

Building Regulations England Part L (BREL) Compliance Report

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

Date: Wed 27 Mar 2024 09:47:44

Project Information			
Assessed By	Cory Skrzypkowski	Building Type	Bungalow, End-terrace
OCDEA Registration	EES/027193	Assessment Date	2024-03-27

Dwelling Details			
Assessment Type	As designed	Total Floor Area	129 m ²
Site Reference	Unit 4	Plot Reference	CEPCN4621
Address	4 Burrill Development Cowling Road, Burrill , DL8 1RG		

Client Details	
Name	Andrew Burningham
Company	Array
Address	

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	11.77 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	6.46 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	64.23 kWh _{PE} /m ²	
Dwelling primary energy	66.99 kWh _{PE} /m ²	FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	64.5 kWh/m ²	
Dwelling fabric energy efficiency	116.1 kWh/m ²	FAIL

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	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.11	Ground Floor (0.11)	OK
Roofs	0.16	0.15	Roof (1) (0.15)	OK
Windows, doors, and roof windows	1.6	1.4	FGD1 (1.4)	OK
Rooflights	2.2	1.4	RL1, North (1.4)	OK

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)	52.402	0.18
Party wall: Party Wall (1)	76.82	0 (!)
Ground floor: Ground Floor, Ground Floor	128.76	0.11
Exposed roof: Roof (1)	163.31	0.15

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
FGD1, Fully Glazed Door	8.268	West	0.7	1.4
FGD2, Fully Glazed Door	7.28	West	0.7	1.4
W1, Window	11.18	North	0.7	1.4
W2, Window	11.18	North	0.7	1.4
W3, Window	5.72	East	0.7	1.4
FGD3, Fully Glazed Door	2.1	East	0.7	1.4
RL1, Roof Light	1.26	North	0.7	1.4
RL2, Roof Light	1.26	North	0.7	1.4
RL3, Roof Light	1.26	South	0.7	1.4
RL4, Roof Light	1.26	South	0.7	1.4

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m ² K) used for thermal bridging

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	15 m ³ /hm ² , Assumed value	FAIL
Air permeability test certificate reference		
4 Space heating		
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity		
Efficiency	448.4%	
Emitter type	Underfloor	
Flow temperature	35°C	
System type	Heat Pump	
Manufacturer	Mitsubishi Electric Europe B.V.	
Model	Ecodan 8.5 kW	
Commissioning		
Secondary heating system: N/A		
Fuel	N/A	
Efficiency	N/A	
Commissioning		
5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	180 litres	
Declared heat loss	1.5 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		
6 Controls		
Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services		
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		
7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	100 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		

12 Declarations**a. Assessor Declaration**

This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.

Signed:

Assessor ID:

Name:

Date:

b. Client Declaration

N/A

Summary for Input Data



Property Reference	Unit 4	Issued on Date	27/03/2024
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621
Property	Burrill Development, 4, Cowling Road, Burrill , Bedale, DL8 1RG		

SAP Rating	70 C	DER	6.46	TER	11.77
Environmental	94 A	% DER < TER			45.11
CO ₂ Emissions (t/year)	0.9	DFEE	116.05	TFEE	64.52
Compliance Check	See BREL	% DFEE < TFEE			-79.87
% DPER < TPER	-4.29	DPER	66.99	TPER	64.23

Assessor Details	Mr. Cory Skrzypkowski	Assessor ID	AU69-0001
Client			

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

Orientation	West	
Property Tenure	ND	
Transaction Type	2	
Terrain Type	Rural	
1.0 Property Type	Bungalow, End-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	N/A	kJ/m ² K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	38.00 m	128.76 m ²	3.71 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	66.05	m ²
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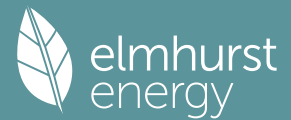
9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Walls	Cavity Wall		Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	98.13	52.40	0.00	None	45.73	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Walls	Solid Wall		Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	76.82	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Block		Dense block, plasterboard on dabs	75.00	242.44

10.0 External Roofs	
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Summary for Input Data



Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area (m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Roof at Rafter Roof	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	168.35	163.31	None	0.00	Enter Gross Area	5.04

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.11	None	0.00	110.00	128.76

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Fully Glazed Door	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.70	1.40
Roof Light	Manufacturer	Roof Light	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FGD1	Fully Glazed Door	External Walls	West	8.27	0
FGD2	Fully Glazed Door	External Walls	West	7.28	0
W1	Window	External Walls	North	11.18	0
W2	Window	External Walls	North	11.18	0
W3	Window	External Walls	East	5.72	0
FGD3	Fully Glazed Door	External Walls	East	2.10	0
RL1	Roof Light	Roof at Rafter	North	1.26	0
RL2	Roof Light	Roof at Rafter	North	1.26	0
RL3	Roof Light	Roof at Rafter	South	1.26	0
RL4	Roof Light	Roof at Rafter	South	1.26	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

Y-value

 W/m²K

18.0 Pressure Testing

Property Tested?

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
LED	100.00	5	500	10

24.0 Main Heating 1

Percentage of Heat

 %

Database Ref. No.

Fuel Type

SAP Code

In Winter

In Summer

Model Name

Manufacturer

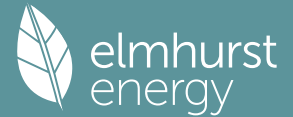
System Type

Controls SAP Code

Delayed Start Stat

Burner Control

Summary for Input Data



HETAS approved System	No
Oil Pump Inside	No
FI Case	0.00
Flue Type	None or Unknown
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00
Boiler Interlock	No
Combi boiler type	No Combi
Combi keep hot type	None

25.0 Main Heating 2

26.0 Heat Networks

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

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	Yes

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower 1	Combi boiler or unvented hot water system	11.00		No	
Shower 2	Combi boiler or unvented hot water system	11.00	9.30	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes
Insulation Type	Measured Loss
Insulation Thickness Type	Other
Insulation Thickness	25
Cylinder Volume	180.00 L

Summary for Input Data

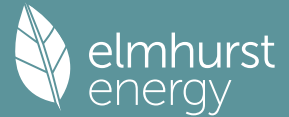


Loss	<input type="text" value="1.50"/>	kWh/day
Pipes insulation	<input type="text" value="Fully insulated primary pipework"/>	
In Airing Cupboard	<input type="text" value="No"/>	

31.0 Thermal Store	<input type="text" value="None"/>
Thermal Store Pipework	<input type="text" value="within a single casing"/>

Recommendations
Lower cost measures
None
Further measures to achieve even higher standards
None

Full SAP Calculation Printout



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Environmental	94 A	% DER < TER			45.11
CO ₂ Emissions (t/year)	0.9	DFEE	116.05	TFEE	64.52
Compliance Check	See BREL	% DFEE < TFEE			-79.87
% DPER < TPER	-4.29	DPER	66.99	TPER	64.23
Assessor Details	Mr. Cory Skrzypkowski			Assessor ID	AU69-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	128.7600 (1b)	3.7100 (2b)	477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		477.6996 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 477.6996 (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) =	0.0837 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8337 (18)
Number of sides sheltered		1 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7712 (21)

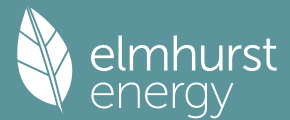
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9833	0.9640	0.9447	0.8483	0.8290	0.7326	0.7326	0.7134	0.7712	0.8290	0.8676	0.9062 (22b)
Effective ac	0.9834	0.9647	0.9463	0.8598	0.8437	0.7684	0.7684	0.7544	0.7974	0.8437	0.8764	0.9106 (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
Fully Glazed Door (Uw = 1.40)			17.6500	1.3258	23.3996		(27)
Window (Uw = 1.40)			28.0800	1.3258	37.2273		(27)
RL1		1.2600	1.3258	1.6705			(27a)
RL2		1.2600	1.3258	1.6705			(27a)
RL3		1.2600	1.3258	1.6705			(27a)
RL4		1.2600	1.3258	1.6705			(27a)
Ground Floor			128.7600	0.1100	14.1636	110.0000	14163.6000 (28a)
External Walls	98.1300	45.7300	52.4000	0.1800	9.4320	60.0000	3144.0000 (29a)
Roof at Rafter	168.3500	5.0400	163.3100	0.1500	24.4965	9.0000	1469.7900 (30)
Total net area of external elements Aum (A, m ²)			395.2400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	115.4008	(33)
Party Walls			76.8200	0.0000	0.0000	70.0000	5377.4000 (32)
Block			242.4400			75.0000	18183.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	42337.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		328.8117 (35)
Thermal bridges (Default value 0.200 * total exposed area)		79.0480 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	194.4488 (37)

Full SAP Calculation Printout



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	155.0280	152.0688	149.1682	135.5440	132.9949	121.1287	121.1287	118.9312	125.6994	132.9949	138.1516	143.5427	(38)
Heat transfer coeff	349.4769	346.5176	343.6170	329.9928	327.4437	315.5775	315.5775	313.3801	320.1482	327.4437	332.6004	337.9915	(39)
Average = Sum(39)m / 12 =													329.9806

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7142	2.6912	2.6687	2.5629	2.5431	2.4509	2.4509	2.4338	2.4864	2.5431	2.5831	2.6250	(40)
HLP (average)													2.5628
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8917 (42)

Hot water usage for mixer showers 128.4495 126.5191 123.7062 118.3243 114.3525 109.9233 107.4057 110.1973 113.2574 118.0131 123.5106 127.9573 (42a)

Hot water usage for baths 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42b)

Hot water usage for other uses 44.2439 42.6351 41.0262 39.4173 37.8084 36.1996 36.1996 37.8084 39.4173 41.0262 42.6351 44.2439 (42c)

Average daily hot water use (litres/day) 158.6479 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	172.6934	169.1542	164.7324	157.7416	152.1610	146.1228	143.6052	148.0057	152.6747	159.0393	166.1457	172.2013	(44)
Energy conte	273.5041	240.8733	253.1876	215.9404	204.8379	179.6751	173.6781	183.2620	188.2632	215.8148	236.7050	269.6256	(45)
Energy content (annual)													Total = Sum(45)m = 2635.3671
Distribution loss (46)m = 0.15 x (45)m	41.0256	36.1310	37.9781	32.3911	30.7257	26.9513	26.0517	27.4893	28.2395	32.3722	35.5058	40.4438	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8100 (55)
Total storage loss	25.1100	22.6800	25.1100	24.3000	25.1100	24.3000	25.1100	25.1100	24.3000	25.1100	24.3000	25.1100	(56)
If cylinder contains dedicated solar storage													
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	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	321.8765	284.5645	301.5600	262.7524	253.2103	226.4871	222.0505	231.6344	235.0752	264.1872	283.5170	317.9980	(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	321.8765	284.5645	301.5600	262.7524	253.2103	226.4871	222.0505	231.6344	235.0752	264.1872	283.5170	317.9980	(64)
Total per year (kWh/year) = Sum(64)m =													3204.9131 (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	129.6380	115.0433	122.8828	109.2498	106.8065	97.1916	96.4459	99.6325	100.0471	110.4563	116.1540	128.3484	(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	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	(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)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	(71)
Water heating gains (Table 5)	174.2447	171.1954	165.1651	151.7358	143.5572	134.9883	129.6316	133.9147	138.9543	148.4628	161.3250	172.5113	(72)
Total internal gains	686.2489	702.2815	672.4971	647.5579	613.5830	590.4303	567.0233	568.2326	585.9985	607.0169	645.6754	671.4455	(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							
East	2.1000	19.6403	0.6300	0.7000	0.7700	12.6049	(76)						
West	15.5500	19.6403	0.6300	0.7000	0.7700	93.3361	(80)						
North	22.3600	10.6334	0.6300	0.7000	0.7700	72.6634	(74)						
East	5.7200	19.6403	0.6300	0.7000	0.7700	34.3333	(76)						
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049	(82)						
South	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049	(82)						
Solar gains	264.9473	521.2898	879.9067	1338.1538	1702.3706	1773.5093	1675.5721	1395.1108	1039.3345	622.9295	330.5575	217.9383	(83)
Total gains	951.1962	1223.5714	1552.4038	1985.7117	2315.9536	2363.9396	2242.5954	1963.3435	1625.3330	1229.9465	976.2329	889.3838	(84)

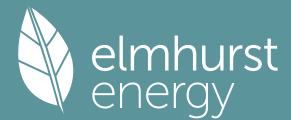
7. Mean internal temperature (heating season)

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
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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tau	33.6517	33.9391	34.2256	35.6386	35.9161	37.2666	37.2666	37.5279	36.7345	35.9161	35.3592	34.7952
alpha	3.2434	3.2626	3.2817	3.3759	3.3944	3.4844	3.4844	3.5019	3.4490	3.3944	3.3573	3.3197
util living area	0.9977	0.9945	0.9849	0.9501	0.8649	0.7124	0.5689	0.6462	0.8769	0.9796	0.9957	0.9982 (86)
Living	18.9160	19.1254	19.4930	20.0359	20.4763	20.7706	20.8643	20.8392	20.5828	19.9951	19.3988	18.9367
Non living	16.6083	16.8840	17.3588	18.0705	18.5742	18.8808	18.9295	18.9337	18.7334	18.0453	17.2746	16.6671
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	11	0	0	0	0	0	0	0	0	0	0	0
16 / 9	20	28	5	0	0	0	0	0	0	0	0	31
MIT	20.2385	19.9383	19.5984	20.0359	20.4763	20.7706	20.8643	20.8392	20.5828	19.9951	19.3988	19.8314 (87)
Th 2	18.8997	18.9124	18.9248	18.9845	18.9959	19.0497	19.0497	19.0598	19.0288	18.9959	18.9729	18.9492 (88)
util rest of house	0.9965	0.9916	0.9767	0.9212	0.7843	0.5505	0.3391	0.4121	0.7636	0.9629	0.9931	0.9973 (89)
MIT 2	18.2472	18.0171	17.4999	18.0705	18.5742	18.8808	18.9295	18.9337	18.7334	18.0453	17.2746	17.9419 (90)
Living area fraction									fLA = Living area / (4) =			0.5130 (91)
MIT	19.2687	19.0026	18.5764	19.0787	19.5499	19.8502	19.9220	19.9112	19.6821	19.0455	18.3643	18.9112 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2687	19.0026	18.5764	19.0787	19.5499	19.8502	19.9220	19.9112	19.6821	19.0455	18.3643	18.9112 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9967	0.9918	0.9748	0.9230	0.8109	0.6246	0.4493	0.5254	0.8105	0.9635	0.9919	0.9973 (94)
Useful gains	948.1045	1213.5358	1513.2574	1832.7186	1878.0298	1476.5845	1007.5419	1031.6016	1317.3226	1185.0215	968.3116	886.9716 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.6000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	5231.2101	4886.7981	4149.6504	3358.8922	2570.4114	1656.8479	1048.3475	1100.3436	1787.1018	2765.4157	3746.4981	4972.2481 (97)
Space heating kWh	3186.6306	2468.4323	1961.4764	1098.8450	515.1319	0.0000	0.0000	0.0000	0.0000	1175.8132	2000.2943	3039.4457 (98a)
Space heating requirement - total per year (kWh/year)												15446.0693
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	3186.6306	2468.4323	1961.4764	1098.8450	515.1319	0.0000	0.0000	0.0000	0.0000	1175.8132	2000.2943	3039.4457 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												15446.0693
Space heating per m2										(98c) / (4) =		119.9602 (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 %)												448.4495 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	3186.6306	2468.4323	1961.4764	1098.8450	515.1319	0.0000	0.0000	0.0000	0.0000	1175.8132	2000.2943	3039.4457 (98)
Space heating efficiency (main heating system 1)	448.4495	448.4495	448.4495	448.4495	448.4495	0.0000	0.0000	0.0000	0.0000	448.4495	448.4495	448.4495 (210)
Space heating fuel (main heating system)	710.5885	550.4371	437.3907	245.0320	114.8695	0.0000	0.0000	0.0000	0.0000	262.1952	446.0467	677.7677 (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	321.8765	284.5645	301.5600	262.7524	253.2103	226.4871	222.0505	231.6344	235.0752	264.1872	283.5170	317.9980 (64)
Efficiency of water heater (217)m	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170	178.2170 (216)
Fuel for water heating, kWh/month	180.6094	159.6731	169.2095	147.4340	142.0798	127.0850	124.5956	129.9733	131.9039	148.2391	159.0853	178.4330 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	37.6242	30.1835	27.1769	19.9110	15.3798	12.5654	14.0300	18.2367	23.6877	31.0795	35.1042	38.6699 (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												3444.3274 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												178.2170
Water heating fuel used												1798.3210 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												0.0000 (231)
Electricity for lighting (calculated in Appendix L)												303.6488 (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)

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Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	5546.2972 (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	3444.3274	0.1552	534.5067 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1798.3210	0.1411	253.7102 (264)
Space and water heating			788.2170 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	303.6488	0.1443	43.8259 (268)
Total CO2, kg/year			832.0429 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4600 (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	3444.3274	1.5745	5423.1694 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1798.3210	1.5217	2736.4660 (278)
Space and water heating			8159.6353 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	303.6488	1.5338	465.7467 (282)
Total Primary energy kWh/year			8625.3820 (286)
Dwelling Primary energy Rate (DPER)			66.9900 (287)

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

 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	128.7600 (1b)	x 3.7100 (2b)	= 477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	477.6996 (5)

 2. Ventilation rate

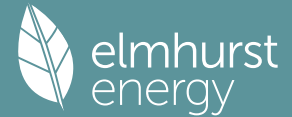
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number 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) =	0.0837 (8)
Pressure Test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3337 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3087 (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	0.3936	0.3859	0.3782	0.3396	0.3319	0.2933	0.2933	0.2856	0.3087	0.3319	0.3473	0.3627 (22b)
Effective ac	0.5775	0.5745	0.5715	0.5577	0.5551	0.5430	0.5430	0.5408	0.5476	0.5551	0.5603	0.5658 (25)

 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.20)			29.0000	1.1450	33.2061		(27)
RL1			0.8000	2.0221	1.6176		(27a)
RL2			0.8000	2.0221	1.6176		(27a)
RL3			0.8000	2.0221	1.6176		(27a)
RL4			0.8000	2.0221	1.6176		(27a)
Ground Floor			128.7600	0.1300	16.7388		(28a)
External Walls	98.1300	29.0000	69.1300	0.1800	12.4434		(29a)

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Roof at Rafter	168.3500	3.2000	165.1500	0.1100	18.1665	(30)
Total net area of external elements Aum(A, m2)			395.2400			(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		87.0254	(33)
Party Walls			76.8200	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						328.8117 (35)
Thermal bridges (User defined value 0.050 * total exposed area)						19.7620 (36)
Point Thermal bridges						0.0000 (36a) =
Total fabric heat loss						(33) + (36) + (36a) = 106.7874 (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	91.0313	90.5571	90.0923	87.9093	87.5009	85.5995	85.5995	85.2474	86.3319	87.5009	88.3271	89.1910	(38)
Average = Sum(39)m / 12 =													195.9784 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5363	1.5327	1.5290	1.5121	1.5089	1.4942	1.4942	1.4914	1.4998	1.5089	1.5153	1.5220	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	1.5121

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8917 (42)
Hot water usage for mixer showers	93.4178	92.0139	89.9682	86.0540	83.1655	79.9442	78.1132	80.1435	82.3690	85.8277	89.8259	93.0599	(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses	44.2439	42.6351	41.0262	39.4173	37.8084	36.1996	36.1996	37.8084	39.4173	41.0262	42.6351	44.2439	(42c)
Average daily hot water use (litres/day)													126.3498 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	137.6617	134.6490	130.9944	125.4713	120.9739	116.1438	114.3128	117.9519	121.7863	126.8539	132.4610	137.3038	(44)
Energy content (annual)	218.0225	191.7383	201.3335	171.7640	162.8541	142.8123	138.2514	146.0491	150.1747	172.1395	188.7149	214.9846	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 2098.8391

Water storage loss:													180.0000 (47)
Store volume													1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):													0.5400 (49)
Temperature factor from Table 2b													0.8381 (55)
Enter (49) or (54) in (55)													

Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	267.2652	236.2156	250.5761	219.4182	212.0968	190.4665	187.4941	195.2918	197.8289	221.3822	236.3691	264.2273	(62)
WWHRS	-42.7067	-37.7702	-39.5507	-32.7496	-30.5214	-26.1174	-24.4809	-26.0330	-27.0221	-31.8560	-36.0890	-41.9159	(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	224.5585	198.4454	211.0254	186.6686	181.5754	164.3491	163.0132	169.2588	170.8068	189.5261	200.2801	222.3114	(64)
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2281.8188 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

Heat gains from water heating, kWh/month	111.8866	99.3348	106.3375	95.2349	93.5431	85.6085	85.3627	87.9555	88.0565	96.6305	100.8711	110.8765	(65)
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5. Internal gains (see Table 5 and 5a)

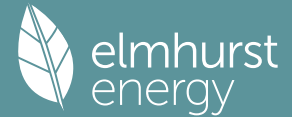
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	(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)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	(71)
Water heating gains (Table 5)	150.3853	147.8196	142.9268	132.2707	125.7300	118.9006	114.7349	118.2197	122.3006	129.8797	140.0987	149.0276	(72)
Total internal gains	665.3894	681.9057	653.2588	631.0928	598.7559	574.3427	552.1266	552.5376	569.3448	591.4339	627.4491	650.9617	(73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North		14.1800	10.6334	0.6300	0.7000	0.7700	46.0808 (74)
East		4.9600	19.6403	0.6300	0.7000	0.7700	29.7715 (76)
West		9.8600	19.6403	0.6300	0.7000	0.7700	59.1829 (80)
North		1.6000	26.0000	0.6300	0.7000	1.0000	16.5110 (82)
South		1.6000	26.0000	0.6300	0.7000	1.0000	16.5110 (82)

Solar gains	168.0572	330.6607	558.1435	848.8260	1079.8606	1124.9861	1062.8618	884.9564	659.2745	395.1343	209.6749	138.2387	(83)
Total gains	833.4467	1012.5664	1211.4023	1479.9187	1678.6164	1699.3288	1614.9884	1437.4941	1228.6193	986.5682	837.1240	789.2004	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	59.4509	59.5937	59.7344	60.4042	60.5312	61.1294	61.1294	61.2415	60.8976	60.5312	60.2748	60.0092
alpha	4.9634	4.9729	4.9823	5.0269	5.0354	5.0753	5.0753	5.0828	5.0598	5.0354	5.0183	5.0006
util living area	0.9992	0.9977	0.9919	0.9618	0.8634	0.6793	0.5146	0.5935	0.8669	0.9860	0.9981	0.9994 (86)
MIT	19.4412	19.6321	19.9560	20.4097	20.7736	20.9512	20.9902	20.9808	20.8304	20.3364	19.8126	19.4173 (87)
Th 2	19.6604	19.6631	19.6658	19.6784	19.6808	19.6919	19.6919	19.6939	19.6876	19.6808	19.6760	19.6710 (88)
util rest of house	0.9988	0.9966	0.9878	0.9420	0.7995	0.5610	0.3669	0.4362	0.7765	0.9757	0.9970	0.9991 (89)
MIT 2	17.8744	18.1206	18.5350	19.1062	19.5114	19.6705	19.6900	19.6895	19.5859	19.0293	18.3614	17.8512 (90)
Living area fraction	FLA = Living area / (4) =											0.5130 (91)
MIT	18.6781	18.8960	19.2639	19.7749	20.1589	20.3274	20.3569	20.3519	20.2243	19.6998	19.1058	18.6545 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6781	18.8960	19.2639	19.7749	20.1589	20.3274	20.3569	20.3519	20.2243	19.6998	19.1058	18.6545 (93)

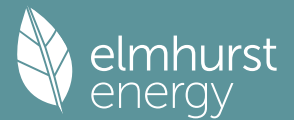
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9984	0.9957	0.9862	0.9438	0.8254	0.6212	0.4433	0.5180	0.8187	0.9759	0.9963	0.9988 (94)
Useful gains	832.1143	1008.1916	1194.6431	1396.6970	1385.4595	1055.5704	715.9843	744.6724	1005.8506	962.7536	834.0408	788.2452 (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	2844.2525	2762.0304	2512.9519	2117.3011	1643.4613	1101.8838	722.7843	758.9000	1182.7184	1767.9816	2342.5124	2832.7744 (97)
Space heating kWh	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (98a)
Space heating requirement - total per year (kWh/year)												7573.5395
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	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7573.5395
Space heating per m2												(98c) / (4) = 58.8190 (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	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (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)	1621.9185	1276.9010	1062.6455	562.1181	207.9668	0.0000	0.0000	0.0000	0.0000	649.0679	1176.7059	1648.0279 (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	224.5585	198.4454	211.0254	186.6686	181.5754	164.3491	163.0132	169.2588	170.8068	189.5261	200.2801	222.3114 (64)
Efficiency of water heater	87.5126	87.3798	87.0615	86.2269	84.1846	79.8000	79.8000	79.8000	79.8000	86.4566	87.2676	87.5411 (217)
Fuel for water heating, kWh/month	256.6013	227.1068	242.3866	216.4853	215.6871	205.9513	204.2772	212.1038	214.0437	219.2153	229.5010	253.9510 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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	31.0442	24.9048	22.4240	16.4288	12.6901	10.3679	11.5763	15.0473	19.5450	25.6441	28.9649	31.9070 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-92.4727	-118.3807	-154.6654	-157.5231	-157.1615	-142.2599	-140.2777	-138.1660	-133.3591	-126.6257	-97.1793	-81.4133 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-96.0573	-194.6407	-374.0734	-544.4803	-704.1586	-702.0622	-693.9439	-594.7077	-445.6212	-272.3599	-126.1364	-76.5598 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												8205.3516 (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												2697.3102 (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)												250.5445 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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PV generation	-6364.2856	(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	4874.9207	(238)

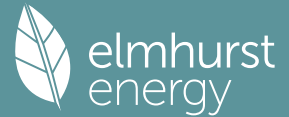
 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	8205.3516	0.2100	1723.1238 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2697.3102	0.2100	566.4351 (264)
Space and water heating			2289.5590 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	250.5445	0.1443	36.1613 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1539.4843	0.1367	-210.5008
PV Unit electricity exported	-4824.8013	0.1268	-611.9863
Total			-822.4871 (269)
Total CO2, kg/year			1515.1624 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7700 (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	8205.3516	1.1300	9272.0473 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2697.3102	1.1300	3047.9605 (278)
Space and water heating			12320.0078 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	250.5445	1.5338	384.2936 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1539.4843	1.5055	-2317.6378
PV Unit electricity exported	-4824.8013	0.4656	-2246.6066
Total			-4564.2443 (283)
Total Primary energy kWh/year			8270.1578 (286)
Target Primary Energy Rate (TPER)			64.2300 (287)

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Property Reference	Unit 4		Issued on Date	27/03/2024	
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621		
Property	Burrill Development, 4, Cowling Road, Burrill, Bedale, DL8 1RG				
SAP Rating	70 C	DER	6.46	TER	11.77
Environmental	94 A	% DER < TER			45.11
CO ₂ Emissions (t/year)	0.9	DFEE	116.05	TFEE	64.52
Compliance Check	See BREL	% DFEE < TFEE			-79.87
% DPER < TPER	-4.29	DPER	66.99	TPER	64.23
Assessor Details	Mr. Cory Skrzyzkowski			Assessor ID	AU69-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	128.7600 (1b)	3.7100 (2b)	477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		477.6996 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 477.6996 (5)

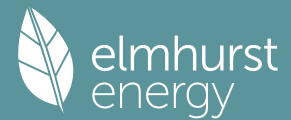
2. Ventilation rate

		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) =	0.0837 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8337 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7712 (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	0.9833, 0.9640, 0.9447, 0.8483, 0.8290, 0.7326, 0.7326, 0.7134, 0.7712, 0.8290, 0.8676, 0.9062	(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	0.9834, 0.9647, 0.9463, 0.8598, 0.8437, 0.7684, 0.7684, 0.7544, 0.7974, 0.8437, 0.8764, 0.9106	(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
Fully Glazed Door (Uw = 1.40)			17.6500	1.3258	23.3996		(27)
Window (Uw = 1.40)			28.0800	1.3258	37.2273		(27)
RL1			1.2600	1.3258	1.6705		(27a)
RL2			1.2600	1.3258	1.6705		(27a)
RL3			1.2600	1.3258	1.6705		(27a)
RL4			1.2600	1.3258	1.6705		(27a)
Ground Floor			128.7600	0.1100	14.1636	110.0000	14163.6000 (28a)
External Walls	98.1300	45.7300	52.4000	0.1800	9.4320	60.0000	3144.0000 (29a)
Roof at Rafter	168.3500	5.0400	163.3100	0.1500	24.4965	9.0000	1469.7900 (30)
Total net area of external elements Aum (A, m ²)			395.2400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 115.4008		(33)
Party Walls			76.8200	0.0000	0.0000	70.0000	5377.4000 (32)
Block			242.4400			75.0000	18183.0000 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 42337.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							328.8117 (35)
Thermal bridges (Default value 0.200 * total exposed area)							79.0480 (36)
Point Thermal bridges							(36a) = 0.0000

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Total fabric heat loss (33) + (36) + (36a) = 194.4488 (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	155.0280	152.0688	149.1682	135.5440	132.9949	121.1287	121.1287	118.9312	125.6994	132.9949	138.1516	143.5427 (38)
Heat transfer coeff	349.4769	346.5176	343.6170	329.9928	327.4437	315.5775	315.5775	313.3801	320.1482	327.4437	332.6004	337.9915 (39)
Average = Sum(39)m / 12 =												329.9806
HLP	2.7142	2.6912	2.6687	2.5629	2.5431	2.4509	2.4509	2.4338	2.4864	2.5431	2.5831	2.6250 (40)
HLP (average)												2.5628
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42)
Hot water usage for baths	31.3884	30.9222	30.2658	29.0554	28.1491	27.1441	26.6013	27.2531	27.9629	29.0382	30.2736	31.2823 (42b)
Hot water usage for other uses	44.2439	42.6351	41.0262	39.4173	37.8084	36.1996	36.1996	37.8084	39.4173	41.0262	42.6351	44.2439 (42c)
Average daily hot water use (litres/day)												69.3237 (43)
Daily hot water use	75.6323	73.5573	71.2920	68.4727	65.9575	63.3437	62.8009	65.0616	67.3802	70.0644	72.9086	75.5262 (44)
Energy content (annual)	119.7831	104.7446	109.5731	93.7357	88.7915	77.8885	75.9522	80.5598	83.0865	95.0768	103.8717	118.2558 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	101.8156	89.0329	93.1371	79.6754	75.4728	66.2052	64.5594	68.4759	70.6236	80.8153	88.2909	100.5174 (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	101.8156	89.0329	93.1371	79.6754	75.4728	66.2052	64.5594	68.4759	70.6236	80.8153	88.2909	100.5174 (64)
12Total per year (kWh/year)												978.6214 (64)
Electric shower(s)	58.2239	51.8780	56.6488	54.0592	55.0736	52.5349	54.2861	55.0736	54.0592	56.6488	55.5836	58.2239 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												662.2938 (64a)
Heat gains from water heating, kWh/month	40.0099	35.2277	37.4465	33.4337	32.6366	29.6850	29.7114	30.8874	31.1707	34.3660	35.9686	39.6853 (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	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585 (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)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681 (71)
Water heating gains (Table 5)	53.7767	52.4222	50.3313	46.4356	43.8664	41.2292	39.9346	41.5153	43.2926	46.1909	49.9564	53.3405 (72)
Total internal gains	565.7809	583.5083	557.6633	542.2577	513.8922	496.6713	477.3264	475.8332	490.3368	504.7450	534.3068	552.2747 (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						
East	2.1000	19.6403	0.6300	0.7000	0.7700	12.6049 (76)						
West	15.5500	19.6403	0.6300	0.7700	0.7700	93.3361 (80)						
North	22.3600	10.6334	0.6300	0.7000	0.7700	72.6634 (74)						
East	5.7200	19.6403	0.6300	0.7000	0.7700	34.3333 (76)						
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
South	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
Solar gains	264.9473	521.2898	879.9067	1338.1538	1702.3706	1773.5093	1675.5721	1395.1108	1039.3345	622.9295	330.5575	217.9383 (83)
Total gains	830.7282	1104.7981	1437.5701	1880.4115	2216.2628	2270.1805	2152.8985	1870.9441	1529.6713	1127.6745	864.8643	770.2130 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	33.6517	33.9391	34.2256	35.6386	35.9161	37.2666	37.2666	37.5279	36.7345	35.9161	35.3592	34.7952
alpha	3.2434	3.2626	3.2817	3.3759	3.3944	3.4844	3.4844	3.5019	3.4490	3.3944	3.3573	3.3197

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util living area	0.9985	0.9959	0.9879	0.9568	0.8770	0.7296	0.5872	0.6678	0.8924	0.9842	0.9971	0.9989 (86)
MIT	18.2829	18.5629	19.0563	19.7877	20.3898	20.7964	20.9303	20.8921	20.5293	19.7284	18.9268	18.3075 (87)
Th 2	18.8997	18.9124	18.9248	18.9845	18.9959	19.0497	19.0497	19.0598	19.0288	18.9959	18.9729	18.9492 (88)
util rest of house												
MIT 2	0.9977	0.9938	0.9812	0.9310	0.8005	0.5685	0.3525	0.4306	0.7871	0.9708	0.9952	0.9983 (89)
Living area fraction	16.5806	16.8676	17.3649	18.1130	18.6553	18.9860	19.0418	19.0441	18.8202	18.0794	17.2705	16.6367 (90)
MIT	17.4538	17.7372	18.2326	18.9720	19.5450	19.9147	20.0106	19.9921	19.6969	18.9253	18.1202	17.4938 (92)
Temperature adjustment												0.0000
adjusted MIT	17.4538	17.7372	18.2326	18.9720	19.5450	19.9147	20.0106	19.9921	19.6969	18.9253	18.1202	17.4938 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9968	0.9920	0.9779	0.9308	0.8258	0.6483	0.4766	0.5566	0.8322	0.9701	0.9940	0.9976 (94)
Useful gains	828.0780	1095.9502	1405.8211	1750.2808	1830.1453	1471.7906	1025.9831	1041.4455	1272.9949	1093.9342	859.6726	768.3829 (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	4596.9572	4448.3286	4031.5104	3323.7015	2568.8055	1677.2006	1076.2937	1125.6825	1791.8508	2726.0638	3665.3083	4493.1792 (97)
Space heating kWh	2804.0461	2252.7983	1953.5128	1132.8629	549.5632	0.0000	0.0000	0.0000	0.0000	1214.3044	2020.0577	2771.2484 (98a)
Space heating requirement - total per year (kWh/year)												14698.3939
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	2804.0461	2252.7983	1953.5128	1132.8629	549.5632	0.0000	0.0000	0.0000	0.0000	1214.3044	2020.0577	2771.2484 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												14698.3939
Space heating per m2										(98c) / (4) =		114.1534 (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	2966.4286	2335.2736	2381.6884	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7104	0.7863	0.7219	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	2107.4129	1836.2729	1719.2390	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	2523.0303	2392.5241	2076.7477	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	299.2446	413.8509	265.9864	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	74.8111	103.4627	66.4966	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												244.7705 (107)
Energy for space heating												114.1534 (99)
Energy for space cooling												1.9010 (108)
Total												116.0544 (109)
Fabric Energy Efficiency (DFEE)												116.1 (109)

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

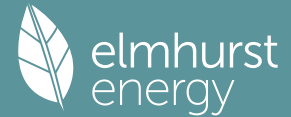
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	128.7600 (1b)	x 3.7100 (2b)	= 477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	477.6996 (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) = 0.8337 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3337 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)

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Infiltration rate adjusted to include shelter factor

(21) = (18) x (20) = 0.3087 (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	0.3936	0.3859	0.3782	0.3396	0.3319	0.2933	0.2933	0.2856	0.3087	0.3319	0.3473	0.3627	(22b)
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	0.5775	0.5745	0.5715	0.5577	0.5551	0.5430	0.5430	0.5408	0.5476	0.5551	0.5603	0.5658	(23c)
													(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Opening Type (Uw = 1.20)			29.0000	1.1450	33.2061			(27)					
RL1			0.8000	2.0221	1.6176			(27a)					
RL2			0.8000	2.0221	1.6176			(27a)					
RL3			0.8000	2.0221	1.6176			(27a)					
RL4			0.8000	2.0221	1.6176			(27a)					
Ground Floor			128.7600	0.1300	16.7388			(28a)					
External Walls	98.1300	29.0000	69.1300	0.1800	12.4434			(29a)					
Roof at Rafter	168.3500	3.2000	165.1500	0.1100	18.1665			(30)					
Total net area of external elements Aum(A, m2)			395.2400					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	87.0254			(33)					
Party Walls			76.8200	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								328.8117 (35)					
Thermal bridges (User defined value 0.050 * total exposed area)								19.7620 (36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	106.7874 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	91.0313	90.5571	90.0923	87.9093	87.5009	85.5995	85.5995	85.2474	86.3319	87.5009	88.3271	89.1910	(38)
Heat transfer coeff	197.8187	197.3445	196.8797	194.6967	194.2883	192.3869	192.3869	192.0348	193.1193	194.2883	195.1145	195.9784	(39)
Average = Sum(39)m / 12 =												194.6947	
HLP	1.5363	1.5327	1.5290	1.5121	1.5089	1.4942	1.4942	1.4914	1.4998	1.5089	1.5153	1.5220	(40)
HLP (average)												1.5121	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

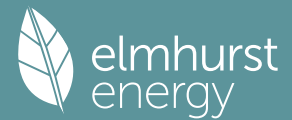
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8917 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths	31.3884	30.9222	30.2658	29.0554	28.1491	27.1441	26.6013	27.2531	27.9629	29.0382	30.2736	31.2823	(42b)
Hot water usage for other uses	44.2439	42.6351	41.0262	39.4173	37.8084	36.1996	36.1996	37.8084	39.4173	41.0262	42.6351	44.2439	(42c)
Average daily hot water use (litres/day)													69.3237 (43)
Daily hot water use	75.6323	73.5573	71.2920	68.4727	65.9575	63.3437	62.8009	65.0616	67.3802	70.0644	72.9086	75.5262	(44)
Energy conte	119.7831	104.7446	109.5731	93.7357	88.7915	77.8885	75.9522	80.5598	83.0865	95.0768	103.8717	118.2558	(45)
Energy content (annual)										Total = Sum(45)m =		1151.3193	
Distribution loss (46)m = 0.15 x (45)m													0.0000 (46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage													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	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	0.0000 (61)
Total heat required for water heating calculated for each month	101.8156	89.0329	93.1371	79.6754	75.4728	66.2052	64.5594	68.4759	70.6236	80.8153	88.2909	100.5174	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
FV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	101.8156	89.0329	93.1371	79.6754	75.4728	66.2052	64.5594	68.4759	70.6236	80.8153	88.2909	100.5174	(64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			978.6214	(64)
Electric shower(s)	58.2239	51.8780	56.6488	54.0592	55.0736	52.5349	54.2861	55.0736	54.0592	56.6488	55.5836	58.2239	(64a)
Heat gains from water heating, kWh/month	40.0099	35.2277	37.4465	33.4337	32.6366	29.6850	29.7114	30.8874	31.1707	34.3660	35.9686	39.6853	(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	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	(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)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	(71)
Water heating gains (Table 5)													

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Total internal gains	53.7767	52.4222	50.3313	46.4356	43.8664	41.2292	39.9346	41.5153	43.2926	46.1909	49.9564	53.3405 (72)
	565.7809	583.5083	557.6633	542.2577	513.8922	496.6713	477.3264	475.8332	490.3368	504.7450	534.3068	552.2747 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	14.1800	10.6334	0.6300	0.7000	0.7700	46.0808 (74)
East	4.9600	19.6403	0.6300	0.7000	0.7700	29.7715 (76)
West	9.8600	19.6403	0.6300	0.7000	0.7700	59.1829 (80)
North	1.6000	26.0000	0.6300	0.7000	1.0000	16.5110 (82)
South	1.6000	26.0000	0.6300	0.7000	1.0000	16.5110 (82)

Solar gains	168.0572	330.6607	558.1435	848.8260	1079.8606	1124.9861	1062.8618	884.9564	659.2745	395.1343	209.6749	138.2387 (83)
Total gains	733.8381	914.1690	1115.8068	1391.0837	1593.7528	1621.6574	1540.1882	1360.7897	1149.6113	899.8793	743.9817	690.5133 (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	59.4509	59.5937	59.7344	60.4042	60.5312	61.1294	61.1294	61.2415	60.8976	60.5312	60.2748	60.0092
alpha	4.9634	4.9729	4.9823	5.0269	5.0354	5.0753	5.0753	5.0828	5.0598	5.0354	5.0183	5.0006
util living area	0.9996	0.9985	0.9943	0.9698	0.8820	0.7037	0.5374	0.6218	0.8900	0.9905	0.9989	0.9997 (86)
MIT	19.3785	19.5706	19.8978	20.3627	20.7459	20.9428	20.9881	20.9764	20.8038	20.2848	19.7542	19.3550 (87)
Th 2	19.6604	19.6631	19.6658	19.6784	19.6808	19.6919	19.6919	19.6939	19.6876	19.6808	19.6760	19.6710 (88)
util rest of house	0.9993	0.9978	0.9914	0.9534	0.8226	0.5846	0.3843	0.4597	0.8075	0.9832	0.9983	0.9995 (89)
MIT 2	18.2060	18.3999	18.7274	19.1896	19.5292	19.6719	19.6900	19.6895	19.5920	19.1238	18.5933	18.1906 (90)
Living area fraction									fLA = Living area / (4) =			0.5130 (91)
MIT	18.8075	19.0004	19.3278	19.7913	20.1533	20.3238	20.3559	20.3497	20.2136	19.7194	19.1888	18.7879 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8075	19.0004	19.3278	19.7913	20.1533	20.3238	20.3559	20.3497	20.2136	19.7194	19.1888	18.7879 (93)

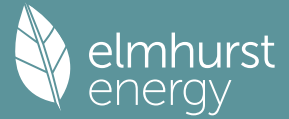
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9991	0.9973	0.9904	0.9551	0.8466	0.6453	0.4638	0.5444	0.8459	0.9835	0.9979	0.9994 (94)
Useful gains	733.2103	911.7449	1105.0885	1328.6851	1349.2555	1046.4084	714.2658	740.7590	972.4579	885.0190	742.4233	690.0831 (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	2869.8474	2782.6448	2525.5280	2120.5078	1642.3774	1101.1870	722.5850	758.4722	1180.6608	1771.7868	2358.7038	2858.9203 (97)
Space heating kWh	1589.6580	1257.2448	1056.8070	570.1124	218.0827	0.0000	0.0000	0.0000	0.0000	659.7552	1163.7220	1613.6149 (98a)
Space heating requirement - total per year (kWh/year)												8128.9969
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	1589.6580	1257.2448	1056.8070	570.1124	218.0827	0.0000	0.0000	0.0000	0.0000	659.7552	1163.7220	1613.6149 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												8128.9969
Space heating per m2												(98c) / (4) = 63.1329 (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	1808.4371	1423.6633	1459.4647	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8310	0.8998	0.8468	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1502.8333	1280.9899	1235.8485	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1789.6756	1699.6722	1499.8209	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	206.5264	311.4996	196.3955	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fC = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	51.6316	77.8749	49.0989	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												178.6054 (107)
Energy for space heating												63.1329 (99)
Energy for space cooling												1.3871 (108)
Total												64.5201 (109)
Fabric Energy Efficiency (TFEE)												64.5 (109)

Full SAP Calculation Printout



Property Reference	Unit 4		Issued on Date	27/03/2024	
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621		
Property	Burrill Development, 4, Cowling Road, Burrill, Bedale, DL8 1RG				
SAP Rating	70 C	DER	6.46	TER	11.77
Environmental	94 A	% DER < TER			45.11
CO ₂ Emissions (t/year)	0.9	DFEE	116.05	TFEE	64.52
Compliance Check	See BREL	% DFEE < TFEE			-79.87
% DPER < TPER	-4.29	DPER	66.99	TPER	64.23
Assessor Details	Mr. Cory Skrzypkowski			Assessor ID	AU69-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	128.7600 (1b)	3.7100 (2b)	477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		477.6996 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 477.6996 (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) =	0.0837 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8337 (18)
Number of sides sheltered		1 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.7712 (21)

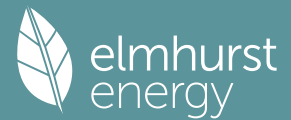
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.9833	0.9640	0.9447	0.8483	0.8290	0.7326	0.7326	0.7134	0.7712	0.8290	0.8676	0.9062 (22b)
Effective ac	0.9834	0.9647	0.9463	0.8598	0.8437	0.7684	0.7684	0.7544	0.7974	0.8437	0.8764	0.9106 (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
Fully Glazed Door (Uw = 1.40)			17.6500	1.3258	23.3996		(27)
Window (Uw = 1.40)			28.0800	1.3258	37.2273		(27)
RL1		1.2600	1.3258	1.6705			(27a)
RL2		1.2600	1.3258	1.6705			(27a)
RL3		1.2600	1.3258	1.6705			(27a)
RL4		1.2600	1.3258	1.6705			(27a)
Ground Floor			128.7600	0.1100	14.1636	110.0000	14163.6000 (28a)
External Walls	98.1300	45.7300	52.4000	0.1800	9.4320	60.0000	3144.0000 (29a)
Roof at Rafter	168.3500	5.0400	163.3100	0.1500	24.4965	9.0000	1469.7900 (30)
Total net area of external elements Aum (A, m ²)			395.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	115.4008		(33)
Party Walls			76.8200	0.0000	0.0000	70.0000	5377.4000 (32)
Block			242.4400			75.0000	18183.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	42337.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		328.8117 (35)
Thermal bridges (Default value 0.200 * total exposed area)		79.0480 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	194.4488 (37)

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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	155.0280	152.0688	149.1682	135.5440	132.9949	121.1287	121.1287	118.9312	125.6994	132.9949	138.1516	143.5427 (38)
Average = Sum(39)m / 12 =	349.4769	346.5176	343.6170	329.9928	327.4437	315.5775	315.5775	313.3801	320.1482	327.4437	332.6004	337.9915 (39)
												329.9806

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	2.7142	2.6912	2.6687	2.5629	2.5431	2.4509	2.4509	2.4338	2.4864	2.5431	2.5831	2.6250 (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													2.8917 (42)
Hot water usage for mixer showers													
Hot water usage for baths	128.4495	126.5191	123.7062	118.3243	114.3525	109.9233	107.4057	110.1973	113.2574	118.0131	123.5106	127.9573 (42a)	
Hot water usage for other uses	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)	
Average daily hot water use (litres/day)	44.2439	42.6351	41.0262	39.4173	37.8084	36.1996	36.1996	37.8084	39.4173	41.0262	42.6351	44.2439 (42c)	
Daily hot water use	172.6934	169.1542	164.7324	157.7416	152.1610	146.1228	143.6052	148.0057	152.6747	159.0393	166.1457	172.2013 (44)	
Energy content (annual)	273.5041	240.8733	253.1876	215.9404	204.8379	179.6751	173.6781	183.2620	188.2632	215.8148	236.7050	269.6256 (45)	
Distribution loss (46)m = 0.15 x (45)m	41.0256	36.1310	37.9781	32.3911	30.7257	26.9513	26.0517	27.4893	28.2395	32.3722	35.5058	40.4438 (46)	
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5000 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8100 (55)
Total storage loss	25.1100	22.6800	25.1100	24.3000	25.1100	24.3000	25.1100	25.1100	24.3000	25.1100	24.3000	25.1100 (56)	
If cylinder contains dedicated solar storage	25.1100	22.6800	25.1100	24.3000	25.1100	24.3000	25.1100	25.1100	24.3000	25.1100	24.3000	25.1100 (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	321.8765	284.5645	301.5600	262.7524	253.2103	226.4871	222.0505	231.6344	235.0752	264.1872	283.5170	317.9980 (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	321.8765	284.5645	301.5600	262.7524	253.2103	226.4871	222.0505	231.6344	235.0752	264.1872	283.5170	317.9980 (64)	
Total per year (kWh/year)													3204.9131 (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	129.6380	115.0433	122.8828	109.2498	106.8065	97.1916	96.4459	99.6325	100.0471	110.4563	116.1540	128.3484 (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	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585 (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)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681 (71)
Water heating gains (Table 5)	174.2447	171.1954	165.1651	151.7358	143.5572	134.9883	129.6316	133.9147	138.9543	148.4628	161.3250	172.5113 (72)
Total internal gains	686.2489	702.2815	672.4971	647.5579	613.5830	590.4303	567.0233	568.2326	585.9985	607.0169	645.6754	671.4455 (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						
East	2.1000	19.6403	0.6300	0.7000	0.7700	12.6049 (76)						
West	15.5500	19.6403	0.6300	0.7000	0.7700	93.3361 (80)						
North	22.3600	10.6334	0.6300	0.7000	0.7700	72.6634 (74)						
East	5.7200	19.6403	0.6300	0.7000	0.7700	34.3333 (76)						
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
South	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
Solar gains	264.9473	521.2898	879.9067	1338.1538	1702.3706	1773.5093	1675.5721	1395.1108	1039.3345	622.9295	330.5575	217.9383 (83)
Total gains	951.1962	1223.5714	1552.4038	1985.7117	2315.9536	2363.9396	2242.5954	1963.3435	1625.3330	1229.9465	976.2329	889.3838 (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	

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Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	5546.2972 (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	3444.3274	0.1552	534.5067 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1798.3210	0.1411	253.7102 (264)
Space and water heating			788.2170 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	303.6488	0.1443	43.8259 (268)
Total CO2, kg/year			832.0429 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4600 (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	3444.3274	1.5745	5423.1694 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1798.3210	1.5217	2736.4660 (278)
Space and water heating			8159.6353 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	303.6488	1.5338	465.7467 (282)
Total Primary energy kWh/year			8625.3820 (286)
Dwelling Primary energy Rate (DPER)			66.9900 (287)

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

 1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	128.7600 (1b)	x 3.7100 (2b)	= 477.6996 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	128.7600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	477.6996 (5)

 2. Ventilation rate

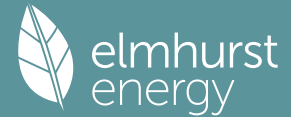
		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number 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) =	0.0837 (8)
Pressure Test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3337	(18)
Number of sides sheltered	1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3087 (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	0.3936	0.3859	0.3782	0.3396	0.3319	0.2933	0.2933	0.2856	0.3087	0.3319	0.3473	0.3627 (22b)
Effective ac	0.5775	0.5745	0.5715	0.5577	0.5551	0.5430	0.5430	0.5408	0.5476	0.5551	0.5603	0.5658 (25)

 3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opening Type (Uw = 1.20)			29.0000	1.1450	33.2061		(27)
RL1			0.8000	2.0221	1.6176		(27a)
RL2			0.8000	2.0221	1.6176		(27a)
RL3			0.8000	2.0221	1.6176		(27a)
RL4			0.8000	2.0221	1.6176		(27a)
Ground Floor			128.7600	0.1300	16.7388		(28a)
External Walls	98.1300	29.0000	69.1300	0.1800	12.4434		(29a)

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Roof at Rafter	168.3500	3.2000	165.1500	0.1100	18.1665	(30)
Total net area of external elements Aum(A, m2)			395.2400			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		87.0254	(33)
Party Walls			76.8200	0.0000	0.0000	(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K						328.8117 (35)
Thermal bridges (User defined value 0.050 * total exposed area)						19.7620 (36)
Point Thermal bridges						0.0000 (36a) =
Total fabric heat loss						(33) + (36) + (36a) = 106.7874 (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	91.0313	90.5571	90.0923	87.9093	87.5009	85.5995	85.5995	85.2474	86.3319	87.5009	88.3271	89.1910	(38)
Average = Sum(39)m / 12 =													195.9784 (39)
													194.6947

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.5363	1.5327	1.5290	1.5121	1.5089	1.4942	1.4942	1.4914	1.4998	1.5089	1.5153	1.5220	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	1.5121
													31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.8917 (42)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													126.3498 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	137.6617	134.6490	130.9944	125.4713	120.9739	116.1438	114.3128	117.9519	121.7863	126.8539	132.4610	137.3038	(44)
Energy content (annual)	218.0225	191.7383	201.3335	171.7640	162.8541	142.8123	138.2514	146.0491	150.1747	172.1395	188.7149	214.9846	(45)
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 2098.8391
Water storage loss:	32.7034	28.7608	30.2000	25.7646	24.4281	21.4218	20.7377	21.9074	22.5262	25.8209	28.3072	32.2477	(46)

Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.5520 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8381 (55)
Total storage loss													

If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)
Primary loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)
Combi 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)
Total heat required for water heating calculated for each month	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)
WWHRS	267.2652	236.2156	250.5761	219.4182	212.0968	190.4665	187.4941	195.2918	197.8289	221.3822	236.3691	264.2273	(62)
PV diverter	-42.7067	-37.7702	-39.5507	-32.7496	-30.5214	-26.1174	-24.4809	-26.0330	-27.0221	-31.8560	-36.0890	-41.9159	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	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)
Total per year (kWh/year)	224.5585	198.4454	211.0254	186.6686	181.5754	164.3491	163.0132	169.2588	170.8068	189.5261	200.2801	222.3114	(64)
Electric shower(s)													Total per year (kWh/year) = Sum(64)m = 2281.8188 (64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													0.0000 (64a)
	111.8866	99.3348	106.3375	95.2349	93.5431	85.6085	85.3627	87.9555	88.0565	96.6305	100.8711	110.8765	(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	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	144.5851	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.4089	165.4169	149.4089	154.3892	149.4089	154.3892	149.4089	149.4089	154.3892	149.4089	154.3892	149.4089	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	296.2198	299.2936	291.5476	275.0574	254.2414	234.6774	221.6074	218.5335	226.2795	242.7697	263.5857	283.1498	(68)
Pumps, fans	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	37.4585	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	-115.6681	(71)
Total internal gains	150.3853	147.8196	142.9268	132.2707	125.7300	118.9006	114.7349	118.2197	122.3006	129.8797	140.0987	149.0276	(72)
	665.3894	681.9057	653.2588	631.0928	598.7559	574.3427	552.1266	552.5376	569.3448	591.4339	627.4491	650.9617	(73)

6. Solar gains

[Jan]		Area	Solar flux	g	FF	Access	Gains						
		m2	Table 6a	Specific data	Specific data	factor	W						
			W/m2	or Table 6b	or Table 6c	Table 6d							
North		14.1800	10.6334	0.6300	0.7000	0.7700	46.0808	(74)					
East		4.9600	19.6403	0.6300	0.7000	0.7700	29.7715	(76)					
West		9.8600	19.6403	0.6300	0.7000	0.7700	59.1829	(80)					
North		1.6000	26.0000	0.6300	0.7000	1.0000	16.5110	(82)					
South		1.6000	26.0000	0.6300	0.7000	1.0000	16.5110	(82)					
Solar gains	168.0572	330.6607	558.1435	848.8260	1079.8606	1124.9861	1062.8618	884.9564	659.2745	395.1343	209.6749	138.2387	(83)
Total gains	833.4467	1012.5664	1211.4023	1479.9187	1678.6164	1699.3288	1614.9884	1437.4941	1228.6193	986.5682	837.1240	789.2004	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	59.4509	59.5937	59.7344	60.4042	60.5312	61.1294	61.1294	61.2415	60.8976	60.5312	60.2748	60.0092
alpha	4.9634	4.9729	4.9823	5.0269	5.0354	5.0753	5.0753	5.0828	5.0598	5.0354	5.0183	5.0006
util living area	0.9992	0.9977	0.9919	0.9618	0.8634	0.6793	0.5146	0.5935	0.8669	0.9860	0.9981	0.9994 (86)
MIT	19.4412	19.6321	19.9560	20.4097	20.7736	20.9512	20.9902	20.9808	20.8304	20.3364	19.8126	19.4173 (87)
Th 2	19.6604	19.6631	19.6658	19.6784	19.6808	19.6919	19.6919	19.6939	19.6876	19.6808	19.6760	19.6710 (88)
util rest of house	0.9988	0.9966	0.9878	0.9420	0.7995	0.5610	0.3669	0.4362	0.7765	0.9757	0.9970	0.9991 (89)
MIT 2	17.8744	18.1206	18.5350	19.1062	19.5114	19.6705	19.6900	19.6895	19.5859	19.0293	18.3614	17.8512 (90)
Living area fraction	FLA = Living area / (4) =											0.5130 (91)
MIT	18.6781	18.8960	19.2639	19.7749	20.1589	20.3274	20.3569	20.3519	20.2243	19.6998	19.1058	18.6545 (92)
Temperature adjustment												0.0000
adjusted MIT	18.6781	18.8960	19.2639	19.7749	20.1589	20.3274	20.3569	20.3519	20.2243	19.6998	19.1058	18.6545 (93)

8. Space heating requirement

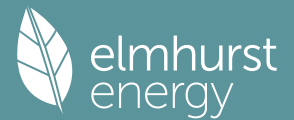
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9984	0.9957	0.9862	0.9438	0.8254	0.6212	0.4433	0.5180	0.8187	0.9759	0.9963	0.9988 (94)
Useful gains	832.1143	1008.1916	1194.6431	1396.6970	1385.4595	1055.5704	715.9843	744.6724	1005.8506	962.7536	834.0408	788.2452 (95)
Ext temp.	4.3000	4.9000	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	2844.2525	2762.0304	2512.9519	2117.3011	1643.4613	1101.8838	722.7843	758.9000	1182.7184	1767.9816	2342.5124	2832.7744 (97)
Space heating kWh	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (98a)
Space heating requirement - total per year (kWh/year)												7573.5395
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	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												7573.5395
Space heating per m2												(98c) / (4) = 58.8190 (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	1497.0308	1178.5797	980.8218	518.8350	191.9533	0.0000	0.0000	0.0000	0.0000	599.0897	1086.0996	1521.1297 (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)	1621.9185	1276.9010	1062.6455	562.1181	207.9668	0.0000	0.0000	0.0000	0.0000	649.0679	1176.7059	1648.0279 (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	224.5585	198.4454	211.0254	186.6686	181.5754	164.3491	163.0132	169.2588	170.8068	189.5261	200.2801	222.3114 (64)
Efficiency of water heater	87.5126	87.3798	87.0615	86.2269	84.1846	79.8000	79.8000	79.8000	79.8000	86.4566	87.2676	87.5411 (217)
Fuel for water heating, kWh/month	256.6013	227.1068	242.3866	216.4853	215.6871	205.9513	204.2772	212.1038	214.0437	219.2153	229.5010	253.9510 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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	31.0442	24.9048	22.4240	16.4288	12.6901	10.3679	11.5763	15.0473	19.5450	25.6441	28.9649	31.9070 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-92.4727	-118.3807	-154.6654	-157.5231	-157.1615	-142.2599	-140.2777	-138.1660	-133.3591	-126.6257	-97.1793	-81.4133 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-96.0573	-194.6407	-374.0734	-544.4803	-704.1586	-702.0622	-693.9439	-594.7077	-445.6212	-272.3599	-126.1364	-76.5598 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												8205.3516 (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												2697.3102 (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)												250.5445 (232)

Energy saving/generation technologies (Appendices M ,N and Q)

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PV generation	-6364.2856	(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	4874.9207	(238)

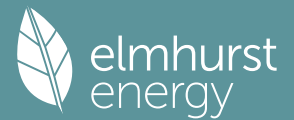
 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	8205.3516	0.2100	1723.1238 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2697.3102	0.2100	566.4351 (264)
Space and water heating			2289.5590 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	250.5445	0.1443	36.1613 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1539.4843	0.1367	-210.5008
PV Unit electricity exported	-4824.8013	0.1268	-611.9863
Total			-822.4871 (269)
Total CO2, kg/year			1515.1624 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.7700 (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	8205.3516	1.1300	9272.0473 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2697.3102	1.1300	3047.9605 (278)
Space and water heating			12320.0078 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	250.5445	1.5338	384.2936 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1539.4843	1.5055	-2317.6378
PV Unit electricity exported	-4824.8013	0.4656	-2246.6066
Total			-4564.2443 (283)
Total Primary energy kWh/year			8270.1578 (286)
Target Primary Energy Rate (TPER)			64.2300 (287)

Predicted Energy Assessment



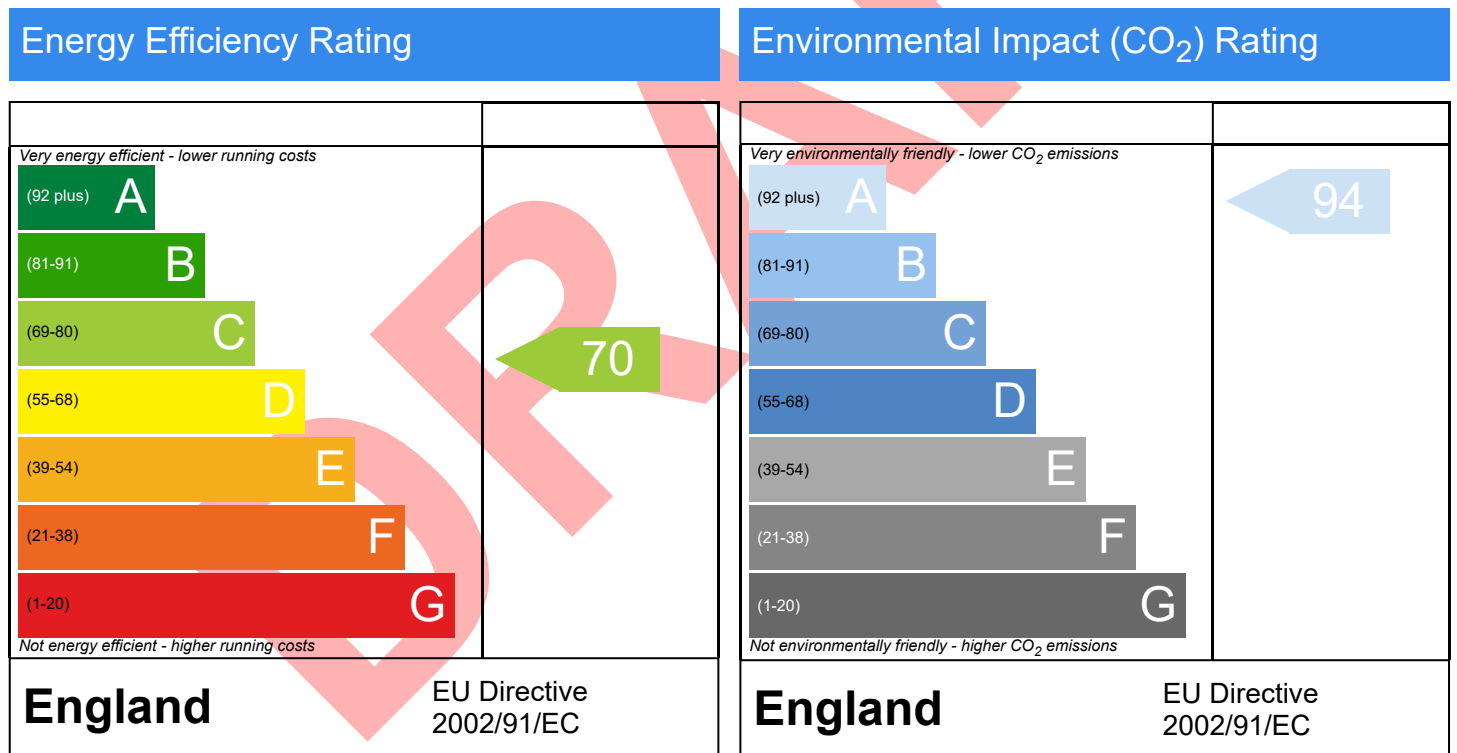
Burrill Development, 4, Cowling Road, Burrill , Bedale, DL8 1RG

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

Bungalow, End-Terrace
27/03/2024
Cory Skrzypkowski
128.76 m²

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

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



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

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