

Building Regulations England Part L (BREL) Compliance Report

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

Date: Tue 21 Apr 2026 16:46:42

Project Information			
Assessed By	Derek White	Building Type	House, Detached
OCDEA Registration	EES/004958	Assessment Date	2026-04-21

Dwelling Details			
Assessment Type	As designed	Total Floor Area	140 m ²
Site Reference	1 Be Lean	Plot Reference	001
Address			

Client Details	
Name	Dan & Carolyn Schuster-Woldan
Company	Own Build
Address	land adjacent to, 2 Coleridge Road, London, N8 8EJ

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

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	12.53 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	4.83 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	66.69 kWh _{PE} /m ²		
Dwelling primary energy	50.55 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	59.8 kWh/m ²		
Dwelling fabric energy efficiency	53.0 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.15	Walls (1) (0.15)	OK
Party walls	0.2	N/A	N/A	N/A
Curtain walls	1.6	N/A	N/A	N/A
Floors	0.18	0.1	FT1 - Ground (0.1)	OK
Roofs	0.16	0.1	Roof (1) (0.1)	OK
Windows, doors, and roof windows	1.6	1.21	H-RL1 (1.7)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Walls (1)	174.31	0.15	
Ground floor: FT1 - Ground, FT1 - Ground	97.62000274658203	0.1 (!)	
Exposed roof: Roof (1)	53.668201831055	0.1 (!)	
Exposed roof: Roof (2)	41.290000915527	0.1 (!)	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
NE-GD1, NE-GD1	3.12	North East	N/A	1 (!)
NE-GW1, NE-GW1	5.018	North East	0.8	1.2
NW-GW3, NE-GW1	7.02	North West	0.8	1.2
SW-GW4, NE-GW1	13	South West	0.8	1.2
SW-GW5, NE-GW1	6.188	South West	0.8	1.2
SE-GW2, NE-GW1	4.914	South East	0.8	1.2
SE-GW6, NE-GW1	1.8	South East	0.8	1.2
NE-FW1, NE-GW1	0.96	North East	0.8	1.2
SE-FW2, NE-GW1	1.92	South East	0.8	1.2
SE-FW3, NE-GW1	2.56	South East	0.8	1.2
NW-FW4, NE-GW1	2.56	South East	0.8	1.2
H-RL1, H-RL1	1.1218	Horizontal	0.8	1.7

Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
H-RL2, H-RL1	0.54	Horizontal	0.8	1.7
H-RL3, H-RL1	1	Horizontal	0.8	1.7

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)	Calculated by person with suitable expertise	0.02500000037252903 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.02199999988079071 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.017999999225139618 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.04800000041723251	
External wall	E15: Flat roof with parapet	SAP table default	0.3	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.03500000014901161 (!)	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.06599999964237213	
Roof	R1: Head of roof window	SAP table default	0.24	
Roof	R2: Sill of roof window	SAP table default	0.24	
Roof	R3: Jamb of roof window	SAP table default	0.24	

3 Air permeability (better than typically expected values are flagged with a subsequent (!))

Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	4 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat pump with radiators or underfloor heating - Electricity

Efficiency	249.9%
Emitter type	Both radiators and underfloor
Flow temperature	35°C
System type	Air source heat pump
Manufacturer	
Model	
Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	250 litres
Declared heat loss	1.6100000143051147 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	120 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	0.93 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	86%	OK
Manufacturer/Model	ComfoAir 350	
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Summary for Input Data

Plot Reference	1 Be Lean	Issued on Date	21/04/2026
Assessment Reference	001	Plot Type Ref	Lat_2 Coleridge Road N8 8EJ
Plot Address		SAP Version	10.2

SAP Rating	78 C	DER	4.83	TER	12.53
Environmental	95 A	% DER < TER			61.45
CO ₂ Emissions (t/year)	0.58	DFEE	52.98	TFEE	59.79
Compliance Check	See BREL	% DFEE < TFEE			11.40
% DPER < TPER	24.21	DPER	50.55	TPER	66.69

Assessor Details	Mr. Derek White	Assessor ID	B381-0001
Client			

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, Detached	
2.0 Number of Storeys	2	
3.0 Date Built	2026	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Very little	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	176.47	kJ/m²

7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements				
	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	1st Storey:	1.00 m	97.62 m ²	2.60 m
		1.00 m	42.49 m ²	3.06 m

8.0 Living Area	34.00	m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
WT1 - Brick faced	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.15	60.00	223.37	174.31	0.00	None	49.06	Enter Gross Area

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
IW1	Plasterboard on timber frame	9.00	170.21

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
RT1 - GF Flat	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	55.33	53.67	None	0.00	Enter Gross Area	1.66
RT2 - FF Flat	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	42.29	41.29	None	0.00	Enter Gross Area	1.00

Description	Storey	Construction	Kappa	Area (m ²)
IC1	Lowest occupied	Other	9.00	42.29

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
FT1 - Ground	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.10	None	0.00	110.00	97.62

11.2 Internal Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
IF1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	18.00	42.29

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
NE-GD1	Manufacturer	Solid Door				0.00			1.00
NE-GW1	Manufacturer	Window	Double Low-E Soft 0.05			0.40		0.80	1.20
H-RL1	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.40		0.80	1.70

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
NE-GD1	NE-GD1	WT1 - Brick faced	North East	3.12	
NE-GW1	NE-GW1	WT1 - Brick faced	North East	5.02	
NW-GW3	NE-GW1	WT1 - Brick faced	North West	7.02	
SW-GW4	NE-GW1	WT1 - Brick faced	South West	13.00	
SW-GW5	NE-GW1	WT1 - Brick faced	South West	6.19	
SE-GW2	NE-GW1	WT1 - Brick faced	South East	4.91	
SE-GW6	NE-GW1	WT1 - Brick faced	South East	1.80	
NE-FW1	NE-GW1	WT1 - Brick faced	North East	0.96	
SE-FW2	NE-GW1	WT1 - Brick faced	South East	1.92	
SE-FW3	NE-GW1	WT1 - Brick faced	South East	2.56	
NW-FW4	NE-GW1	WT1 - Brick faced	South East	2.56	
H-RL1	H-RL1	RT1 - GF Flat	Horizontal	1.12	0
H-RL2	H-RL1	RT1 - GF Flat	Horizontal	0.54	0
H-RL3	H-RL1	RT2 - FF Flat	Horizontal	1.00	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	21.91	0.03	0.03	No
E3 Sill	Independently assessed	8.70	0.02	0.02	No
E4 Jamb	Independently assessed	46.04	0.02	0.02	No
E5 Ground floor (normal)	Independently assessed	55.23	0.05	0.05	No
E15 Flat roof with parapet	Table K1 - Default	55.70	0.30	0.30	No
E16 Corner (normal)	Independently assessed	43.44	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	5.20	-0.07	-0.07	No
R1 Head of roof window	Table K1 - Default	8.12	0.24	0.24	No
R2 Sill of roof window	Table K1 - Default	8.12	0.24	0.24	No
R3 Jamb of roof window	Table K1 - Default	5.42	0.24	0.24	No

Y-value 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	500142
Configuration	4
Manufacturer SFP	0.93
Duct Type	Rigid
MVHR Efficiency	86.00
Wet Rooms	4
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

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

Summary for Input Data

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

22.0 Pressure Testing

Designed AP ₅₀	4.00	m ³ /(h.m ²) @ 50 Pa
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	Efficacy	Power	Capacity	Count
	Low energy Lighting	120.00	6.00	720.00	40

24.0 Main Heating 1

Percentage of Heat	100.00	%
Fuel Type	Electricity	
SAP Code	214	
In Winter	249.90	
In Summer	175.10	
Controls SAP Code	2207	
Controls description	Time and temperature zone control by arrangement	
PCDF Controls	0	
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	35.00	

25.0 Main Heating 2

26.0 Heat Networks

27.0 Secondary Heating

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
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Summary for Input Data



Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Stand alone shower	Combi boiler or unvented hot water system	8.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Hot Water Cylinder	
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Cylinder Volume	250.00
Loss	1.61
Pipes insulation	Fully insulated primary pipework

L

kWh/day

31.0 Thermal Store

None

Recommendations

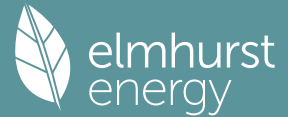
Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement SAP rating	Environmental Impact
Solar water heating	£4,000 - £7,000	£96	C 79	A 96
Photovoltaic	£8,000 - £10,000	£273	B 84	A 97
Wind turbine			0	0

Full SAP Calculation Printout



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Plot Address					SAP Version	10.2	
SAP Rating	78 C	DER	4.83	TER	12.53		
Environmental	95 A	% DER < TER				61.45	
CO ₂ Emissions (t/year)	0.58	DFEE	52.98	TFEE	59.79		
Compliance Check	See BREL	% DFEE < TFEE				11.40	
% DPER < TPER	24.21	DPER	50.55	TPER	66.69		
Assessor Details	Mr. Derek White				Assessor ID	B381-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (5)

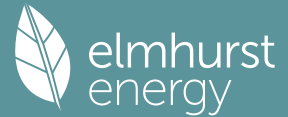
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.2550 0.2500 0.2450 0.2200 0.2150 0.1900 0.1900 0.1850 0.2000 0.2150 0.2250 0.2350 (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) =	77.4000 (23c)
Effective ac	0.3680 0.3630 0.3580 0.3330 0.3280 0.3030 0.3030 0.2980 0.3130 0.3280 0.3380 0.3480 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
NE-GD1			3.1200	1.0000	3.1200		(26)
NE-GW1			45.9400	1.1450	52.6031		(27)
H-RL1			2.6600	1.5918	4.2341		(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003 (28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997 (29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300 (30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100 (30)
Total net area of external elements Aum (A, m ²)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		105.3616		(33)
Main dwelling							
IW1			170.2100			9.0000	1531.8901 (32c)
IF1			42.2900			18.0000	761.2200 (32d)
IC1			42.2900			9.0000	380.6100 (32e)

Full SAP Calculation Printout



Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
176.4696 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

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

Point Thermal bridges

Total fabric heat loss

(36a) = 27.3045 (36)
(33) + (36) + (36a) = 132.6661 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$

(38)m	Jan 46.6125	Feb 45.9792	Mar 45.3458	Apr 42.1792	May 41.5459	Jun 38.3793	Jul 38.3793	Aug 37.7460	Sep 39.6459	Oct 41.5459	Nov 42.8126	Dec 44.0792	(38)
Heat transfer coeff	179.2786	178.6453	178.0120	174.8454	174.2121	171.0454	171.0454	170.4121	172.3121	174.2121	175.4787	176.7453	(39)
Average = Sum(39)m / 12 =												174.6871	(39)

HLP	Jan 1.2796	Feb 1.2750	Mar 1.2705	Apr 1.2479	May 1.2434	Jun 1.2208	Jul 1.2208	Aug 1.2163	Sep 1.2298	Oct 1.2434	Nov 1.2524	Dec 1.2615	(40)
HLP (average)												1.2468	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	(40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173	(42)
Hot water usage for mixer showers														
73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	(42a)		
Hot water usage for baths														
31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	(42b)		
Hot water usage for other uses														
44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	(42c)		
Average daily hot water use (litres/day)													137.1595	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use														
149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	(44)		
Energy content (annual)	236.3156	207.9388	218.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2278.1907		
35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	(46)		
Water storage loss (or HIU loss):														
Store volume													250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.8694	(55)
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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														
286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	(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														
286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	(64)		
12Total per year (kWh/year)													2869.4177	(64)
Electric shower(s)													2869	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														
Heat gains from water heating, kWh/month														
118.7460	105.4232	112.8131	100.8908	99.0111	90.5139	90.1653	92.9462	93.1032	102.2874	106.9282	117.6516	(65)		

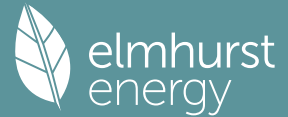
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan 145.8647	Feb 145.8647	Mar 145.8647	Apr 145.8647	May 145.8647	Jun 145.8647	Jul 145.8647	Aug 145.8647	Sep 145.8647	Oct 145.8647	Nov 145.8647	Dec 145.8647	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
156.1259	172.8537	156.1259	161.3301	156.1259	161.3301	156.1259	156.1259	156.1259	161.3301	156.1259	161.3301	156.1259	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
309.5371	312.7491	304.6549	287.4233	265.6715	245.2279	231.5703	228.3583	236.4525	253.6841	275.4359	295.8795	295.8795	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	(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)													
-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	(71)
Water heating gains (Table 5)													
159.6048	156.8797	151.6306	140.1262	133.0794	125.7137	121.1899	124.9277	129.3101	137.4831	148.5114	158.1339	158.1339	(72)
Total internal gains													
695.0272	712.2419	682.1708	658.6390	624.6362	599.0311	575.6455	576.1713	593.8520	617.0524	655.0367	679.8987	679.8987	(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	5.9800	11.2829	0.4000	0.8000	0.7700	14.9626 (75)

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Southeast			13.7500	36.7938	0.4000	0.8000	0.7700	112.1918 (77)
Southwest			19.1900	36.7938	0.4000	0.8000	0.7700	156.5789 (79)
Northwest			7.0200	11.2829	0.4000	0.8000	0.7700	17.5648 (81)
Horizontal			2.6600	26.0000	0.4000	0.8000	1.0000	19.9181 (82)

Solar gains	321.2161	565.3946	819.2374	1086.9650	1279.7734	1297.0237	1239.5047	1092.1982	911.7187	637.4597	388.1338	272.6628 (83)
Total gains	1016.2433	1277.6365	1501.4082	1745.6040	1904.4096	1896.0548	1815.1502	1668.3695	1505.5707	1254.5121	1043.1705	952.5616 (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	38.3096	38.4455	38.5822	39.2810	39.4238	40.1537	40.1537	40.3029	39.8585	39.4238	39.1392	38.8587	
alpha	3.5540	3.5630	3.5721	3.6187	3.6283	3.6769	3.6769	3.6869	3.6572	3.6283	3.6093	3.5906	
util living area	0.9857	0.9684	0.9341	0.8518	0.7166	0.5423	0.4049	0.4540	0.6847	0.9009	0.9728	0.9885 (86)	
MIT	19.4682	19.7234	20.0569	20.4554	20.7283	20.8673	20.9032	20.8969	20.7997	20.4164	19.8749	19.4372 (87)	
Th 2	19.8569	19.8604	19.8640	19.8819	19.8854	19.9034	19.9034	19.9070	19.8962	19.8854	19.8783	19.8711 (88)	
util rest of house	0.9822	0.9610	0.9188	0.8192	0.6595	0.4613	0.3083	0.3530	0.6050	0.8710	0.9652	0.9857 (89)	
MIT 2	18.0788	18.4033	18.8212	19.3130	19.6169	19.7652	19.7908	19.7914	19.7052	19.2837	18.6116	18.0498 (90)	
Living area fraction									fLA = Living area / (4) =				0.2427 (91)
MIT	18.4160	18.7237	19.1210	19.5902	19.8866	20.0326	20.0607	20.0597	19.9708	19.5586	18.9181	18.3864 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.4160	18.7237	19.1210	19.5902	19.8866	20.0326	20.0607	20.0597	19.9708	19.5586	18.9181	18.3864 (93)	

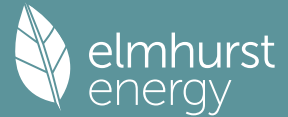
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9763	0.9515	0.9066	0.8094	0.6596	0.4713	0.3225	0.3675	0.6108	0.8603	0.9566	0.9806 (94)
Useful gains	992.1083	1215.6521	1361.1700	1412.9630	1256.1760	893.5349	585.4258	613.1719	919.6557	1079.3119	997.8482	934.0575 (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	2530.6904	2469.5337	2246.6980	1869.1338	1426.2050	929.2216	591.9399	623.6530	1011.6152	1560.6899	2073.8317	2507.3872 (97)
Space heating kWh	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98a)
Space heating requirement - total per year (kWh/year)												5404.5015
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	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5404.5015
Space heating per m2										(98c) / (4) =		38.5733 (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 %)												249.9000 (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	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	458.0652	337.1782	263.6386	131.4298	50.6209	0.0000	0.0000	0.0000	0.0000	143.3154	310.0073	468.4103 (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	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	163.6376	144.6563	153.4473	134.2703	129.7409	116.4467	114.5473	119.3239	120.8943	135.3683	144.6400	161.7580 (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	46.2341	41.7598	46.2341	44.7426	46.2341	44.7426	46.2341	46.2341	44.7426	46.2341	44.7426	46.2341 (231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797 (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												2162.6657 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000

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Water heating fuel used	1638.7309 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625) mechanical ventilation fans (SFP = 1.1625)	544.3689 (230a)
Total electricity for the above, kWh/year	544.3689 (231)
Electricity for lighting (calculated in Appendix L)	231.4848 (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	4577.2502 (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	2162.6657	0.1559	337.0791 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1638.7309	0.1410	231.0408 (264)	
Space and water heating			568.1200 (265)	
Pumps, fans and electric keep-hot	544.3689	0.1387	75.5107 (267)	
Energy for lighting	231.4848	0.1443	33.4104 (268)	
Total CO2, kg/year			677.0411 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.8300 (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	2162.6657	1.5770	3410.5593 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1638.7309	1.5213	2493.0433 (278)	
Space and water heating			5903.6026 (279)	
Pumps, fans and electric keep-hot	544.3689	1.5128	823.5212 (281)	
Energy for lighting	231.4848	1.5338	355.0591 (282)	
Total Primary energy kWh/year			7082.1829 (286)	
Dwelling Primary energy Rate (DPER)			50.5500 (287)	

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

1. Overall dwelling characteristics

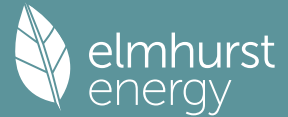
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)	
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	383.8314 (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	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1042 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3542 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3542 (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	0.4516	0.4428	0.4339	0.3896	0.3808	0.3365	0.3365	0.3276	0.3542	0.3808	0.3985	0.4162 (22b)
Effective ac	0.6020	0.5980	0.5941	0.5759	0.5725	0.5566	0.5566	0.5537	0.5627	0.5725	0.5794	0.5866 (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								
TER Opaque door			3.1200	1.0000	3.1200			(26)
TER Opening Type			30.1500	1.1450	34.5229			(27)
TER Roof Window			1.7500	1.1450	2.7856			(27a)
FT1 - Ground			97.6200	0.1300	12.6906			(28a)
WT1 - Brick faced	223.3700	33.2700	190.1000	0.1800	34.2180			(29a)
RT1 - GF Flat	55.3300	1.0900	54.2400	0.1100	5.9664			(30)
RT2 - FF Flat	42.2900	0.6600	41.6300	0.1100	4.5793			(30)
Total net area of external elements Aum(A, m2)			418.6100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	97.8828			(33)

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

176.4696 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	21.9100	0.0500	1.0955	
E3 Sill	8.7000	0.0500	0.4350	
E4 Jamb	46.0400	0.0500	2.3020	
E5 Ground floor (normal)	55.2300	0.1600	8.8368	
E15 Flat roof with parapet	55.7000	0.5600	31.1920	
E16 Corner (normal)	43.4400	0.0900	3.9096	
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0900	-0.4680	
R1 Head of roof window	8.1200	0.0800	0.6496	
R2 Sill of roof window	8.1200	0.0600	0.4872	
R3 Jamb of roof window	5.4200	0.0800	0.4336	

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

48.8733 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 146.7561 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	76.2495	75.7479	75.2562	72.9469	72.5149	70.5035	70.5035	70.1310	71.2782	72.5149	73.3889	74.3027	(38)
Average = Sum(39)m / 12 =	223.0056	222.5040	222.0123	219.7030	219.2709	217.2596	217.2596	216.8871	218.0343	219.2709	220.1450	221.0588	(39)
												219.7009	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5916	1.5881	1.5846	1.5681	1.5650	1.5506	1.5506	1.5480	1.5562	1.5650	1.5712	1.5778	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

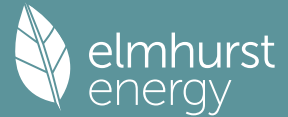
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173 (42)
Hot water usage for mixer showers													
73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	72.8531	(42a)
Hot water usage for baths													
31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	31.4662	(42b)
Hot water usage for other uses													
44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	44.5060	(42c)
Average daily hot water use (litres/day)													137.1595 (43)
Daily hot water use													
149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	148.8252	(44)
Energy conte	236.3156	207.9388	182.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m	35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8903 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0208 (55)
Total storage loss													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(56)
If cylinder contains dedicated solar storage													
31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	(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													
291.2224	257.5321	273.3793	239.6488	231.8692	208.4398	205.2653	213.6291	216.2275	241.7229	257.8062	287.9312	287.9312	(62)
WWHRS	-33.4335	-29.5688	-30.9628	-25.6384	-23.8941	-20.4463	-19.1652	-20.3802	-21.1546	-24.9389	-28.2527	-32.8143	(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													
257.7889	227.9632	242.4165	214.0104	207.9752	187.9935	186.1002	193.2489	195.0729	216.7840	229.5535	255.1168	255.1168	(64)
12Total per year (kWh/year)													2614.0240 (64)
Electric shower(s)													2614 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
122.5004	108.8142	116.5675	104.5241	102.7654	94.1471	93.9197	96.7006	96.7365	106.0418	110.5615	121.4060	121.4060	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
156.1259	172.8537	156.1259	161.3301	156.1259	161.3301	156.1259	156.1259	161.3301	156.1259	161.3301	156.1259	156.1259	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
309.5371	312.7491	304.6549	287.4233	265.6715	245.2279	231.5703	228.3583	236.4525	253.6841	275.4359	295.8795	295.8795	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	(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)													

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	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	(71)
Water heating gains (Table 5)	164.6510	161.9260	156.6768	145.1724	138.1256	130.7599	126.2361	129.9739	134.3563	142.5293	153.5576	(72)
Total internal gains	700.0734	717.2882	687.2170	663.6852	629.6824	604.0773	580.6917	581.2175	598.8983	622.0987	660.0830	(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					3.9300	11.2829	0.6300	0.7000			0.7700			13.5515 (75)
Southeast					9.0200	36.7938	0.6300	0.7000			0.7700			101.4270 (77)
Southwest					12.5900	36.7938	0.6300	0.7000			0.7700			141.5704 (79)
Northwest					4.6100	11.2829	0.6300	0.7000			0.7700			15.8963 (81)
Horizontal					1.7500	26.0000	0.6300	0.7000			1.0000			18.0590 (82)
Solar gains	290.5041	511.3633	741.0110	983.2641	1157.7476	1173.3805	1121.3337	988.0255	824.6928	576.5592	351.0287	246.5897 (83)		
Total gains	990.5775	1228.6514	1428.2280	1646.9494	1787.4301	1777.4579	1702.0254	1569.2431	1423.5911	1198.6578	1011.1117	931.5347 (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	30.7979	30.8673	30.9357	31.2608	31.3224	31.6124	31.6124	31.6667	31.5001	31.3224	31.1981	31.0691	
alpha	3.0532	3.0578	3.0624	3.0841	3.0882	3.1075	3.1075	3.1111	3.1000	3.0882	3.0799	3.0713	
util living area	0.9871	0.9748	0.9521	0.8988	0.8027	0.6573	0.5164	0.5688	0.7766	0.9298	0.9776	0.9892	(86)
MIT	18.5219	18.8466	19.3197	19.9315	20.4514	20.7977	20.9299	20.9042	20.6373	19.9420	19.1226	18.4730	(87)
Th 2	19.6195	19.6221	19.6247	19.6368	19.6391	19.6497	19.6497	19.6517	19.6456	19.6391	19.6345	19.6297	(88)
util rest of house	0.9837	0.9682	0.9392	0.8705	0.7453	0.5561	0.3763	0.4281	0.6913	0.9041	0.9707	0.9864	(89)
MIT 2	16.7921	17.2049	17.8013	18.5601	19.1633	19.5227	19.6240	19.6126	19.3831	18.5930	17.5670	16.7358	(90)
Living area fraction	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(91)
MIT	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9744	0.9542	0.9205	0.8510	0.7373	0.5712	0.4086	0.4592	0.6944	0.8857	0.9578	0.9784	(94)
Useful gains	965.2459	1172.3713	1314.6733	1401.5318	1317.8395	1015.2047	695.4662	720.5499	988.5446	1061.7085	968.4862	911.3683	(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	2879.4248	2826.5340	2590.8296	2195.4620	1705.0234	1136.7277	725.8445	764.7444	1218.2590	1824.4165	2387.3545	2864.3320	(97)
Space heating kWh	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(98a)
Space heating requirement - total per year (kWh/year)												7386.9461	
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	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7386.9461	
Space heating per m2										(98c) / (4) =		52.7225	(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	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(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)	1542.9568	1204.3308	1028.6677	619.3172	312.0962	0.0000	0.0000	0.0000	0.0000	614.7938	1106.8095	1574.2199	(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	257.7889	227.9632	242.4165	214.0104	207.9752	187.9935	186.1002	193.2489	195.0729	216.7840	229.5535	255.1168	(64)	
Efficiency of water heater (217)m	87.2911	87.1278	86.8087	86.1532	84.7906	79.8000	79.8000	79.8000	79.8000	86.1153	86.9997	87.3290	(216)	
Fuel for water heating, kWh/month	295.3210	261.6425	279.2536	248.4068	245.2810	235.5808	233.2082	242.1665	244.4523	251.7370	263.8554	292.1331	(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	32.4399	26.0245	23.4322	17.1674	13.2606	10.8340	12.0968	15.7238	20.4237	26.7970	30.2671	33.3415	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-78.0162	-103.8470	-141.0000	-149.4120	-153.7334	-140.7991	-138.8603	-134.4501	-125.9556	-114.0088	-83.4636	-68.1760	(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)	

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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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-64.9187	-133.4716	-259.8658	-382.8152	-499.2804	-499.3276	-493.6087	-421.1815	-313.0010	-188.4840	-85.8443	-51.5920 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												8003.1919 (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												3093.0382 (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)												261.8084 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4825.1132 (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												6618.9254 (238)

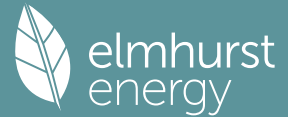
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	8003.1919	0.2100	1680.6703 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3093.0382	0.2100	649.5380 (264)
Space and water heating			2330.2083 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	261.8084	0.1443	37.7870 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1431.7223	0.1359	-194.5192
PV Unit electricity exported	-3393.3909	0.1265	-429.1609
Total			-623.6801 (269)
Total CO2, kg/year			1756.2445 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5300 (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	8003.1919	1.1300	9043.6069 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3093.0382	1.1300	3495.1332 (278)
Space and water heating			12538.7401 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	261.8084	1.5338	401.5705 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1431.7223	1.5022	-2150.7324
PV Unit electricity exported	-3393.3909	0.4643	-1575.4004
Total			-3726.1328 (283)
Total Primary energy kWh/year			9344.2786 (286)
Target Primary Energy Rate (TPER)			66.6900 (287)

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Plot Reference	1 Be Lean				Issued on Date	21/04/2026	
Assessment Reference	001			Plot Type Ref	Lat_2 Coleridge Road N8 8EJ		
Plot Address					SAP Version	10.2	
SAP Rating	78 C		DER	4.83		TER	12.53
Environmental	95 A		% DER < TER				61.45
CO ₂ Emissions (t/year)	0.58		DFEE	52.98		TFEE	59.79
Compliance Check	See BREL		% DFEE < TFEE				11.40
% DPER < TPER	24.21		DPER	50.55		TPER	66.69
Assessor Details	Mr. Derek White				Assessor ID	B381-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) = 0.1042 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3042 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3042 (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	0.3879	0.3803	0.3727	0.3346	0.3270	0.2890	0.2890	0.2814	0.3042	0.3270	0.3422	0.3574 (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	0.5752	0.5723	0.5694	0.5560	0.5535	0.5418	0.5418	0.5396	0.5463	0.5535	0.5586	0.5639 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
NE-GD1			3.1200	1.0000	3.1200		(26)
NE-GW1			45.9400	1.1450	52.6031		(27)
H-RL1			2.6600	1.5918	4.2341		(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003 (28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997 (29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300 (30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100 (30)
Total net area of external elements Aum(A, m ²)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x k)					(26)...(30) + (32) =	105.3616	(33)
Main dwelling							
IW1			170.2100			9.0000	1531.8901 (32c)
IF1			42.2900			18.0000	761.2200 (32d)
IC1			42.2900			9.0000	380.6100 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 176.4696 (35)
List of Thermal Bridges

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Total gains 907.7327 1170.4885 1397.4060 1649.1876 1812.4556 1811.8137 1734.1307 1585.2021 1419.8089 1160.4926 941.9105 845.0831 (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	33.4171	33.4774	33.5367	33.8180	33.8711	34.1208	34.1208	34.1674	34.0242	33.8711	33.7638	33.6523
alpha	3.2278	3.2318	3.2358	3.2545	3.2581	3.2747	3.2747	3.2778	3.2683	3.2581	3.2509	3.2435
util living area	0.9899	0.9771	0.9518	0.8900	0.7801	0.6234	0.4814	0.5372	0.7583	0.9303	0.9811	0.9920 (86)
MIT	18.6509	18.9968	19.4783	20.0790	20.5606	20.8518	20.9525	20.9317	20.7052	20.0416	19.2294	18.5928 (87)
Th 2	19.7124	19.7144	19.7164	19.7256	19.7273	19.7354	19.7354	19.7368	19.7323	19.7273	19.7238	19.7202 (88)
util rest of house	0.9873	0.9713	0.9394	0.8611	0.7225	0.5276	0.3554	0.4082	0.6748	0.9055	0.9754	0.9899 (89)
MIT 2	17.6064	17.9496	18.4225	19.0011	19.4310	19.6628	19.7215	19.7147	19.5655	18.9825	18.1897	17.5541 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.8599	18.2038	18.6787	19.2626	19.7051	19.9513	20.0202	20.0101	19.8420	19.2395	18.4420	17.8061 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.8599	18.2038	18.6787	19.2626	19.7051	19.9513	20.0202	20.0101	19.8420	19.2395	18.4420	17.8061 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9818	0.9619	0.9262	0.8484	0.7214	0.5453	0.3851	0.4379	0.6830	0.8933	0.9671	0.9852 (94)
Useful gains	891.2082	1125.9186	1294.2649	1399.2202	1307.4316	987.9331	667.8993	694.1747	969.7927	1036.6548	910.9314	832.5998 (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	2786.9124	2729.3492	2494.1123	2104.5500	1623.2060	1077.1583	688.4482	725.6685	1159.0814	1751.8392	2307.1418	2776.8829 (97)
Space heating kWh	1410.4039	1077.5053	892.6865	507.8374	234.9361	0.0000	0.0000	0.0000	0.0000	532.0972	1005.2715	1446.5467 (98a)
Space heating requirement - total per year (kWh/year)	7107.2847											
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	1410.4039	1077.5053	892.6865	507.8374	234.9361	0.0000	0.0000	0.0000	0.0000	532.0972	1005.2715	1446.5467 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	7107.2847											
Space heating per m2	(98c) / (4) = 50.7265 (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	1892.1068	1489.5309	1527.7005	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7914	0.8554	0.8195	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1497.3645	1274.1161	1252.0005	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2025.0457	1938.6520	1771.8361	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	379.9305	494.4147	386.7576	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	94.9826	123.6037	96.6894	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	315.2757 (107)											
Energy for space heating	50.7265 (99)											
Energy for space cooling	2.2502 (108)											
Total	52.9767 (109)											
Fabric Energy Efficiency (DFEE)	53.0 (109)											

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

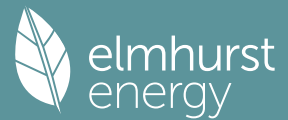
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)	
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (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)

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Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1042 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3542 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3542 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)	
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)	
Adj infilt rate	0.4516 0.4428 0.4339 0.3896 0.3808 0.3365 0.3365 0.3276 0.3542 0.3808 0.3985 0.4162 (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	0.6020 0.5980 0.5941 0.5759 0.5725 0.5566 0.5566 0.5537 0.5627 0.5725 0.5794 0.5866 (25)	

3. Heat losses and heat loss parameter

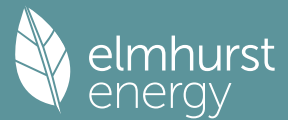
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			3.1200	1.0000	3.1200		(26)
TER Opening Type			30.1500	1.1450	34.5229		(27)
TER Roof Window			1.7500	1.1450	2.7856		(27a)
FT1 - Ground			97.6200	0.1300	12.6906		(28a)
WT1 - Brick faced	223.3700	33.2700	190.1000	0.1800	34.2180		(29a)
RT1 - GF Flat	55.3300	1.0900	54.2400	0.1100	5.9664		(30)
RT2 - FF Flat	42.2900	0.6600	41.6300	0.1100	4.5793		(30)
Total net area of external elements Aum(A, m2)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		97.8828		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							176.4696 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				21.9100	0.0500	1.0955	
E3 Sill				8.7000	0.0500	0.4350	
E4 Jamb				46.0400	0.0500	2.3020	
E5 Ground floor (normal)				55.2300	0.1600	8.8368	
E15 Flat roof with parapet				55.7000	0.5600	31.1920	
E16 Corner (normal)				43.4400	0.0900	3.9096	
E17 Corner (inverted - internal area greater than external area)				5.2000	-0.0900	-0.4680	
R1 Head of roof window				8.1200	0.0800	0.6496	
R2 Sill of roof window				8.1200	0.0600	0.4872	
R3 Jamb of roof window				5.4200	0.0800	0.4336	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							48.8733 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	146.7561 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 76.2495	Feb 75.7479	Mar 75.2562	Apr 72.9469	May 72.5149	Jun 70.5035	Jul 70.5035	Aug 70.1310	Sep 71.2782	Oct 72.5149	Nov 73.3889	Dec 74.3027 (38)
Heat transfer coeff	223.0056	222.5040	222.0123	219.7030	219.2709	217.2596	217.2596	216.8871	218.0343	219.2709	220.1450	221.0588 (39)
Average = Sum(39)m / 12 =												219.7009
HLP	Jan 1.5916	Feb 1.5881	Mar 1.5846	Apr 1.5681	May 1.5650	Jun 1.5506	Jul 1.5506	Aug 1.5480	Sep 1.5562	Oct 1.5650	Nov 1.5712	Dec 1.5778 (40)
HLP (average)												1.5681
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9173 (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	31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662 (42b)
Hot water usage for other uses	44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060 (42c)
Average daily hot water use (litres/day)												69.7331 (43)
Daily hot water use	Jan 76.0789	Feb 73.9916	Mar 71.7129	Apr 68.8770	May 66.3470	Jun 63.7177	Jul 63.1717	Aug 65.4458	Sep 67.7781	Oct 70.4782	Nov 73.3391	Dec 75.9722 (44)
Energy conte	120.4904	105.3631	110.2201	94.2892	89.3158	78.3483	76.4007	81.0355	83.5772	95.6382	104.4850	118.9541 (45)
Energy content (annual)										Total = Sum(45)m =		1158.1175
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	102.4169	89.5586	93.6871	80.1458	75.9184	66.5961	64.9406	68.8802	71.0406	81.2925	88.8123	101.1110 (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	102.4169	89.5586	93.6871	80.1458	75.9184	66.5961	64.9406	68.8802	71.0406	81.2925	88.8123	101.1110 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				984.3999 (64)
Electric shower(s)												984 (64)

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	58.5676	52.1842	56.9831	54.3783	55.3987	52.8450	54.6065	55.3987	54.3783	56.9831	55.9116	58.5676 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											666.2025 (64a)
Heat gains from water heating, kWh/month	40.2461	35.4357	37.6675	33.6310	32.8293	29.8603	29.8868	31.0697	31.3547	34.5689	36.1810	39.9196 (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	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.1259	172.8537	156.1259	161.3301	156.1259	161.3301	156.1259	156.1259	161.3301	156.1259	161.3301	156.1259 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.5371	312.7491	304.6549	287.4233	265.6715	245.2279	231.5703	228.3583	236.4525	253.6841	275.4359	295.8795 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865 (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)	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918 (71)
Water heating gains (Table 5)	54.0942	52.7317	50.6284	46.7098	44.1254	41.4726	40.1704	41.7604	43.5482	46.4636	50.2514	53.6554 (72)
Total internal gains	586.5166	605.0939	578.1686	562.2226	532.6822	514.7900	494.6260	493.0039	508.0902	523.0329	553.7767	572.4202 (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					3.9300	11.2829		0.6300	0.7000		0.7700	13.5515 (75)				
Southeast					9.0200	36.7938		0.6300	0.7000		0.7700	101.4270 (77)				
Southwest					12.5900	36.7938		0.6300	0.7000		0.7700	141.5704 (79)				
Northwest					4.6100	11.2829		0.6300	0.7000		0.7700	15.8963 (81)				
Horizontal					1.7500	26.0000		0.6300	0.7000		1.0000	18.0590 (82)				
Solar gains					290.5041	511.3633	741.0110	983.2641	1157.7476	1173.3805	1121.3337	988.0255	824.6928	576.5592	351.0287	246.5897 (83)
Total gains					877.0207	1116.4571	1319.1796	1545.4867	1690.4298	1688.1705	1615.9597	1481.0295	1332.7830	1099.5921	904.8055	819.0099 (84)

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	30.7979	30.8673	30.9357	31.2608	31.3224	31.6124	31.6124	31.6667	31.5001	31.3224	31.1981	31.0691
alpha	3.0532	3.0578	3.0624	3.0841	3.0882	3.1075	3.1075	3.1111	3.1000	3.0882	3.0799	3.0713
util living area	0.9907	0.9803	0.9605	0.9118	0.8211	0.6789	0.5381	0.5935	0.7998	0.9427	0.9834	0.9925 (86)
MIT	18.4236	18.7535	19.2359	19.8670	20.4090	20.7776	20.9214	20.8919	20.6013	19.8712	19.0331	18.3746 (87)
Th 2	19.6195	19.6221	19.6247	19.6368	19.6391	19.6497	19.6497	19.6517	19.6456	19.6391	19.6345	19.6297 (88)
util rest of house	0.9883	0.9752	0.9497	0.8862	0.7664	0.5780	0.3945	0.4502	0.7181	0.9207	0.9781	0.9905 (89)
MIT 2	17.3189	17.6472	18.1236	18.7396	19.2350	19.5393	19.6269	19.6166	19.4165	18.7592	17.9357	17.2770 (90)
Living area fraction	17.5870	17.9157	18.3935	19.0132	19.5199	19.8398	19.9410	19.9261	19.7040	19.0290	18.2020	17.5433 (91)
MIT	17.5870	17.9157	18.3935	19.0132	19.5199	19.8398	19.9410	19.9261	19.7040	19.0290	18.2020	17.5433 (92)
Temperature adjustment												0.0000
adjusted MIT	17.5870	17.9157	18.3935	19.0132	19.5199	19.8398	19.9410	19.9261	19.7040	19.0290	18.2020	17.5433 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9828	0.9660	0.9365	0.8714	0.7607	0.5938	0.4278	0.4822	0.7223	0.9074	0.9700	0.9858 (94)
Useful gains	861.9058	1078.4639	1235.3513	1346.7995	1285.9802	1002.4912	691.3238	714.0943	962.6921	997.8158	877.6275	807.3879 (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	2963.0767	2896.0422	2640.5080	2221.8965	1714.6681	1138.3958	725.8623	764.7594	1221.8655	1848.2376	2444.0586	2949.6606 (97)
Space heating kWh	1563.2711	1221.4126	1045.4366	630.0698	318.9438	0.0000	0.0000	0.0000	0.0000	632.7138	1127.8303	1593.8509 (98a)
Space heating requirement - total per year (kWh/year)												8133.5289
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	1563.2711	1221.4126	1045.4366	630.0698	318.9438	0.0000	0.0000	0.0000	0.0000	632.7138	1127.8303	1593.8509 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8133.5289
Space heating per m2										(98c) / (4) =		58.0510 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

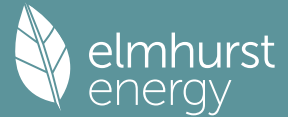
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	2042.2401	1607.7209	1648.3421	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.7250	0.7576	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1480.6262	1282.9398	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1882.9423	1802.8117	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	289.6675	386.7847	299.9855	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												

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	0.0000	0.0000	0.0000	0.0000	0.0000	72.4169	96.6962	74.9964	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement													244.1094 (107)
Energy for space heating													58.0510 (99)
Energy for space cooling													1.7423 (108)
Total													59.7933 (109)
Fabric Energy Efficiency (TFEE)													59.8 (109)

Full SAP Calculation Printout



Plot Reference	1 Be Lean				Issued on Date	21/04/2026	
Assessment Reference	001			Plot Type Ref	Lat_2 Coleridge Road N8 8EJ		
Plot Address					SAP Version	10.2	
SAP Rating	78 C		DER	4.83		TER	12.53
Environmental	95 A		% DER < TER				61.45
CO ₂ Emissions (t/year)	0.58		DFEE	52.98		TFEE	59.79
Compliance Check	See BREL		% DFEE < TFEE				11.40
% DPER < TPER	24.21		DPER	50.55		TPER	66.69
Assessor Details	Mr. Derek White				Assessor ID	B381-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (5)

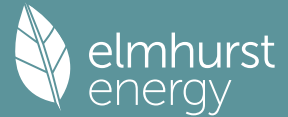
2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.2000 (18)
Number of sides sheltered	0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (21)
Wind speed	Jan 5.1000 Feb 5.0000 Mar 4.9000 Apr 4.4000 May 4.3000 Jun 3.8000 Jul 3.8000 Aug 3.7000 Sep 4.0000 Oct 4.3000 Nov 4.5000 Dec 4.7000 (22)
Wind factor	1.2750 1.2500 1.2250 1.1000 1.0750 0.9500 0.9500 0.9250 1.0000 1.0750 1.1250 1.1750 (22a)
Adj infilt rate	0.2550 0.2500 0.2450 0.2200 0.2150 0.1900 0.1900 0.1850 0.2000 0.2150 0.2250 0.2350 (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) =	77.4000 (23c)
Effective ac	0.3680 0.3630 0.3580 0.3330 0.3280 0.3030 0.3030 0.2980 0.3130 0.3280 0.3380 0.3480 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
NE-GD1			3.1200	1.0000	3.1200		(26)
NE-GW1			45.9400	1.1450	52.6031		(27)
H-RL1			2.6600	1.5918	4.2341		(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003 (28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997 (29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300 (30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100 (30)
Total net area of external elements Aum (A, m ²)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		105.3616		(33)
Main dwelling							
IW1			170.2100			9.0000	1531.8901 (32c)
IF1			42.2900			18.0000	761.2200 (32d)
IC1			42.2900			9.0000	380.6100 (32e)

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Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
176.4696 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

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

Point Thermal bridges

Total fabric heat loss

(36a) = 27.3045 (36)
(33) + (36) + (36a) = 132.6661 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$

(38)m	Jan 46.6125	Feb 45.9792	Mar 45.3458	Apr 42.1792	May 41.5459	Jun 38.3793	Jul 38.3793	Aug 37.7460	Sep 39.6459	Oct 41.5459	Nov 42.8126	Dec 44.0792	(38)
Heat transfer coeff	179.2786	178.6453	178.0120	174.8454	174.2121	171.0454	171.0454	170.4121	172.3121	174.2121	175.4787	176.7453	(39)
Average = Sum(39)m / 12 =												174.6871	(39)

HLP	Jan 1.2796	Feb 1.2750	Mar 1.2705	Apr 1.2479	May 1.2434	Jun 1.2208	Jul 1.2208	Aug 1.2163	Sep 1.2298	Oct 1.2434	Nov 1.2524	Dec 1.2615	(40)
HLP (average)												1.2468	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	(40)

4. Water heating energy requirements (kWh/year)

Assumed occupancy

Hot water usage for mixer showers 2.9173 (42)

Hot water usage for baths 72.8531 (42a)

Hot water usage for other uses 31.4662 (42b)

Hot water usage for other uses 44.5060 (42c)

Average daily hot water use (litres/day) 137.1595 (43)

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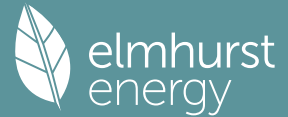
Average daily hot water use (litres/day) 137.1595 (43)

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Average daily hot water use (litres/day) 137.1595 (43)

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Southeast			13.7500	36.7938	0.4000	0.8000	0.7700	112.1918 (77)
Southwest			19.1900	36.7938	0.4000	0.8000	0.7700	156.5789 (79)
Northwest			7.0200	11.2829	0.4000	0.8000	0.7700	17.5648 (81)
Horizontal			2.6600	26.0000	0.4000	0.8000	1.0000	19.9181 (82)

Solar gains	321.2161	565.3946	819.2374	1086.9650	1279.7734	1297.0237	1239.5047	1092.1982	911.7187	637.4597	388.1338	272.6628 (83)
Total gains	1016.2433	1277.6365	1501.4082	1745.6040	1904.4096	1896.0548	1815.1502	1668.3695	1505.5707	1254.5121	1043.1705	952.5616 (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	38.3096	38.4455	38.5822	39.2810	39.4238	40.1537	40.1537	40.3029	39.8585	39.4238	39.1392	38.8587	
alpha	3.5540	3.5630	3.5721	3.6187	3.6283	3.6769	3.6769	3.6869	3.6572	3.6283	3.6093	3.5906	
util living area	0.9857	0.9684	0.9341	0.8518	0.7166	0.5423	0.4049	0.4540	0.6847	0.9009	0.9728	0.9885 (86)	
MIT	19.4682	19.7234	20.0569	20.4554	20.7283	20.8673	20.9032	20.8969	20.7997	20.4164	19.8749	19.4372 (87)	
Th 2	19.8569	19.8604	19.8640	19.8819	19.8854	19.9034	19.9034	19.9070	19.8962	19.8854	19.8783	19.8711 (88)	
util rest of house	0.9822	0.9610	0.9188	0.8192	0.6595	0.4613	0.3083	0.3530	0.6050	0.8710	0.9652	0.9857 (89)	
MIT 2	18.0788	18.4033	18.8212	19.3130	19.6169	19.7652	19.7908	19.7914	19.7052	19.2837	18.6116	18.0498 (90)	
Living area fraction									fLA = Living area / (4) =				0.2427 (91)
MIT	18.4160	18.7237	19.1210	19.5902	19.8866	20.0326	20.0607	20.0597	19.9708	19.5586	18.9181	18.3864 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.4160	18.7237	19.1210	19.5902	19.8866	20.0326	20.0607	20.0597	19.9708	19.5586	18.9181	18.3864 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9763	0.9515	0.9066	0.8094	0.6596	0.4713	0.3225	0.3675	0.6108	0.8603	0.9566	0.9806 (94)
Useful gains	992.1083	1215.6521	1361.1700	1412.9630	1256.1760	893.5349	585.4258	613.1719	919.6557	1079.3119	997.8482	934.0575 (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	2530.6904	2469.5337	2246.6980	1869.1338	1426.2050	929.2216	591.9399	623.6530	1011.6152	1560.6899	2073.8317	2507.3872 (97)
Space heating kWh	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98a)
Space heating requirement - total per year (kWh/year)												5404.5015
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	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5404.5015
Space heating per m2										(98c) / (4) =		38.5733 (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 %)												249.9000 (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	1144.7051	842.6084	658.8329	328.4430	126.5015	0.0000	0.0000	0.0000	0.0000	358.1452	774.7081	1170.5573 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	458.0652	337.1782	263.6386	131.4298	50.6209	0.0000	0.0000	0.0000	0.0000	143.3154	310.0073	468.4103 (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	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	163.6376	144.6563	153.4473	134.2703	129.7409	116.4467	114.5473	119.3239	120.8943	135.3683	144.6400	161.7580 (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	46.2341	41.7598	46.2341	44.7426	46.2341	44.7426	46.2341	46.2341	44.7426	46.2341	44.7426	46.2341 (231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797 (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												2162.6657 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000

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Water heating fuel used	1638.7309 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625)	
mechanical ventilation fans (SFP = 1.1625)	544.3689 (230a)
Total electricity for the above, kWh/year	544.3689 (231)
Electricity for lighting (calculated in Appendix L)	231.4848 (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	4577.2502 (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	2162.6657	0.1559	337.0791 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1638.7309	0.1410	231.0408 (264)	
Space and water heating			568.1200 (265)	
Pumps, fans and electric keep-hot	544.3689	0.1387	75.5107 (267)	
Energy for lighting	231.4848	0.1443	33.4104 (268)	
Total CO2, kg/year			677.0411 (272)	
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.8300 (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	2162.6657	1.5770	3410.5593 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1638.7309	1.5213	2493.0433 (278)	
Space and water heating			5903.6026 (279)	
Pumps, fans and electric keep-hot	544.3689	1.5128	823.5212 (281)	
Energy for lighting	231.4848	1.5338	355.0591 (282)	
Total Primary energy kWh/year			7082.1829 (286)	
Dwelling Primary energy Rate (DPER)			50.5500 (287)	

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

1. Overall dwelling characteristics

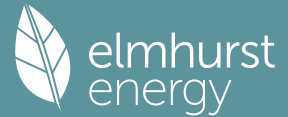
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)	
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)	
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	383.8314 (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	4 * 10 =	40.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.1042 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3542 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3542 (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	0.4516	0.4428	0.4339	0.3896	0.3808	0.3365	0.3365	0.3276	0.3542	0.3808	0.3985	0.4162 (22b)
Effective ac	0.6020	0.5980	0.5941	0.5759	0.5725	0.5566	0.5566	0.5537	0.5627	0.5725	0.5794	0.5866 (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								
TER Opaque door			3.1200	1.0000	3.1200			(26)
TER Opening Type			30.1500	1.1450	34.5229			(27)
TER Roof Window			1.7500	1.1450	2.7856			(27a)
FT1 - Ground			97.6200	0.1300	12.6906			(28a)
WT1 - Brick faced	223.3700	33.2700	190.1000	0.1800	34.2180			(29a)
RT1 - GF Flat	55.3300	1.0900	54.2400	0.1100	5.9664			(30)
RT2 - FF Flat	42.2900	0.6600	41.6300	0.1100	4.5793			(30)
Total net area of external elements Aum(A, m2)			418.6100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	97.8828			(33)

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

176.4696 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	21.9100	0.0500	1.0955	
E3 Sill	8.7000	0.0500	0.4350	
E4 Jamb	46.0400	0.0500	2.3020	
E5 Ground floor (normal)	55.2300	0.1600	8.8368	
E15 Flat roof with parapet	55.7000	0.5600	31.1920	
E16 Corner (normal)	43.4400	0.0900	3.9096	
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0900	-0.4680	
R1 Head of roof window	8.1200	0.0800	0.6496	
R2 Sill of roof window	8.1200	0.0600	0.4872	
R3 Jamb of roof window	5.4200	0.0800	0.4336	

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

48.8733 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 146.7561 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	76.2495	75.7479	75.2562	72.9469	72.5149	70.5035	70.5035	70.1310	71.2782	72.5149	73.3889	74.3027	(38)
Average = Sum(39)m / 12 =	223.0056	222.5040	222.0123	219.7030	219.2709	217.2596	217.2596	216.8871	218.0343	219.2709	220.1450	221.0588	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5916	1.5881	1.5846	1.5681	1.5650	1.5506	1.5506	1.5480	1.5562	1.5650	1.5712	1.5778	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

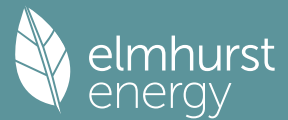
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173 (42)
Hot water usage for mixer showers	73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	(42a)
Hot water usage for baths	31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	(42b)
Hot water usage for other uses	44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	(42c)
Average daily hot water use (litres/day)													137.1595 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	(44)
Energy content (annual)	236.3156	207.9388	182.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)
Distribution loss (46)m = 0.15 x (45)m	35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8903 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													1.0208 (55)
Total storage loss	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	(56)
If cylinder contains dedicated solar storage	31.6444	28.5820	31.6444	30.6236	31.6444	30.6236	31.6444	31.6444	30.6236	31.6444	30.6236	31.6444	(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	291.2224	257.5321	273.3793	239.6488	231.8692	208.4398	205.2653	213.6291	216.2275	241.7229	257.8062	287.9312	(62)
WWHRS	-33.4335	-29.5688	-30.9628	-25.6384	-23.8941	-20.4463	-19.1652	-20.3802	-21.1546	-24.9389	-28.2527	-32.8143	(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	257.7889	227.9632	242.4165	214.0104	207.9752	187.9935	186.1002	193.2489	195.0729	216.7840	229.5535	255.1168	(64)
12Total per year (kWh/year)													2614.0240 (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	122.5004	108.8142	116.5675	104.5241	102.7654	94.1471	93.9197	96.7006	96.7365	106.0418	110.5615	121.4060	(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	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	145.8647	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	156.1259	172.8537	156.1259	161.3301	156.1259	161.3301	156.1259	156.1259	161.3301	156.1259	161.3301	156.1259	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	309.5371	312.7491	304.6549	287.4233	265.6715	245.2279	231.5703	228.3583	236.4525	253.6841	275.4359	295.8795	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	37.5865	(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)													

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	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	(71)
Water heating gains (Table 5)	164.6510	161.9260	156.6768	145.1724	138.1256	130.7599	126.2361	129.9739	134.3563	142.5293	153.5576	(72)
Total internal gains	700.0734	717.2882	687.2170	663.6852	629.6824	604.0773	580.6917	581.2175	598.8983	622.0987	660.0830	(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					3.9300	11.2829	0.6300	0.7000			0.7700			13.5515 (75)
Southeast					9.0200	36.7938	0.6300	0.7000			0.7700			101.4270 (77)
Southwest					12.5900	36.7938	0.6300	0.7000			0.7700			141.5704 (79)
Northwest					4.6100	11.2829	0.6300	0.7000			0.7700			15.8963 (81)
Horizontal					1.7500	26.0000	0.6300	0.7000			1.0000			18.0590 (82)
Solar gains	290.5041	511.3633	741.0110	983.2641	1157.7476	1173.3805	1121.3337	988.0255	824.6928	576.5592	351.0287	246.5897 (83)		
Total gains	990.5775	1228.6514	1428.2280	1646.9494	1787.4301	1777.4579	1702.0254	1569.2431	1423.5911	1198.6578	1011.1117	931.5347 (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	30.7979	30.8673	30.9357	31.2608	31.3224	31.6124	31.6124	31.6667	31.5001	31.3224	31.1981	31.0691	
alpha	3.0532	3.0578	3.0624	3.0841	3.0882	3.1075	3.1075	3.1111	3.1000	3.0882	3.0799	3.0713	
util living area	0.9871	0.9748	0.9521	0.8988	0.8027	0.6573	0.5164	0.5688	0.7766	0.9298	0.9776	0.9892	(86)
MIT	18.5219	18.8466	19.3197	19.9315	20.4514	20.7977	20.9299	20.9042	20.6373	19.9420	19.1226	18.4730	(87)
Th 2	19.6195	19.6221	19.6247	19.6368	19.6391	19.6497	19.6497	19.6517	19.6456	19.6391	19.6345	19.6297	(88)
util rest of house	0.9837	0.9682	0.9392	0.8705	0.7453	0.5561	0.3763	0.4281	0.6913	0.9041	0.9707	0.9864	(89)
MIT 2	16.7921	17.2049	17.8013	18.5601	19.1633	19.5227	19.6240	19.6126	19.3831	18.5930	17.5670	16.7358	(90)
Living area fraction	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(91)
MIT	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.2119	17.6033	18.1698	18.8929	19.4759	19.8321	19.9409	19.9260	19.6875	18.9204	17.9445	17.1573	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9744	0.9542	0.9205	0.8510	0.7373	0.5712	0.4086	0.4592	0.6944	0.8857	0.9578	0.9784	(94)
Useful gains	965.2459	1172.3713	1314.6733	1401.5318	1317.8395	1015.2047	695.4662	720.5499	988.5446	1061.7085	968.4862	911.3683	(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	2879.4248	2826.5340	2590.8296	2195.4620	1705.0234	1136.7277	725.8445	764.7444	1218.2590	1824.4165	2387.3545	2864.3320	(97)
Space heating kWh	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(98a)
Space heating requirement - total per year (kWh/year)												7386.9461	
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	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7386.9461	
Space heating per m2										(98c) / (4) =		52.7225	(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	1424.1491	1111.5973	949.4603	571.6297	288.0648	0.0000	0.0000	0.0000	0.0000	567.4547	1021.5851	1453.0050	(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)	1542.9568	1204.3308	1028.6677	619.3172	312.0962	0.0000	0.0000	0.0000	0.0000	614.7938	1106.8095	1574.2199	(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	257.7889	227.9632	242.4165	214.0104	207.9752	187.9935	186.1002	193.2489	195.0729	216.7840	229.5535	255.1168	(64)	
Efficiency of water heater (217)m	87.2911	87.1278	86.8087	86.1532	84.7906	79.8000	79.8000	79.8000	79.8000	86.1153	86.9997	87.3290	(216)	
Fuel for water heating, kWh/month	295.3210	261.6425	279.2536	248.4068	245.2810	235.5808	233.2082	242.1665	244.4523	251.7370	263.8554	292.1331	(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	32.4399	26.0245	23.4322	17.1674	13.2606	10.8340	12.0968	15.7238	20.4237	26.7970	30.2671	33.3415	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-78.0162	-103.8470	-141.0000	-149.4120	-153.7334	-140.7991	-138.8603	-134.4501	-125.9556	-114.0088	-83.4636	-68.1760	(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)	

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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	(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	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-64.9187	-133.4716	-259.8658	-382.8152	-499.2804	-499.3276	-493.6087	-421.1815	-313.0010	-188.4840	-85.8443	-51.5920 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												8003.1919 (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												3093.0382 (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)												261.8084 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-4825.1132 (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												6618.9254 (238)

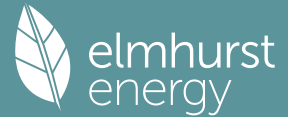
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	8003.1919	0.2100	1680.6703 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	3093.0382	0.2100	649.5380 (264)
Space and water heating			2330.2083 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	261.8084	0.1443	37.7870 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1431.7223	0.1359	-194.5192
PV Unit electricity exported	-3393.3909	0.1265	-429.1609
Total			-623.6801 (269)
Total CO2, kg/year			1756.2445 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5300 (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	8003.1919	1.1300	9043.6069 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3093.0382	1.1300	3495.1332 (278)
Space and water heating			12538.7401 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	261.8084	1.5338	401.5705 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1431.7223	1.5022	-2150.7324
PV Unit electricity exported	-3393.3909	0.4643	-1575.4004
Total			-3726.1328 (283)
Total Primary energy kWh/year			9344.2786 (286)
Target Primary Energy Rate (TPER)			66.6900 (287)

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Plot Reference	1 Be Lean				Issued on Date	21/04/2026	
Assessment Reference	001			Plot Type Ref	Lat_2 Coleridge Road N8 8EJ		
Plot Address					SAP Version	10.2	
SAP Rating	78 C	DER	4.83	TER	12.53		
Environmental	95 A	% DER < TER				61.45	
CO ₂ Emissions (t/year)	0.58	DFEE	52.98	TFEE	59.79		
Compliance Check	See BREL	% DFEE < TFEE				11.40	
% DPER < TPER	24.21	DPER	50.55	TPER	66.69		
Assessor Details	Mr. Derek White				Assessor ID	B381-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (5)

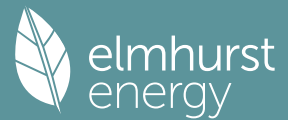
2. Ventilation rate

	m ³ per hour											
Number of open chimneys	0 * 80 = 0.0000 (6a)											
Number of open flues	0 * 20 = 0.0000 (6b)											
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)											
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)											
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)											
Number of blocked chimneys	0 * 20 = 0.0000 (6f)											
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)											
Number of passive vents	0 * 10 = 0.0000 (7b)											
Number of flueless gas fires	0 * 40 = 0.0000 (7c)											
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)											
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	4.0000 (17)											
Infiltration rate	0.2000 (18)											
Number of sides sheltered	0 (19)											
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000 (20)											
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2000 (21)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.2550	0.2500	0.2450	0.2200	0.2150	0.1900	0.1900	0.1850	0.2000	0.2150	0.2250	0.2350 (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) =												77.4000 (23c)
Effective ac	0.3680	0.3630	0.3580	0.3330	0.3280	0.3030	0.3030	0.2980	0.3130	0.3280	0.3380	0.3480 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
NE-GD1			3.1200	1.0000	3.1200		(26)
NE-GW1			45.9400	1.1450	52.6031		(27)
H-RL1			2.6600	1.5918	4.2341		(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003 (28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997 (29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300 (30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100 (30)
Total net area of external elements Aum(A, m ²)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		105.3616		(33)
Main dwelling							
IW1			170.2100			9.0000	1531.8901 (32c)
IF1			42.2900			18.0000	761.2200 (32d)
IC1			42.2900			9.0000	380.6100 (32e)

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Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
176.4696 (35)

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

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

Point Thermal bridges
Total fabric heat loss

27.3045 (36)
(36a) = 0.0000
(33) + (36) + (36a) = 132.6661 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	46.6125	45.9792	45.3458	42.1792	41.5459	38.3793	38.3793	37.7460	39.6459	41.5459	42.8126	44.0792	(38)
Heat transfer coeff	179.2786	178.6453	178.0120	174.8454	174.2121	171.0454	171.0454	170.4121	172.3121	174.2121	175.4787	176.7453	(39)
Average = Sum(39)m / 12 =												174.6871	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.2796	1.2750	1.2705	1.2479	1.2434	1.2208	1.2208	1.2163	1.2298	1.2434	1.2524	1.2615	(40)
HLP (average)												1.2468	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173 (42)
Hot water usage for mixer showers													
	73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	(42a)
Hot water usage for baths													
	31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	(42b)
Hot water usage for other uses													
	44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	(42c)
Average daily hot water use (litres/day)													137.1595 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	(44)
Energy conte	236.3156	207.9388	218.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)
Energy content (annual)										Total = Sum(45)m =		2278.1907	
Distribution loss (46)m = $0.15 \times (45)\text{m}$	35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	(46)
Water storage loss (or HIU loss):													
Store volume												250.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8694	(55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	(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	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	(64)
										Total per year (kWh/year) = Sum(64)m =		2869.4177	(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)
												0.0000	(64a)
Heat gains from water heating, kWh/month													
	118.7460	105.4232	112.8131	100.8908	99.0111	90.5139	90.1653	92.9462	93.1032	102.2874	106.9282	117.6516	(65)

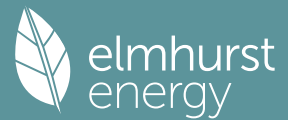
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	32.7691	29.1052	23.6699	17.9197	13.3952	11.3088	12.2195	15.8834	21.3186	27.0689	31.5934	33.6798	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	461.9956	466.7897	454.7088	428.9900	396.5246	366.0118	345.6273	340.8332	352.9141	378.6329	411.0983	441.6112	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	(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)													
	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	(71)
Water heating gains (Table 5)													
	159.6048	156.8797	151.6306	140.1262	133.0794	125.7137	121.1899	124.9277	129.3101	137.4831	148.5114	158.1339	(72)
Total internal gains	771.1365	769.5416	746.7762	703.8028	659.7661	616.8011	592.8036	595.4113	617.3098	659.9518	707.9700	750.1918	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Northeast	5.9800	11.2829	0.4000	0.8000	1.0000	19.4319 (75)
Southeast	13.7500	36.7938	0.4000	0.8000	1.0000	145.7036 (77)

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Southwest			19.1900		36.7938		0.4000		0.8000		1.0000		203.3492 (79)
Northwest			7.0200		11.2829		0.4000		0.8000		1.0000		22.8114 (81)
Horizontal			2.6600		26.0000		0.4000		0.8000		1.0000		19.9181 (82)

Solar gains	411.2142	721.9219	1041.9771	1377.3185	1618.1082	1638.6805	1566.4977	1382.5131	1157.7349	812.7670	496.5185	349.3022 (83)
Total gains	1182.3507	1491.4635	1788.7533	2081.1213	2277.8743	2255.4817	2159.3013	1977.9243	1775.0446	1472.7188	1204.4885	1099.4940 (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	38.3096	38.4455	38.5822	39.2810	39.4238	40.1537	40.1537	40.3029	39.8585	39.4238	39.1392	38.8587	
alpha	3.5540	3.5630	3.5721	3.6187	3.6283	3.6769	3.6769	3.6869	3.6572	3.6283	3.6093	3.5906	
util living area	0.9774	0.9512	0.8981	0.7899	0.6361	0.4672	0.3438	0.3883	0.6094	0.8569	0.9587	0.9820 (86)	
MIT	19.5799	19.8552	20.2053	20.5701	20.7898	20.8861	20.9086	20.9047	20.8370	20.5129	19.9771	19.5378 (87)	
Th 2	19.8569	19.8604	19.8640	19.8819	19.8854	19.9034	19.9034	19.9070	19.8962	19.8854	19.8783	19.8711 (88)	
util rest of house	0.9722	0.9405	0.8770	0.7509	0.5777	0.3936	0.2603	0.2996	0.5304	0.8191	0.9479	0.9778 (89)	
MIT 2	18.2196	18.5663	18.9976	19.4375	19.6731	19.7776	19.7930	19.7949	19.7341	19.3904	18.7379	18.1770 (90)	
Living area fraction									fLA = Living area / (4) =				0.2427 (91)
MIT	18.5497	18.8791	19.2907	19.7123	19.9441	20.0466	20.0637	20.0642	20.0018	19.6628	19.0386	18.5073 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.5497	18.8791	19.2907	19.7123	19.9441	20.0466	20.0637	20.0642	20.0018	19.6628	19.0386	18.5073 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9642	0.9291	0.8645	0.7444	0.5809	0.4035	0.2727	0.3126	0.5384	0.8103	0.9375	0.9710 (94)
Useful gains	1139.9908	1385.6617	1546.3662	1549.1616	1323.3112	910.0904	588.7401	618.3105	955.7385	1193.4052	1129.1648	1067.5612 (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	2554.6595	2497.2980	2276.8976	1890.4847	1436.2189	931.6131	592.4487	624.4280	1016.9468	1578.8465	2094.9725	2528.7411 (97)
Space heating kWh	1052.5135	747.0196	543.5153	245.7526	84.0033	0.0000	0.0000	0.0000	0.0000	286.7683	695.3815	1087.1178 (98a)
Space heating requirement - total per year (kWh/year)												4742.0721
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	1052.5135	747.0196	543.5153	245.7526	84.0033	0.0000	0.0000	0.0000	0.0000	286.7683	695.3815	1087.1178 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4742.0721
Space heating per m2										(98c) / (4) =		33.8453 (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 %)												249.9000 (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	1052.5135	747.0196	543.5153	245.7526	84.0033	0.0000	0.0000	0.0000	0.0000	286.7683	695.3815	1087.1178 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	421.1739	298.9274	217.4931	98.3404	33.6148	0.0000	0.0000	0.0000	0.0000	114.7532	278.2639	435.0211 (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	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	163.6376	144.6563	153.4473	134.2703	129.7409	116.4467	114.5473	119.3239	120.8943	135.3683	144.6400	161.7580 (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	46.2341	41.7598	46.2341	44.7426	46.2341	44.7426	46.2341	46.2341	44.7426	46.2341	44.7426	46.2341 (231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797 (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												1897.5879 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000
Water heating fuel used												1638.7309 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625)	
mechanical ventilation fans (SFP = 1.1625)	544.3689 (230a)
Total electricity for the above, kWh/year	544.3689 (231)
Electricity for lighting (calculated in Appendix L)	231.4848 (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	4312.1724 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1897.5879	16.4900	312.9122 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1638.7309	16.4900	270.2267 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	544.3689	16.4900	89.7664 (249)
Energy for lighting	231.4848	16.4900	38.1718 (250)
Additional standing charges			0.0000 (251)
Total energy cost			711.0772 (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] = 1.3829 (257)
SAP value	77.5833
SAP rating (Section 12)	78 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1897.5879	0.1564	296.7887 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1638.7309	0.1410	231.0408 (264)
Space and water heating			527.8296 (265)
Pumps, fans and electric keep-hot	544.3689	0.1387	75.5107 (267)
Energy for lighting	231.4848	0.1443	33.4104 (268)
Total CO2, kg/year			636.7507 (272)
CO2 emissions per m2			4.5400 (273)
EI value			95.3906
EI rating			95 (274)
EI band			A

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

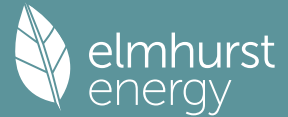
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	383.8314 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)

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Infiltration rate 0.2000 (18)
Number of sides sheltered 0 (19)

Shelter factor (20) = $1 - [0.075 \times (19)] = 1.0000$ (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2000 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000	(22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500	(22a)
Adj infilt rate	0.2100	0.2000	0.2000	0.1850	0.1850	0.1650	0.1700	0.1600	0.1650	0.1750	0.1750	0.1900	(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) =												77.4000	(23c)
Effective ac	0.3230	0.3130	0.3130	0.2980	0.2980	0.2780	0.2830	0.2730	0.2780	0.2880	0.2880	0.3030	(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								
NE-GD1			3.1200	1.0000	3.1200			(26)
NE-GW1			45.9400	1.1450	52.6031			(27)
H-RL1			2.6600	1.5918	4.2341			(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003	(28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997	(29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300	(30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100	(30)
Total net area of external elements Aum (A, m2)			418.6100					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 105.3616			(33)
Main dwelling								
IW1			170.2100			9.0000	1531.8901	(32c)
IF1			42.2900			18.0000	761.2200	(32d)
IC1			42.2900			9.0000	380.6100	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 176.4696 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 27.3045 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 132.6661 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$

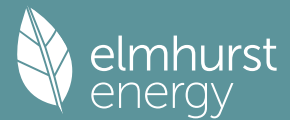
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	40.9126	39.6459	39.6459	37.7460	37.7460	35.2127	35.8460	34.5794	35.2127	36.4793	36.4793	38.3793	(38)
Heat transfer coeff	173.5787	172.3121	172.3121	170.4121	170.4121	167.8788	168.5122	167.2455	167.8788	169.1455	169.1455	171.0454	(39)
Average = Sum(39)m / 12 =												169.9899	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.2389	1.2298	1.2298	1.2163	1.2163	1.1982	1.2027	1.1937	1.1982	1.2072	1.2072	1.2208	(40)
HLP (average)												1.2133	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173	(42)
Hot water usage for mixer showers														
73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	72.8531	(42a)	
Hot water usage for baths														
31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	31.4662	(42b)	
Hot water usage for other uses														
44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	44.5060	(42c)	
Average daily hot water use (litres/day)												137.1595	(43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	(44)	
Energy content	236.3156	207.9388	218.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)	
Energy content (annual)										Total = Sum(45)m =		2278.1907		
Distribution loss (46)m = 0.15 x (45)m														
35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	34.9537	(46)	
Water storage loss (or HIU loss):														
Store volume												250.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)	
Temperature factor from Table 2b												0.5400	(49)	
Enter (49) or (54) in (55)												0.8694	(55)	
Total storage loss														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)	
If cylinder contains dedicated solar storage														
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(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														
286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	283.2382	(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														
286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	283.2382	(64)	

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Electric shower(s)											Total per year (kWh/year) = Sum(64)m = 2869.4177 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
118.7460	105.4232	112.8131	100.8908	99.0111	90.5139	90.1653	92.9462	93.1032	102.2874	106.9282	117.6516 (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	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	32.7691	29.1052	23.6699	17.9197	13.3952	11.3088	12.2195	15.8834	21.3186	27.0689	31.5934	33.6798 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	461.9956	466.7897	454.7088	428.9900	396.5246	366.0118	345.6273	340.8332	352.9141	378.6329	411.0983	441.6112 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211 (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)												
	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918 (71)
Water heating gains (Table 5)												
	159.6048	156.8797	151.6306	140.1262	133.0794	125.7137	121.1899	124.9277	129.3101	137.4831	148.5114	158.1339 (72)
Total internal gains												
	771.1365	769.5416	746.7762	703.8028	659.7661	616.8011	592.8036	595.4113	617.3098	659.9518	707.9700	750.1918 (73)

6. Solar gains

[Jan]												Area		Solar flux		g		FF		Access		Gains		
												m2		Table 6a		Specific data		Specific data		factor		W		
														W/m2		or Table 6b		or Table 6c		Table 6d				
Northeast												5.9800	12.9236		0.4000		0.8000		1.0000		22.2575		(75)	
Southeast												13.7500	40.4699		0.4000		0.8000		1.0000		160.2609		(77)	
Southwest												19.1900	40.4699		0.4000		0.8000		1.0000		223.6659		(79)	
Northwest												7.0200	12.9236		0.4000		0.8000		1.0000		26.1283		(81)	
Horizontal												2.6600	30.0000		0.4000		0.8000		1.0000		22.9824		(82)	
Solar gains	455.2950	720.2984	1030.6314	1411.2054	1621.5265	1760.0333	1663.2607	1496.6014	1243.7331	866.8145	563.3857	382.9125	(83)											
Total gains	1226.4314	1489.8400	1777.4076	2115.0082	2281.2926	2376.8345	2256.0643	2092.0127	1861.0429	1526.7663	1271.3557	1133.1043	(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	39.5676	39.8585	39.8585	40.3029	40.3029	40.9111	40.7573	41.0660	40.9111	40.6047	40.6047	40.1537
alpha	3.6378	3.6572	3.6572	3.6869	3.6869	3.7274	3.7172	3.7377	3.7274	3.7070	3.7070	3.6769
util living area	0.9702	0.9430	0.8786	0.7407	0.5580	0.3484	0.2308	0.2547	0.4998	0.8032	0.9401	0.9763 (86)
MIT	19.7657	19.9995	20.3421	20.6772	20.8499	20.9089	20.9158	20.9157	20.8851	20.6486	20.1765	19.7298 (87)
Th 2	19.8890	19.8962	19.8962	19.9070	19.9070	19.9214	19.9178	19.9251	19.9214	19.9142	19.9142	19.9034 (88)
util rest of house	0.9633	0.9305	0.8535	0.6952	0.4932	0.2753	0.1506	0.1697	0.4156	0.7541	0.9244	0.9706 (89)
MIT 2	18.4783	18.7739	19.1890	19.5777	19.7506	19.8115	19.8111	19.8188	19.7970	19.5661	19.0124	18.4444 (90)
Living area fraction	fLA = Living area / (4) = 0.2427 (91)											
MIT	18.7907	19.0713	19.4688	19.8445	20.0173	20.0778	20.0792	20.0850	20.0611	19.8288	19.2949	18.7563 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.7907	19.0713	19.4688	19.8445	20.0173	20.0778	20.0792	20.0850	20.0611	19.8288	19.2949	18.7563 (93)

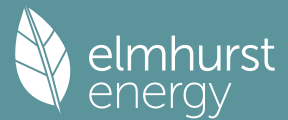
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9543	0.9190	0.8422	0.6924	0.5000	0.2860	0.1626	0.1824	0.4269	0.7497	0.9133	0.9627 (94)
Useful gains	1170.3237	1369.1171	1497.0118	1464.3315	1140.5718	679.8559	366.8600	381.6116	794.4206	1144.6220	1161.1743	1090.8572 (95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)
Heat loss rate W	2376.4215	2321.2681	2079.6023	1694.6653	1195.8405	684.5782	367.2207	382.1550	816.0710	1391.8592	1910.4837	2335.8526 (97)
Space heating kWh	897.3367	639.8455	433.4474	165.8403	41.1199	0.0000	0.0000	0.0000	0.0000	183.9445	539.5027	926.2766 (98a)
Space heating requirement - total per year (kWh/year)												3827.3136
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	897.3367	639.8455	433.4474	165.8403	41.1199	0.0000	0.0000	0.0000	0.0000	183.9445	539.5027	926.2766 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3827.3136
Space heating per m2										(98c) / (4) =		27.3165 (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 %)												249.9000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	897.3367	639.8455	433.4474	165.8403	41.1199	0.0000	0.0000	0.0000	0.0000	183.9445	539.5027	926.2766 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)												

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Space heating efficiency (main heating system 2)	359.0783	256.0406	173.4483	66.3627	16.4545	0.0000	0.0000	0.0000	0.0000	73.6072	215.8875	370.6589	(211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Water heating requirement	286.5294	253.2932	268.6863	235.1072	227.1762	203.8982	200.5724	208.9361	211.6859	237.0299	253.2646	283.2382	(64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	(216)
Fuel for water heating, kWh/month	163.6376	144.6563	153.4473	134.2703	129.7409	116.4467	114.5473	119.3239	120.8943	135.3683	144.6400	161.7580	(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	46.2341	41.7598	46.2341	44.7426	46.2341	44.7426	46.2341	46.2341	44.7426	46.2341	44.7426	46.2341	(231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797	(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												1531.5381	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												175.1000	
Water heating fuel used												1638.7309	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625)													
mechanical ventilation fans (SFP = 1.1625)												544.3689	(230a)
Total electricity for the above, kWh/year												544.3689	(231)
Electricity for lighting (calculated in Appendix L)												231.4848	(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												3946.1226	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1531.5381	27.6700	423.7766	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1638.7309	27.6700	453.4368	(247)
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000	(247a)
Pumps, fans and electric keep-hot	544.3689	27.6700	150.6269	(249)
Energy for lighting	231.4848	27.6700	64.0518	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1091.8921	(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	1531.5381	0.1572	240.7227	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1638.7309	0.1410	231.0408	(264)
Space and water heating			471.7635	(265)
Pumps, fans and electric keep-hot	544.3689	0.1387	75.5107	(267)
Energy for lighting	231.4848	0.1443	33.4104	(268)
Total CO2, kg/year			580.6846	(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	1531.5381	1.5819	2422.6807	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1638.7309	1.5213	2493.0433	(278)
Space and water heating			4915.7240	(279)
Pumps, fans and electric keep-hot	544.3689	1.5128	823.5212	(281)
Energy for lighting	231.4848	1.5338	355.0591	(282)
Total Primary energy kWh/year			6094.3043	(286)

SAP 10 EPC IMPROVEMENTS

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001

Current energy efficiency rating: C 78
Current environmental impact rating: A 95

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

Recommended measures:
N Solar water heating
U Solar photovoltaic panels
SAP change + 1.6
Cost change -£ 96
CO2 change -43 kg (7.5%)
SAP change + 5.0
Cost change -£ 273
CO2 change -132 kg (24.6%)

Typical annual savings
Recommended measures
Solar water heating
Solar photovoltaic panels
Total Savings
Energy efficiency
Environmental impact
C 79
A 96
B 84
A 97

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

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, Thames Valley):
Electricity
Space heating
Water heating
Lighting
Generated (PV)
Total cost of fuels
Total cost of uses
Delivered energy
Carbon dioxide emissions
CO2 emissions per m²
Primary energy

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

1. Overall dwelling characteristics

Main dwelling
Ground floor
First floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)
Dwelling volume

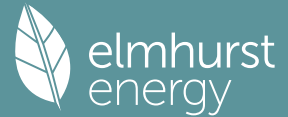
2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Shelter factor
Infiltration rate adjusted to include shelter factor

Wind speed
Wind factor
Adj infilt rate
Balanced mechanical ventilation with heat recovery
If mechanical ventilation
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =
Effective ac

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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								
NE-GD1			3.1200	1.0000	3.1200			(26)
NE-GW1			45.9400	1.1450	52.6031			(27)
H-RL1			2.6600	1.5918	4.2341			(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003	(28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997	(29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300	(30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100	(30)
Total net area of external elements Aum(A, m2)			418.6100					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		105.3616			(33)
Main dwelling								
IW1			170.2100			9.0000	1531.8901	(32c)
IF1			42.2900			18.0000	761.2200	(32d)
IC1			42.2900			9.0000	380.6100	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 24725.1601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 176.4696 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 27.3045 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 132.6661 (37)

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

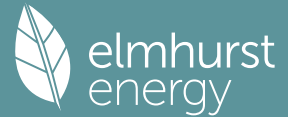
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	46.6125	45.9792	45.3458	42.1792	41.5459	38.3793	38.3793	37.7460	39.6459	41.5459	42.8126	44.0792	(38)
Heat transfer coeff	179.2786	178.6453	178.0120	174.8454	174.2121	171.0454	171.0454	170.4121	172.3121	174.2121	175.4787	176.7453	(39)
Average = Sum(39)m / 12 =												174.6871	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2796	1.2750	1.2705	1.2479	1.2434	1.2208	1.2208	1.2163	1.2298	1.2434	1.2524	1.2615	(40)
HLP (average)												1.2468	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173 (42)
Hot water usage for mixer showers													
73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	72.8531	(42a)
Hot water usage for baths													
31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	31.4662	(42b)
Hot water usage for other uses													
44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	44.5060	(42c)
Average daily hot water use (litres/day)													137.1595 (43)
Daily hot water use													
149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252	148.8252	(44)
Energy conte	236.3156	207.9388	218.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	34.9537	(46)
Water storage loss (or HIU loss):													
Store volume													250.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(56)
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	(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													
286.5294	253.2932	267.2905	228.3536	214.3819	191.2915	187.5454	196.8397	206.2830	235.6341	253.2646	283.2382	283.2382	(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													629.0107 (H24)
Heat delivered to space heating													0.0000 (H29)
Solar input													629.0107
Solar input	-0.0000	-16.1968	-58.7304	-81.0274	-106.2054	-97.9024	-97.1802	-84.7843	-58.2560	-28.7277	-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													
286.5294	237.0964	208.5601	147.3262	108.1765	93.3892	90.3652	112.0554	148.0270	206.9064	253.2646	283.2382	283.2382	(64)
Electric shower(s)													2174.9346 (64)
Total per year (kWh/year) = Sum(64)m =													

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
Heat gains from water heating, kWh/month	118.7460	105.4232	111.6965	95.4880	88.7756	80.4285	79.7437	83.2691	88.7809	101.1708	106.9282	117.6516 (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	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	32.7691	29.1052	23.6699	17.9197	13.3952	11.3088	12.2195	15.8834	21.3186	27.0689	31.5934	33.6798 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	461.9956	466.7897	454.7088	428.9900	396.5246	366.0118	345.6273	340.8332	352.9141	378.6329	411.0983	441.6112 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211 (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)	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918 (71)
Water heating gains (Table 5)	159.6048	156.8797	150.1298	132.6222	119.3220	111.7062	107.1824	111.9208	123.3069	135.9823	148.5114	158.1339 (72)
Total internal gains	771.1365	769.5416	745.2754	696.2988	646.0088	602.7937	578.7961	582.4043	611.3066	658.4510	707.9700	750.1918 (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			
														5.9800	11.2829	0.4000	0.8000	1.0000	19.4319 (75)		
Northeast														5.9800	11.2829	0.4000	0.8000	1.0000	19.4319 (75)		
Southeast														13.7500	36.7938	0.4000	0.8000	1.0000	145.7036 (77)		
Southwest														19.1900	36.7938	0.4000	0.8000	1.0000	203.3492 (79)		
Northwest														7.0200	11.2829	0.4000	0.8000	1.0000	22.8114 (81)		
Horizontal														2.6600	26.0000	0.4000	0.8000	1.0000	19.9181 (82)		
Solar gains		411.2142	721.9219	1041.9771	1377.3185	1618.1082	1638.6805	1566.4977	1382.5131	1157.7349	812.7670	496.5185	349.3022	(83)							
Total gains		1182.3507	1491.4635	1787.2525	2073.6173	2264.1169	2241.4742	2145.2938	1964.9174	1769.0414	1471.2180	1204.4885	1099.4940	(84)							

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.3096	38.4455	38.5822	39.2810	39.4238	40.1537	40.1537	40.3029	39.8585	39.4238	39.1392	38.8587
alpha	3.5540	3.5630	3.5721	3.6187	3.6283	3.6769	3.6769	3.6869	3.6572	3.6283	3.6093	3.5906
util living area	0.9774	0.9512	0.8983	0.7913	0.6388	0.4698	0.3459	0.3907	0.6110	0.8572	0.9587	0.9820 (86)
MIT	19.5799	19.8552	20.2046	20.5679	20.7880	20.8855	20.9085	20.9045	20.8364	20.5123	19.9771	19.5378 (87)
Th 2	19.8569	19.8604	19.8640	19.8819	19.8854	19.9034	19.9034	19.9070	19.8962	19.8854	19.8783	19.8711 (88)
util rest of house	0.9722	0.9405	0.8773	0.7524	0.5804	0.3959	0.2619	0.3015	0.5319	0.8195	0.9479	0.9778 (89)
MIT 2	18.2196	18.5663	18.9968	19.4351	19.6715	19.7772	19.7929	19.7948	19.7336	19.3897	18.7379	18.1770 (90)
Living area fraction									FLA = Living area / (4) =			0.2427 (91)
MIT	18.5497	18.8791	19.2899	19.7100	19.9424	20.0462	20.0636	20.0641	20.0012	19.6621	19.0386	18.5073 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5497	18.8791	19.2899	19.7100	19.9424	20.0462	20.0636	20.0641	20.0012	19.6621	19.0386	18.5073 (93)

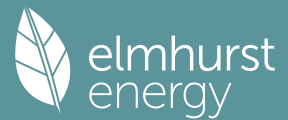
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9642	0.9291	0.8647	0.7458	0.5836	0.4058	0.2744	0.3146	0.5399	0.8107	0.9375	0.9710 (94)
Useful gains	1139.9908	1385.6617	1545.4779	1546.5384	1321.3543	909.6162	588.6451	618.1557	955.1063	1192.7005	1129.1648	1067.5612 (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	2554.6595	2497.2980	2276.7531	1890.0780	1435.9303	931.5448	592.4341	624.4046	1016.8541	1578.7351	2094.9725	2528.7411 (97)
Space heating kWh	1052.5135	747.0196	544.0688	247.3485	85.2446	0.0000	0.0000	0.0000	0.0000	287.2098	695.3815	1087.1178 (98a)
Space heating requirement - total per year (kWh/year)												4745.9042
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	1052.5135	747.0196	544.0688	247.3485	85.2446	0.0000	0.0000	0.0000	0.0000	287.2098	695.3815	1087.1178 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4745.9042
Space heating per m2										(98c) / (4) =		33.8727 (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 %)												249.9000 (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	1052.5135	747.0196	544.0688	247.3485	85.2446	0.0000	0.0000	0.0000	0.0000	287.2098	695.3815	1087.1178 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	421.1739	298.9274	217.7146	98.9790	34.1115	0.0000	0.0000	0.0000	0.0000	114.9299	278.2639	435.0211 (211)
Space heating efficiency (main heating system 2)												

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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	(212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	286.5294	237.0964	208.5601	147.3262	108.1765	93.3892	90.3652	112.0554	148.0270	206.9064	253.2646	283.2382 (64)
Efficiency of water heater (217)m	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	163.6376	135.4063	119.1091	84.1383	61.7799	53.3348	51.6078	63.9951	84.5385	118.1647	144.6400	161.7580 (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	53.0286	47.8968	53.0286	51.3180	53.0286	51.3180	53.0286	53.0286	51.3180	53.0286	51.3180	53.0286 (231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-40.2267	-60.8918	-92.2063	-106.4161	-114.8894	-106.0807	-104.7377	-97.4837	-84.5360	-70.0854	-45.3771	-34.3029 (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												1899.1213 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000
Water heating fuel used												1242.1100 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625)												
mechanical ventilation fans (SFP = 1.1625)												544.3689 (230a)
pump for solar water heating												80.0000 (230g)
Total electricity for the above, kWh/year												624.3689 (231)
Electricity for lighting (calculated in Appendix L)												231.4848 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-957.2339 (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												3039.8511 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1899.1213	16.4900	313.1651 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1242.1100	16.4900	204.8239 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	544.3689	16.4900	89.7664 (249)
Pump for solar water heating	80.0000	16.4900	13.1920 (249)
Energy for lighting	231.4848	16.4900	38.1718 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-957.2339	16.4900	-157.8479
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-157.8479 (252)
Total energy cost			501.2714 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.9749 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	84.1974
SAP rating (Section 12)		84 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1899.1213	0.1564	297.0035 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1242.1100	0.1454	180.6357 (264)
Space and water heating			477.6393 (265)
Pumps, fans and electric keep-hot	624.3689	0.1387	86.6077 (267)
Energy for lighting	231.4848	0.1443	33.4104 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-957.2339	0.1341	-128.3522
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-128.3522 (269)
Total CO2, kg/year			469.3051 (272)
CO2 emissions per m2			3.3500 (273)

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EI value
EI rating
EI band

96.6027
97 (274)
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

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	97.6200 (1b)	x 2.6000 (2b)	= 253.8120 (1b) - (3b)
First floor	42.4900 (1c)	x 3.0600 (2c)	= 130.0194 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	140.1100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 383.8314 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.2000	(18)
Number of sides sheltered	0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2000 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate	0.2100	0.2000	0.2000	0.1850	0.1850	0.1650	0.1700	0.1600	0.1650	0.1750	0.1750	0.1900 (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) =												77.4000 (23c)
Effective ac	0.3230	0.3130	0.3130	0.2980	0.2980	0.2780	0.2830	0.2730	0.2780	0.2880	0.2880	0.3030 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
NE-GD1			3.1200	1.0000	3.1200		(26)
NE-GW1			45.9400	1.1450	52.6031		(27)
H-RL1			2.6600	1.5918	4.2341		(27a)
FT1 - Ground			97.6200	0.1000	9.7620	110.0000	10738.2003 (28a)
WT1 - Brick faced	223.3700	49.0600	174.3100	0.1500	26.1465	60.0000	10458.5997 (29a)
RT1 - GF Flat	55.3300	1.6600	53.6700	0.1000	5.3670	9.0000	483.0300 (30)
RT2 - FF Flat	42.2900	1.0000	41.2900	0.1000	4.1290	9.0000	371.6100 (30)
Total net area of external elements Aum(A, m ²)			418.6100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	105.3616		(33)
Main dwelling							
IW1			170.2100			9.0000	1531.8901 (32c)
IF1			42.2900			18.0000	761.2200 (32d)
IC1			42.2900			9.0000	380.6100 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	24725.1601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		176.4696 (35)

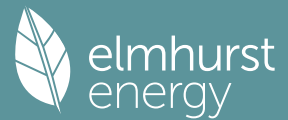
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	21.9100	0.0250	0.5478
E3 Sill	8.7000	0.0220	0.1914
E4 Jamb	46.0400	0.0180	0.8287
E5 Ground floor (normal)	55.2300	0.0480	2.6510
E15 Flat roof with parapet	55.7000	0.3000	16.7100
E16 Corner (normal)	43.4400	0.0350	1.5204
E17 Corner (inverted - internal area greater than external area)	5.2000	-0.0660	-0.3432
R1 Head of roof window	8.1200	0.2400	1.9488
R2 Sill of roof window	8.1200	0.2400	1.9488
R3 Jamb of roof window	5.4200	0.2400	1.3008

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		27.3045 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	132.6661 (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
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(38)m	40.9126	39.6459	39.6459	37.7460	37.7460	35.2127	35.8460	34.5794	35.2127	36.4793	36.4793	38.3793 (38)
Heat transfer coeff	173.5787	172.3121	172.3121	170.4121	170.4121	167.8788	168.5122	167.2455	167.8788	169.1455	169.1455	171.0454 (39)
Average = Sum(39)m / 12 =												169.9899
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2389	1.2298	1.2298	1.2163	1.2163	1.1982	1.2027	1.1937	1.1982	1.2072	1.2072	1.2208 (40)
HLP (average)												1.2133
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.9173 (42)
Hot water usage for mixer showers													
73.1333	72.0342	70.4327	67.3684	65.1071	62.5853	61.1519	62.7413	64.4836	67.1913	70.3213	72.8531	(42a)	
Hot water usage for baths													
31.5729	31.1040	30.4437	29.2262	28.3146	27.3037	26.7577	27.4134	28.1273	29.2090	30.4515	31.4662	(42b)	
Hot water usage for other uses													
44.5060	42.8876	41.2692	39.6508	38.0324	36.4140	36.4140	38.0324	39.6508	41.2692	42.8876	44.5060	(42c)	
Average daily hot water use (litres/day)												137.1595 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	149.2122	146.0258	142.1456	136.2455	131.4541	126.3030	124.3235	128.1871	132.2617	137.6694	143.6604	148.8252 (44)	
Energy content	236.3156	207.9388	218.4725	186.5132	176.9624	155.3042	150.3586	158.7223	163.0919	186.8161	204.6706	233.0244 (45)	
Energy content (annual)										Total = Sum(45)m =		2278.1907	
Distribution loss (46)m = 0.15 x (45)m													
35.4473	31.1908	32.7709	27.9770	26.5444	23.2956	22.5538	23.8084	24.4638	28.0224	30.7006	34.9537	(46)	
Water storage loss (or HIU loss):													
Store volume												250.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8694 (55)	
Total storage loss													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)	
If cylinder contains dedicated solar storage													
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	(61)	
Total heat required for water heating calculated for each month													
286.5294	253.2932	267.2905	228.3536	214.3819	191.2915	187.5454	196.8397	206.2830	235.6341	253.2646	283.2382	(62)	
WWHRS	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	(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												687.1401 (H24)	
Heat delivered to space heating												0.0000 (H29)	
Solar input												687.1401	
Solar input	-0.0000	-17.5792	-59.7718	-85.4913	-108.2751	-107.7445	-105.6173	-95.5879	-67.1122	-35.7264	-4.2343	-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	(63d)	
Output from w/h	286.5294	235.7140	207.5187	142.8623	106.1068	83.5471	81.9281	101.2518	139.1708	199.9077	249.0303	283.2382 (64)	
								Total per year (kWh/year) = Sum(64)m =				2116.8052 (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													
118.7460	105.4232	111.6965	95.4880	88.7756	80.4285	79.7437	83.2691	88.7809	101.1708	106.9282	117.6516	(65)	

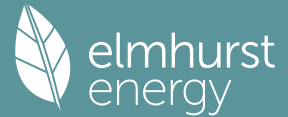
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	175.0376	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	32.7691	29.1052	23.6699	17.9197	13.3952	11.3088	12.2195	15.8834	21.3186	27.0689	31.5934	33.6798	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	461.9956	466.7897	454.7088	428.9900	396.5246	366.0118	345.6273	340.8332	352.9141	378.6329	411.0983	441.6112	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	55.4211	(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)	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	-116.6918	(71)
Water heating gains (Table 5)	159.6048	156.8797	150.1298	132.6222	119.3220	111.7062	107.1824	111.9208	123.3069	135.9823	148.5114	158.1339	(72)
Total internal gains	771.1365	769.5416	745.2754	696.2988	646.0088	602.7937	578.7961	582.4043	611.3066	658.4510	707.9700	750.1918	(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	5.9800	12.9236	0.4000	0.8000	1.0000	22.2575 (75)
Southeast	13.7500	40.4699	0.4000	0.8000	1.0000	160.2609 (77)
Southwest	19.1900	40.4699	0.4000	0.8000	1.0000	223.6659 (79)
Northwest	7.0200	12.9236	0.4000	0.8000	1.0000	26.1283 (81)
Horizontal	2.6600	30.0000	0.4000	0.8000	1.0000	22.9824 (82)

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Solar gains	455.2950	720.2984	1030.6314	1411.2054	1621.5265	1760.0333	1663.2607	1496.6014	1243.7331	866.8145	563.3857	382.9125 (83)
Total gains	1226.4314	1489.8400	1775.9068	2107.5042	2267.5353	2362.8270	2242.0568	2079.0057	1855.0397	1525.2655	1271.3557	1133.1043 (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	39.5676	39.8585	39.8585	40.3029	40.3029	40.9111	40.7573	41.0660	40.9111	40.6047	40.6047	40.1537
alpha	3.6378	3.6572	3.6572	3.6869	3.6869	3.7274	3.7172	3.7377	3.7274	3.7070	3.7070	3.6769
util living area	0.9702	0.9430	0.8789	0.7422	0.5608	0.3504	0.2322	0.2562	0.5012	0.8036	0.9401	0.9763 (86)
MIT	19.7657	19.9995	20.3414	20.6754	20.8488	20.9088	20.9157	20.9156	20.8848	20.6481	20.1765	19.7298 (87)
Th 2	19.8890	19.8962	19.8962	19.9070	19.9070	19.9214	19.9178	19.9251	19.9214	19.9142	19.9142	19.9034 (88)
util rest of house	0.9633	0.9305	0.8538	0.6968	0.4957	0.2769	0.1515	0.1708	0.4168	0.7545	0.9244	0.9706 (89)
MIT 2	18.4783	18.7739	19.1882	19.5760	19.7497	19.8114	19.8111	19.8188	19.7969	19.5656	19.0124	18.4444 (90)
Living area fraction	18.7907	19.0713	19.4681	19.8428	20.0164	20.0777	20.0792	20.0850	20.0609	19.8283	19.2949	18.7563 (92)
MIT	18.7907	19.0713	19.4681	19.8428	20.0164	20.0777	20.0792	20.0850	20.0609	19.8283	19.2949	18.7563 (93)
Temperature adjustment												0.0000
adjusted MIT	18.7907	19.0713	19.4681	19.8428	20.0164	20.0777	20.0792	20.0850	20.0609	19.8283	19.2949	18.7563 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9543	0.9190	0.8425	0.6939	0.5025	0.2877	0.1636	0.1835	0.4281	0.7501	0.9133	0.9627 (94)
Useful gains	1170.3237	1369.1171	1496.2079	1462.3399	1139.4942	679.7462	366.8502	381.5969	794.1752	1144.0943	1161.1743	1090.8572 (95)
Ext temp.	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	17.8000	15.2000	11.6000	8.0000	5.1000 (96)
Heat loss rate W	2376.4215	2321.2681	2079.4754	1694.3676	1195.6861	684.5621	367.2189	382.1524	816.0357	1391.7791	1910.4837	2335.8526 (97)
Space heating kWh	897.3367	639.8455	433.9510	167.0599	41.8068	0.0000	0.0000	0.0000	0.0000	184.2775	539.5027	926.2766 (98a)
Space heating requirement - total per year (kWh/year)												3830.0567
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	897.3367	639.8455	433.9510	167.0599	41.8068	0.0000	0.0000	0.0000	0.0000	184.2775	539.5027	926.2766 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3830.0567
Space heating per m2										(98c) / (4) =		27.3361 (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 %)												249.9000 (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	897.3367	639.8455	433.9510	167.0599	41.8068	0.0000	0.0000	0.0000	0.0000	184.2775	539.5027	926.2766 (98)
Space heating efficiency (main heating system 1)	249.9000	249.9000	249.9000	249.9000	249.9000	0.0000	0.0000	0.0000	0.0000	249.9000	249.9000	249.9000 (210)
Space heating fuel (main heating system)	359.0783	256.0406	173.6499	66.8507	16.7294	0.0000	0.0000	0.0000	0.0000	73.7405	215.8875	370.6589 (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	286.5294	235.7140	207.5187	142.8623	106.1068	83.5471	81.9281	101.2518	139.1708	199.9077	249.0303	283.2382 (64)
Efficiency of water heater	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000	175.1000 (216)
Fuel for water heating, kWh/month	163.6376	134.6168	118.5144	81.5890	60.5978	47.7139	46.7893	57.8251	79.4808	114.1677	142.2218	161.7580 (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	53.0286	47.8968	53.0286	51.3180	53.0286	51.3180	53.0286	53.0286	51.3180	53.0286	51.3180	53.0286 (231)
Lighting	28.6826	23.0102	20.7182	15.1790	11.7247	9.5792	10.6957	13.9026	18.0581	23.6933	26.7615	29.4797 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-44.1707	-60.8440	-90.8580	-106.5702	-113.4747	-110.0531	-108.0518	-102.0614	-88.8678	-73.0472	-50.4710	-37.3891 (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												1532.6357 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												175.1000
Water heating fuel used												1208.9122 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 1.1625)

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mechanical ventilation fans (SFP = 1.1625)	544.3689 (230a)
pump for solar water heating	80.0000 (230g)
Total electricity for the above, kWh/year	624.3689 (231)
Electricity for lighting (calculated in Appendix L)	231.4848 (232)

Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-985.8590 (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	2611.5426 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1532.6357	27.6700	424.0803 (240)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1208.9122	27.6700	334.5060 (247)	
Energy for instantaneous electric shower(s)	0.0000	27.6700	0.0000 (247a)	
Pumps, fans and electric keep-hot	544.3689	27.6700	150.6269 (249)	
Pump for solar water heating	80.0000	27.6700	22.1360 (249)	
Energy for lighting	231.4848	27.6700	64.0518 (250)	
Additional standing charges			0.0000 (251)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-985.8590	27.6700	-272.7872	
PV Unit electricity exported	0.0000	5.8100	0.0000	
Total			-272.7872 (252)	
Total energy cost			722.6138 (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	1532.6357	0.1572	240.8777 (261)	
Total CO2 associated with community systems			0.0000 (373)	
Water heating (other fuel)	1208.9122	0.1460	176.4717 (264)	
Space and water heating			417.3494 (265)	
Pumps, fans and electric keep-hot	624.3689	0.1387	86.6077 (267)	
Energy for lighting	231.4848	0.1443	33.4104 (268)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-985.8590	0.1341	-132.1772	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-132.1772 (269)	
Total CO2, kg/year			405.1903 (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	1532.6357	1.5818	2424.3526 (275)	
Total CO2 associated with community systems			0.0000 (473)	
Water heating (other fuel)	1208.9122	1.5400	1861.7154 (278)	
Space and water heating			4286.0680 (279)	
Pumps, fans and electric keep-hot	624.3689	1.5128	944.5452 (281)	
Energy for lighting	231.4848	1.5338	355.0591 (282)	
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-985.8590	1.4955	-1474.3312	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1474.3312 (283)	
Total Primary energy kWh/year			4111.3411 (286)	

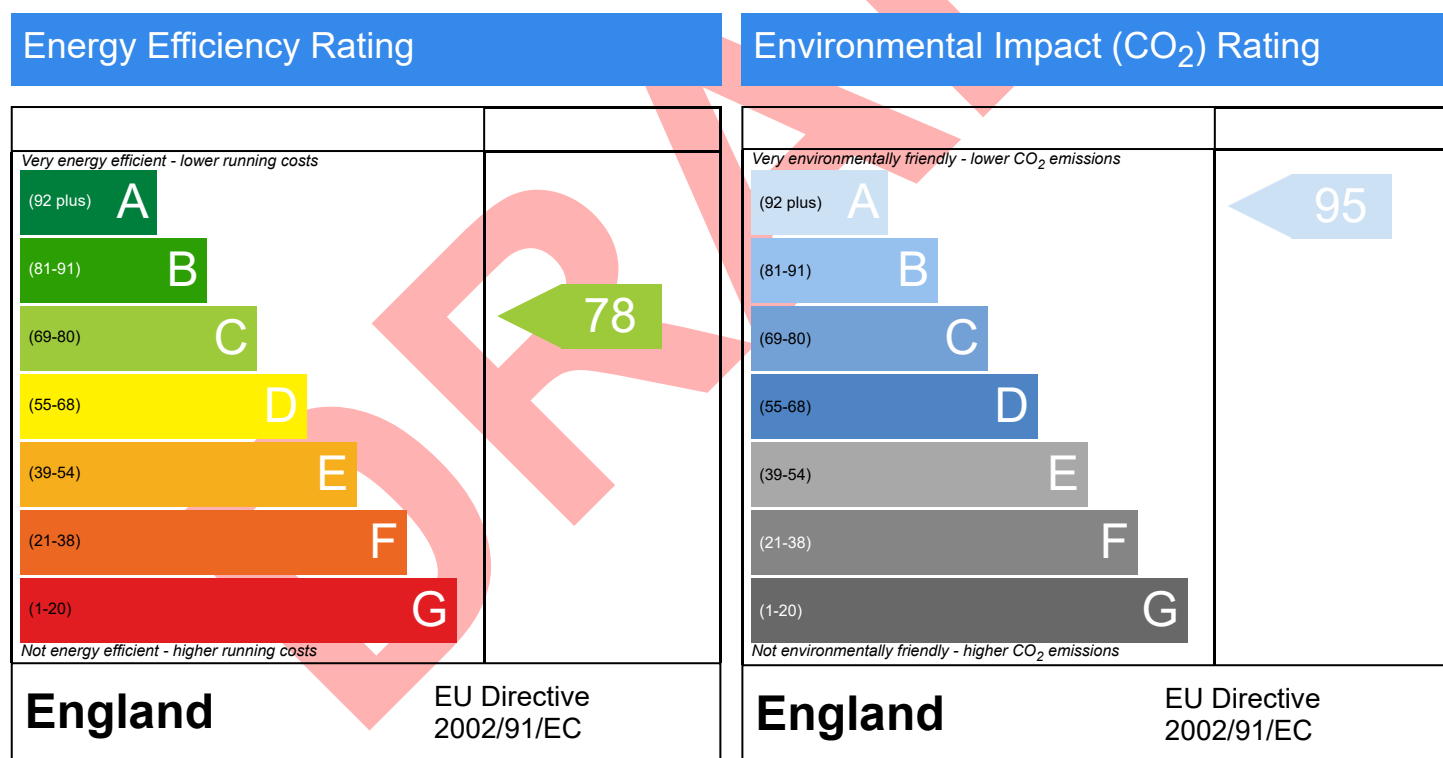
Predicted Energy Assessment



Dwelling type: House, Detached
Date of assessment: 21/04/2026
SAP Version: 10.2
Produced by: Derek White
Total floor area: 140.11 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.



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

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

Thermal Bridging

Plot Reference	1 Be Lean	Issued on Date	21/04/2026
Assessment Reference	001	Plot Type Ref	Detached House
Plot Address		SAP Version	10.2

SAP Rating	78 C	DER	4.83	TER	12.53
Environmental	95 A	% DER < TER			61.45
CO ₂ Emissions (t/year)	0.58	DFEE	52.98	TFEE	59.79
Compliance Check	See BREL	% DFEE < TFEE			11.40
% DPER < TPER	24.21	DPER	50.55	TPER	66.69

Assessor Details	Mr. Derek White	Assessor ID	B381-0001
Client			

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.025	21.91	0.55	
External wall	E3 Sill	Independently assessed	0.022	8.70	0.19	
External wall	E4 Jamb	Independently assessed	0.018	46.04	0.83	
External wall	E5 Ground floor (normal)	Independently assessed	0.048	55.23	2.65	
External wall	E15 Flat roof with parapet	Table K1 - Default	0.300	55.70	16.71	
External wall	E16 Corner (normal)	Independently assessed	0.035	43.44	1.52	
External wall	E17 Corner (inverted – internal area greater than external area)	Independently assessed	-0.066	5.20	-0.34	
External roof	R1 Head of roof window	Table K1 - Default	0.240	8.12	1.95	
External roof	R2 Sill of roof window	Table K1 - Default	0.240	8.12	1.95	
External roof	R3 Jamb of roof window	Table K1 - Default	0.240	5.42	1.30	

Total: 257.88 W/mK:
Y-Value: 0.07 W/m²K:

Energy Report

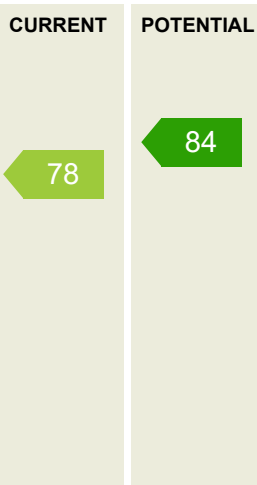
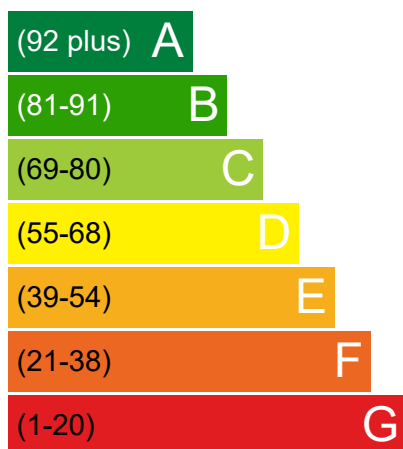
Dwelling Address	
Reference	1 Be Lean-001
SAP Version	10.2
Assessment Date	21/04/2026
Submission Date	
Property Type	House, Detached
Total Floor Area	140

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

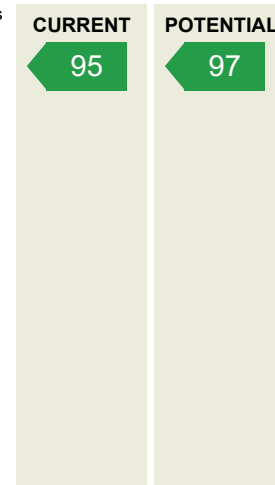
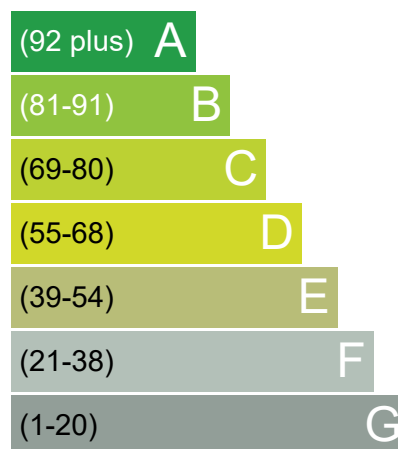
Energy Efficiency Rating

Most energy efficient - lower running costs



Carbon Dioxide (CO2) Emissions Rating

Very environmentally friendly - lower CO2 emissions



Additional ratings for your home

Energy Report



	Primary Energy	Energy	Carbon	Cost	HTC
CURRENT	43.50 kWh	3946 kWh	581 kg	1091.89 £	175 W/K
POTENTIAL	29.34 kWh	2612 kWh	405 kg	722.61 £	175 W/K

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.15 W/m ² K	Very Good
Roof	Average thermal transmittance 0.1 W/m ² K	Very Good
Floor	Average thermal transmittance 0.1 W/m ² K	Very Good
Windows	High performance glazing	Good
Main heating	Air source heat pump, radiators and underfloor, electric	Good
Main heating controls	Time and temperature zone control	Very Good
Secondary heating	None	
Hot water	From main system	Average
Lighting	Excellent lighting efficiency	Very Good
Air tightness	Air permeability [AP50] = 4.0 m ³ /h.m ² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£96	C 79	£4,000 - £7,000	£96	A 96
Photovoltaic	£369	B 84	£8,000 - £10,000	£273	A 97

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 	£64	£64	
Heating 	£574	£597	
Hot Water 	£453	£335	
New Technologies e.g. Impact of PV	£0	-(£273)	
TOTAL	£1092	£723	

Estimated energy use and potential savings



Space Heating

1532

kWh per year



Water Heating

1639

kWh per year

About this document

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

Disclaimer

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

Glossary terms for additional metrics

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