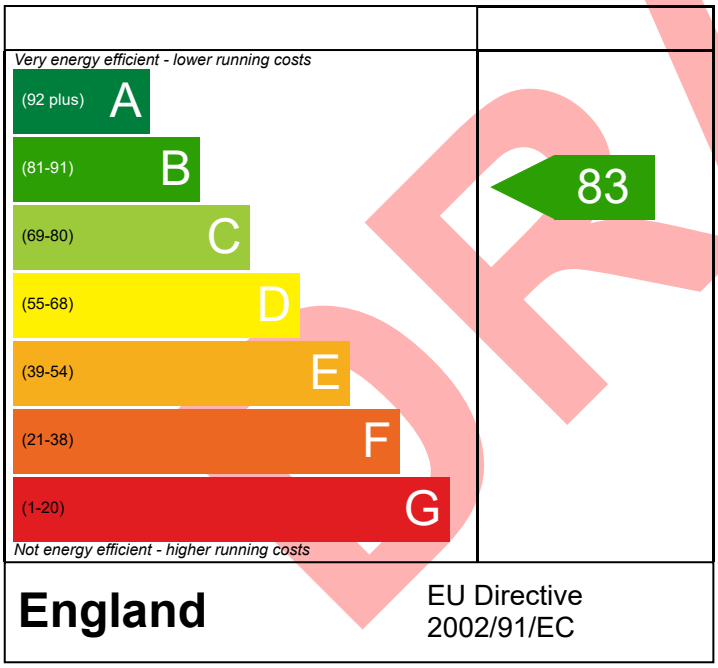
Predicted Energy Assessment

Dwelling type:	House, End-Terrace
Date of assessment:	04/05/2026
SAP Version:	10.2
Produced by:	Chris Law
Total floor area:	91 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.

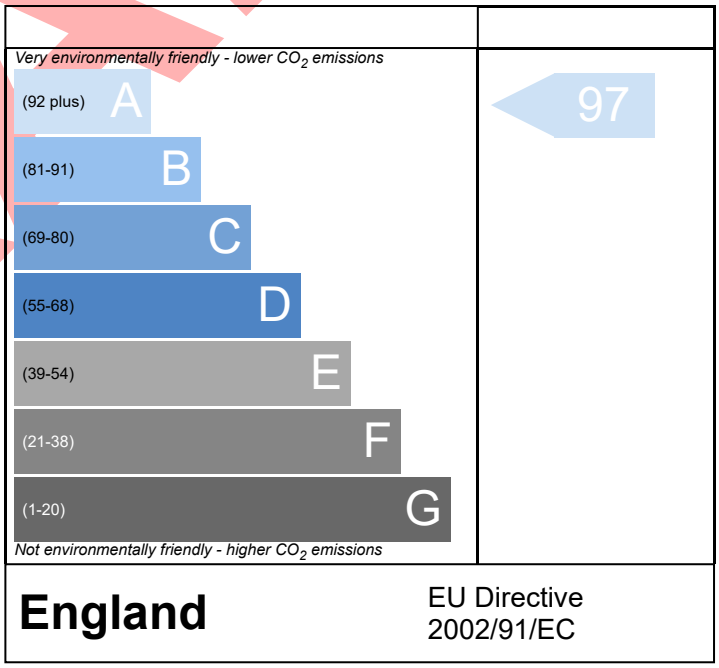
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

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.

DRAFT

Thermal Bridging

elmhurst energy

Plot Reference	Unit 1	Issued on Date	04/05/2026
Assessment Reference	00001	Plot Type Ref	End-Terrace House
Plot Address		SAP Version	10.2

SAP Rating	83 B	DER	3.84	TER	11.25
Environmental	97 A	% DER < TER			65.87
CO_2 Emissions (t/year)	0.34	DFEE	29.88	TFEE	34.86
Compliance Check	See BREL	% DFEE < TFEE			14.28
% DPER < TPER	30.78	DPER	40.72	TPER	58.82

Assessor Details	Mr. Chris Law	Assessor ID	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	0.031	16.53	0.51	
External wall	E3 Sill	Non Gov Approved Schemes	0.028	15.61	0.44	
External wall	E4 Jamb	Non Gov Approved Schemes	0.023	31.96	0.74	
External wall	E5 Ground floor (normal)	Non Gov Approved Schemes	0.058	18.00	1.04	
External wall	E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	0.001	18.00	0.02	
External wall	E11 Eaves (insulation at rafter level)	Non Gov Approved Schemes	0.020	10.76	0.22	
External wall	E13 Gable (insulation at rafter level)	Non Gov Approved Schemes	0.035	6.23	0.22	
External wall	E14 Flat roof	Table K1 - Default	0.160	10.79	1.73	
External wall	E16 Corner (normal)	Non Gov Approved Schemes	0.039	4.80	0.19	
External wall	E18 Party wall between dwellings	Non Gov Approved Schemes	0.039	9.60	0.37	
Party wall	P1 Party wall - Ground floor	Non Gov Approved Schemes	0.044	6.23	0.27	
Party wall	P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	0.000	6.23	0.00	
Party wall	P5 Party wall - Roof (insulation at rafter level)	Non Gov Approved Schemes	0.038	6.23	0.24	

Total: 160.97 W/mK:

Y-Value: 0.03 W/m²K:

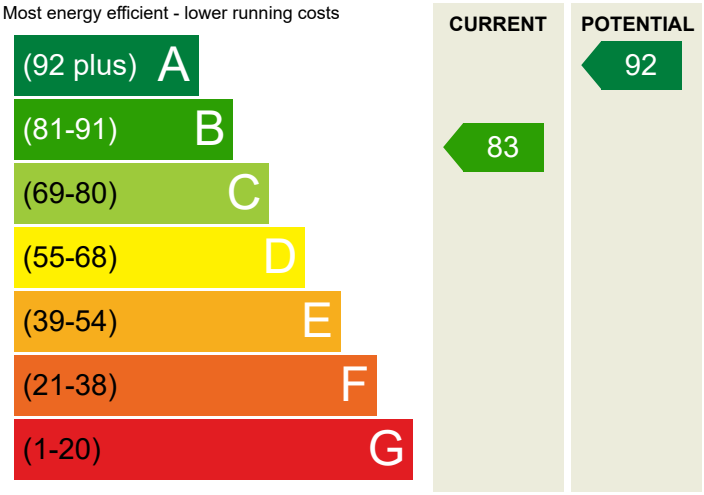
Energy Report

Dwelling Address	
Reference	Unit 1-00001
SAP Version	10.2
Assessment Date	04/05/2026
Submission Date	
Property Type	House, End-Terrace
Total Floor Area	91

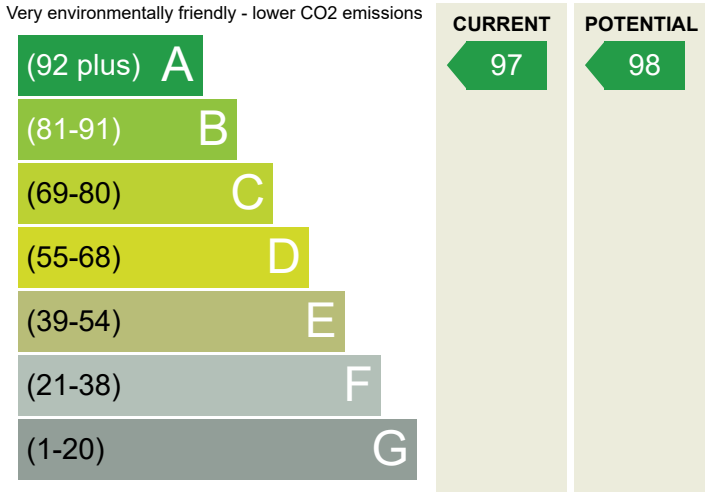
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

Energy Efficiency Rating

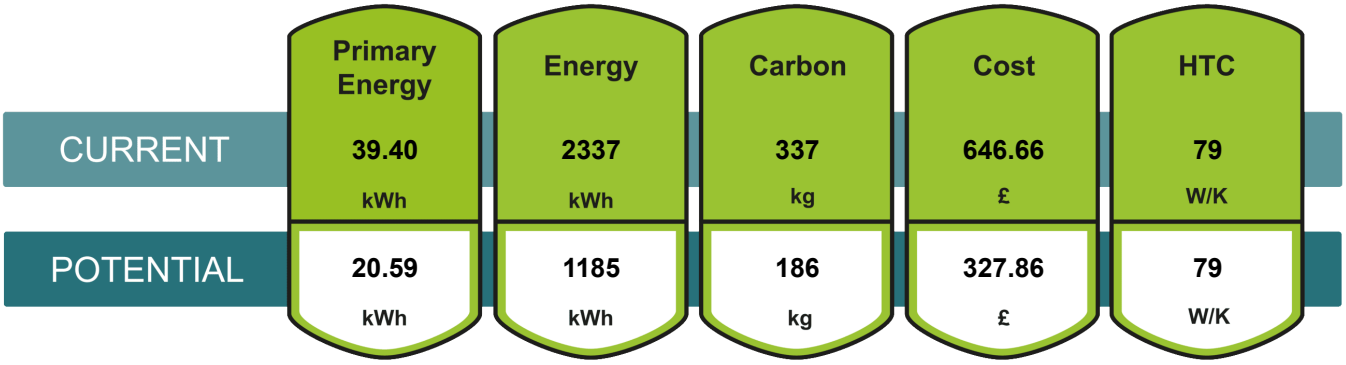


Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home

Energy Report



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.15 W/m²K	Very Good
Floor	Average thermal transmittance 0.12 W/m²K	Very Good
Windows	High performance glazing	Very Good
Main heating	Air source heat pump, radiators and underfloor, electric	Average
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 3.0 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£85	B 85	£4,000 - £7,000	£85	A 97
Photovoltaic	£319	A 92	£8,000 - £10,000	£234	A 98

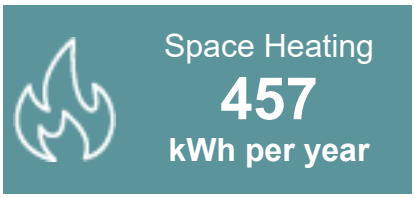
The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

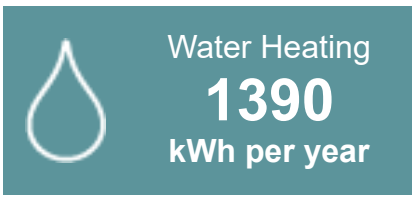
Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£56	£56	
Heating	£206	£228	
Hot Water	£385	£277	
New Technologies e.g. Impact of PV	£0	-(£234)	
TOTAL	£647	£328	

Estimated energy use and potential savings





Energy Report

About this document

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

Disclaimer

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

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO2)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.

Dwelling Sign Off Report

Plot Reference	Unit 1	Issued on Date	04/05/2026
Assessment Reference	00001	Plot Type Ref	End-Terrace House
Plot Address		SAP Version	10.2

SAP Rating	83 B	DER	3.84	TER	11.25
Environmental	97 A	% DER < TER			65.87
CO_2 Emissions (t/year)	0.34	DFEE	29.88	TFEE	34.86
Compliance Check	See BREL	% DFEE < TFEE			14.28
% DPER < TPER	30.78	DPER	40.72	TPER	58.82

Assessor Details	Mr. Chris Law	Assessor ID	AX42-0001
Client	342 Slade Lane, Hannah Beattie		

This report should be used for a client to confirm key assessment details for production of Energy Performance Certificates and should be retained as documentary evidence. It cannot be used in lieu of a BREL/BRWL/Compliance report for demonstrating Building Regulation compliance.

Section 1: Dwelling Information

Dwelling Address (Please confirm final postal address and post code of the dwelling.)

House Name		
House Number		
Postcode		
Street		
Town		
County		

Dwelling Orientation Northeast (Please confirm orientation of main entrance door of the dwelling.)

Comments

Terrain Type Suburban

Property Type House, End-Terrace

Comments

Electricity Tariff Standard

Smart electricity meter fitted: No

Smart gas meter fitted: No

Comments

Section 2: Dwelling Construction Details

External Walls

Description	External Wall		
Type	Cavity Wall		
Construction	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure		
U-value	0.20	W/m²K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	97.00	m²	

Description	Dwarf Wall		
Type	Timber Frame		
Construction	Timber framed wall (one layer of plasterboard)		
U-value	0.16	W/m²K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	12.00	m²	

Comments

External Roofs

Description	External Roof Warm		
Type	External Slope Roof		
Construction	Plasterboard, insulated slope		
U-value	0.15	W/m²K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	29.00	m²	

Description	External Roof Flat		
Type	External Flat Roof		
Construction	Plasterboard, insulated flat roof		
U-value	0.15	W/m²K	U-value calculations should be provided to verify the u-value entered into the Assessment
Gross Area	8.00	m²	

Comments

Heat Loss Floors

Description	Heatloss Floor		
Type	Ground Floor - Solid		
Construction	Slab on ground, screed over insulation		
U-value	0.12	W/m²K	U-value calculations should be provided to verify the u-value entered into the Assessment
Area	33.00	m²	

Comments

Opening Types

Description	Data Source	Type	Glazing	G-value	Frame Type	U-Value (W/m²K)
Window	Manufacturer	Window	Double glazed	0.76		1.20
External Door	Manufacturer	Half Glazed Door	Double glazed	0.76		1.20
Rooflight	Manufacturer	Roof Light	Double glazed	0.76		1.20

Comments

Openings

Name	Opening Type	Location	Orientation	Area (m²)
Window	Window	External Wall	North East	10.81
Window	Window	External Wall	South West	9.23

External Door	External Door	External Wall	North East	1.93
Rooflight	Rooflight	External Roof Warm	North East	0.77

Comments

Thermal Bridging Calculate Bridges

List of Bridges

Bridge Type	Source Type	Length (m)	Psi (W/mK)	Reference
E2 Other lintels (including other steel lintels)	Non Gov Approved Schemes	16.53	0.03	
E3 Sill	Non Gov Approved Schemes	15.61	0.03	
E4 Jamb	Non Gov Approved Schemes	31.96	0.02	
E5 Ground floor (normal)	Non Gov Approved Schemes	18.00	0.06	
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	18.00	0.00	
E11 Eaves (insulation at rafter level)	Non Gov Approved Schemes	10.76	0.02	
E13 Gable (insulation at rafter level)	Non Gov Approved Schemes	6.23	0.04	
E14 Flat roof	Table K1 - Default	10.79	0.16	
E16 Corner (normal)	Non Gov Approved Schemes	4.80	0.04	
E18 Party wall between dwellings	Non Gov Approved Schemes	9.60	0.04	
P1 Party wall - Ground floor	Non Gov Approved Schemes	6.23	0.04	
P2 Party wall - Intermediate floor within a dwelling	Table K1 - Default	6.23	0.00	
P5 Party wall - Roof (insulation at rafter level)	Non Gov Approved Schemes	6.23	0.04	

Y-value 0.033

Comments

Where specific construction details have been used documentary evidence should be provided to the SAP assessor, usually in the form of signed checklists.

Pressure Testing Yes

Designed AP_{50} 3.00 $m^3/(h.m^2)$ @ 50 Pa

Property Tested? Yes

Test Method Blower Door

Where an air pressure test has been carried out a copy of the test certificate should be forwarded to the SAP assessor.

Comments

Section 3: Dwelling Systems

Mechanical Ventilation

Type	Balanced mechanical ventilation with heat recovery	
Brand, Model	Titon, HRV1.6 Q Plus Eco	
Manufacturer SFP	0.90	
MVHR Efficiency	84.00	
Duct Type	Rigid	
Number of Wet Rooms	4	
SFP from Installer Commissioning Certificate	No	Evidence of the measured SFP on a commissioning certificate should be provided
Approved Installation	Yes	Evidence should be provided to show the system has been commissioned by a member of a Competent Persons Scheme
MVHR System Location	Inside heated envelope (installed exclusively)	

Comments

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	0
Number of passive vents	0
Number of flueless gas fires	0

Comments

Fixed Cooling System

No

Comments

Lighting

No Fixed Lighting: No

Name	Efficacy (lm/W)	Power (W)	Capacity (lm)	Count
Lighting	80.00	25.00	2000.00	12

Comments

Dwelling Sign Off Report

elmhurst energy

Main Heating 1	Database	
Fuel Type	Electricity	
Winter Efficiency	247.31	%
Summer Efficiency	169.37	%
Model Name	aroTHERM plus 5kW + AI	
Manufacturer	Vaillant Group UK Ltd	
System Type	Heat Pump	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Heat Emitter	Radiators and Underfloor	
Flow Temperature	Enter value	
Flow Temperature Value	45.00	

Comments

Heating Controls

Description	Time and temperature zone control by arrangement
Boiler Interlock	No
Delayed Start Stat	No
PCDF Control Description	

Comments

Main Heating 2		
Secondary Heating	None	

Water Heating System

Water Heating	Main Heating 1	
Supplementary Immersion	No	
SAP Code	901	
Water use <= 125 l/p/day	Yes	
Cold Water Source	From mains	
Number of baths	1	

Comments

Hot Water Cylinder	Hot Water Cylinder	
Independent Time Control	Yes	
Cylinder Stat	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	200.00	L

Measured Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	

Comments

Waste Water Heat Recovery System

Comments

Section 4: Dwelling Renewable Energy

Photovoltaic Unit	None

Section 5: Declaration

I confirm to the best of my knowledge the details provided in this report are an accurate representation of how the dwelling has been constructed.

Signed .....

Date .....