

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 09:47:45

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

Dwelling Details			
Assessment Type	As designed	Total Floor Area	256 m ²
Site Reference	Unit 8	Plot Reference	CEPCN4621
Address	8 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	7.12 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	2.73 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	38.12 kWh _{PE} /m ²		
Dwelling primary energy	28.47 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	39.1 kWh/m ²		
Dwelling fabric energy efficiency	38.6 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.19	Walls (2) (0.23)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.1	Ground Floor (0.1)	OK
Roofs	0.16	0.13	Roof (2) (0.15)	OK
Windows, doors, and roof windows	1.6	1.4	W1 (1.4)	OK
Rooflights	2.2	1.4	RL1, South (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)	132.461	0.18
Sheltered wall: Walls (2)	28.43	0.23
Party wall: Party Wall (1)	79.31	0 (!)
Ground floor: Ground Floor, Ground Floor	145.62	0.1 (!)
Exposed roof: Roof (1)	39.91	0.1 (!)
Exposed roof: Roof (2)	83.93	0.15
Exposed roof: Roof (3)	34.83	0.1 (!)

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
W1, Window	1.1	West	0.7	1.4
W2, Window	1.1	South	0.7	1.4
W3, Window	1.1	South	0.7	1.4
W4, Window	0.6045	West	0.7	1.4
W5, Window	0.6045	West	0.7	1.4
W6, Window	1.1	North	0.7	1.4
FGD1, Fully Glazed Door	5.04	South	0.7	1.4
FGD2, Fully Glazed Door	2.1	West	0.7	1.4
FGD3, Fully Glazed Door	3.78	North	0.7	1.4
RL1, Roof Light	1.26	South	0.7	1.4

Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
RL2, Roof Light	1.26	South	0.7	1.4
RL3, Roof Light	1.26	South	0.7	1.4
RL4, Roof Light	1.26	South	0.7	1.4
RL5, Roof Light	1.26	North	0.7	1.4
RL6, Roof Light	1.26	North	0.7	1.4

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))

Building part 1 - **Main Dwelling**: Thermal bridging calculated from linear thermal transmittances for each junction

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.05	
External wall	E3: Sill	Government-approved scheme	0.04	
External wall	E4: Jamb	Government-approved scheme	0.05	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.12	
External wall	E6: Intermediate floor within a dwelling	Government-approved scheme	0.07	
External wall	E18: Party wall between dwellings	Government-approved scheme	0.06	
External wall	E12: Gable (insulation at ceiling level)	Calculated by person with suitable expertise	0.12	
External wall	E10: Eaves (insulation at ceiling level)	Government-approved scheme	0.06	
External wall	E13: Gable (insulation at rafter level)	Government-approved scheme	0.04	
External wall	E16: Corner (normal)	Government-approved scheme	0.09	
External wall	E17: Corner (inverted - internal area greater than external area)	Government-approved scheme	-0.09	

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	5 m ³ /hm ² , Design value	OK
Air permeability test certificate reference		

4 Space heating

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

Efficiency	410.3%
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	

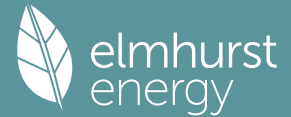
5 Hot water

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 8	Issued on Date	27/03/2024
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621
Property	Burrill Development, 8, Cowling Road, Burrill , Bedale, DL8 1RG		

SAP Rating	85 B	DER	2.73	TER	7.12
Environmental	97 A	% DER < TER			61.66
CO ₂ Emissions (t/year)	0.74	DFEE	38.64	TFEE	39.09
Compliance Check	See BREL	% DFEE < TFEE			1.15
% DPER < TPER	25.31	DPER	28.47	TPER	38.12

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

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

Orientation	North	
Property Tenure	ND	
Transaction Type	6	
Terrain Type	Rural	
1.0 Property Type	House, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	2	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	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:	35.35 m	145.62 m ²	2.84 m
1st Storey:	35.35 m	110.79 m ²	2.81 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	77.10	m ²
-----------------	-------	----------------

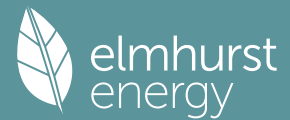
9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	External Walls	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	148.99	132.46	0.00	None	16.53	Enter Gross Area
	Roof Room Walls	Timber Frame	Timber framed wall (one layer of plasterboard)	0.26	9.00	28.43	28.43	0.50	Room In Roof	0.00	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	79.31	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	318.71

10.0 External Roofs	
---------------------	--

Summary for Input Data



Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area (m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
Roof at Joist	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	39.91	39.91	None	0.00	Enter Gross Area	0.00
Roof at Rafter	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	91.49	83.93	None	0.00	Enter Gross Area	7.56
Roof at Joist (adj. Roof Room)	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	34.83	34.83	Room In Roof	0.50	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m ²)
GF	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	110.79

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.10	None	0.00	110.00	145.62

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
FF		Plasterboard ceiling, carpeted chipboard floor	9.00	110.79

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m ² K)
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 (m ²)	Pitch
W1	Window	External Walls	West	1.10	0
W2	Window	External Walls	South	1.10	0
W3	Window	External Walls	South	1.10	0
W4	Window	External Walls	West	0.60	0
W5	Window	External Walls	West	0.60	0
W6	Window	External Walls	North	1.10	0
FGD1	Fully Glazed Door	External Walls	South	5.04	0
FGD2	Fully Glazed Door	External Walls	West	2.10	0
FGD3	Fully Glazed Door	External Walls	North	3.78	0
RL1	Roof Light	Roof at Rafter	South	1.26	0
RL2	Roof Light	Roof at Rafter	South	1.26	0
RL3	Roof Light	Roof at Rafter	South	1.26	0
RL4	Roof Light	Roof at Rafter	South	1.26	0
RL5	Roof Light	Roof at Rafter	North	1.26	0
RL6	Roof Light	Roof at Rafter	North	1.26	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	10.50	0.05	0.05	Yes
E3 Sill	Gov Approved Scheme	10.50	0.04	0.04	Yes
E4 Jamb	Gov Approved Scheme	25.12	0.05	0.05	Yes
E5 Ground floor (normal)	Independently assessed	35.35	0.12	0.12	Yes
E6 Intermediate floor within a dwelling	Gov Approved Scheme	35.35	0.07	0.07	Yes
E18 Party wall between dwellings	Gov Approved Scheme	19.89	0.06	0.06	No
E12 Gable (insulation at ceiling level)	Independently assessed	1.80	0.12	0.12	No
E10 Eaves (insulation at ceiling level)	Gov Approved Scheme	31.92	0.06	0.06	No
E13 Gable (insulation at rafter level)	Gov Approved Scheme	6.22	0.04	0.04	No
E16 Corner (normal)	Gov Approved Scheme	5.79	0.09	0.09	No
E17 Corner (inverted – internal area greater than external area)	Gov Approved Scheme	3.94	-0.09	-0.09	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m²/(h.m²) @ 50 Pa

Property Tested?

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation System Present

Summary for Input Data



20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

No

22.0 Lighting

No Fixed Lighting

No

Name	Efficacy	Power	Capacity	Count
LED	100.00	5	500	15

24.0 Main Heating 1

Database

Percentage of Heat

100.00

%

Database Ref. No.

104642

Fuel Type

Electricity

SAP Code

0

In Winter

410.32

In Summer

178.16

Model Name

Ecodan 8.5 kW

Manufacturer

Mitsubishi Electric Europe B.V.

System Type

Heat Pump

Controls SAP Code

2207

Delayed Start Stat

No

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

26.0 Heat Networks

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

No

Summary for Input Data



Shower 3

Combi boiler or unvented hot water system

11.00

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	
Cylinder Volume	180.00	L
Loss	1.50	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store

None

Recommendations

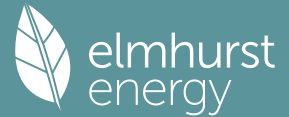
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



Property Reference	Unit 8		Issued on Date	27/03/2024	
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621		
Property	Burrill Development, 8, Cowling Road, Burrill, Bedale, DL8 1RG				
SAP Rating	85 B	DER	2.73	TER	7.12
Environmental	97 A	% DER < TER			61.66
CO ₂ Emissions (t/year)	0.74	DFEE	38.64	TFEE	39.09
Compliance Check	See BREL	% DFEE < TFEE			1.15
% DPER < TPER	25.31	DPER	28.47	TPER	38.12
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	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (5)

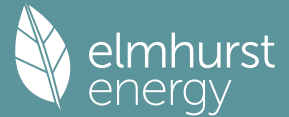
2. Ventilation rate

	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	6 * 10 =											60.0000 (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) =	60.0000 / (5) =											0.0828 (8)
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	5.0000											(17)
Infiltration rate	0.3328											(18)
Number of sides sheltered	2											(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.2829 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
Effective ac	0.3606	0.3536	0.3465	0.3111	0.3041	0.2687	0.2687	0.2616	0.2829	0.3041	0.3182	0.3324 (22b)
	0.5650	0.5625	0.5600	0.5484	0.5462	0.5361	0.5361	0.5342	0.5400	0.5462	0.5506	0.5552 (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)			10.9200	1.3258	14.4773		(27)
Window (Uw = 1.40)			5.6000	1.3258	7.4242		(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)
RL5			1.2600	1.3258	1.6705		(27a)
RL6			1.2600	1.3258	1.6705		(27a)
Ground Floor			145.6200	0.1000	14.5620	110.0000	16018.2000 (28a)
External Walls	148.9900	16.5200	132.4700	0.1800	23.8446	60.0000	7948.2000 (29a)
Roof Room Walls	28.4300		28.4300	0.2300	6.5389	9.0000	255.8700 (29a)
Roof at Joist	39.9100		39.9100	0.1000	3.9910	9.0000	359.1900 (30)
Roof at Rafter	91.4900	7.5600	83.9300	0.1500	12.5895	9.0000	755.3700 (30)
Roof at Joist (adj. Roof Room)	34.8300		34.8300	0.0952	3.3171	9.0000	313.4700 (30)
Total net area of external elements Aum(A, m ²)			489.2700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	96.7674		(33)
Party Walls			79.3100	0.0000	0.0000	70.0000	5551.7000 (32)
Block			318.7100			75.0000	23903.2500 (32c)
FF			110.7900			18.0000	1994.2200 (32d)

Full SAP Calculation Printout



GF 110.7900 9.0000 997.1100 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 58096.5800 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 226.5769 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.5000	0.0500	0.5250
E3 Sill	10.5000	0.0400	0.4200
E4 Jamb	25.1200	0.0500	1.2560
E5 Ground floor (normal)	35.3500	0.1200	4.2420
E6 Intermediate floor within a dwelling	35.3500	0.0700	2.4745
E8 Party wall between dwellings	19.8900	0.0600	1.1934
E12 Gable (insulation at ceiling level)	1.8000	0.1200	0.2160
E10 Eaves (insulation at ceiling level)	31.9200	0.0600	1.9152
E13 Gable (insulation at rafter level)	6.2200	0.0400	0.2488
E16 Corner (normal)	5.7900	0.0900	0.5211
E17 Corner (inverted - internal area greater than external area)	3.9400	-0.0900	-0.3546
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.6574 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss			109.4248 (33) + (36) + (36a) = (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	135.1615	134.5574	133.9653	131.1842	130.6639	128.2417	128.2417	127.7931	129.1747	130.6639	131.7165	132.8170 (38)
Heat transfer coeff	244.5863	243.9822	243.3901	240.6090	240.0887	237.6664	237.6664	237.2179	238.5995	240.0887	241.1413	242.2418 (39)
Average = Sum(39)m / 12 =												240.6065
HLP	0.9539	0.9515	0.9492	0.9384	0.9363	0.9269	0.9269	0.9252	0.9305	0.9363	0.9405	0.9447 (40)
HLP (average)												0.9384
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	133.9040	131.8916	128.9593	123.3488	119.2084	114.5910	111.9665	114.8767	118.0667	123.0244	128.7554	133.3909 (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	46.1238	44.4465	42.7693	41.0921	39.4149	37.7376	37.7376	39.4149	41.0921	42.7693	44.4465	46.1238 (42c)
Average daily hot water use (litres/day)												165.3857 (43)
Daily hot water use	180.0277	176.3382	171.7286	164.4409	158.6232	152.3287	149.7042	154.2915	159.1588	165.7937	173.2019	179.5147 (44)
Energy conte	285.1199	251.1032	263.9405	225.1113	213.5374	187.3059	181.0542	191.0452	196.2588	224.9805	246.7579	281.0766 (45)
Energy content (annual)												Total = Sum(45)m = 2747.2913
Distribution loss (46)m = 0.15 x (45)m	42.7680	37.6655	39.5911	33.7667	32.0306	28.0959	27.1581	28.6568	29.4388	33.7471	37.0137	42.1615 (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	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (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	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 3316.8373 (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	133.5003	118.4448	126.4581	112.2991	109.6991	99.7288	98.8984	102.2204	102.7056	113.5039	119.4966	132.1559 (65)

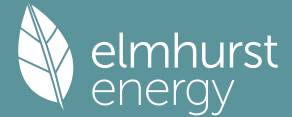
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763 (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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105 (71)
Water heating gains (Table 5)	179.4359	176.2571	169.9706	155.9710	147.4450	138.5122	132.9280	137.3931	142.6467	152.5590	165.9675	177.6289 (72)
Total internal gains	916.2550	943.7865	900.1349	870.8394	824.4717	795.8647	763.4719	763.5587	788.0376	813.2458	864.4960	895.8315 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	---------	---------------------	-----------------	------------------	---------------	---------

Full SAP Calculation Printout



	W/m2	or Table 6b	or Table 6c	Table 6d	
North	3.7800	10.6334	0.6300	0.7700	12.2839 (74)
South	5.0400	46.7521	0.6300	0.7700	72.0117 (78)
West	2.1000	19.6403	0.6300	0.7700	12.6049 (80)
North	1.1000	10.6334	0.6300	0.7700	3.5747 (74)
South	2.2000	46.7521	0.6300	0.7700	31.4337 (78)
West	2.3000	19.6403	0.6300	0.7700	13.8053 (80)
North	2.5200	26.0000	0.6300	1.0000	26.0049 (82)
South	5.0400	26.0000	0.6300	1.0000	52.0098 (82)

Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371 (83)
Total gains	1139.9838	1357.2043	1540.5775	1771.6408	1918.2539	1915.5456	1829.1519	1682.4107	1519.4112	1291.3947	1138.6267	1083.1687 (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	65.9806	66.1439	66.3048	67.0712	67.2166	67.9016	67.9016	68.0300	67.6361	67.2166	66.9232	66.6191
alpha	5.3987	5.4096	5.4203	5.4714	5.4811	5.5268	5.5268	5.5353	5.5091	5.4811	5.4615	5.4413
util living area	0.9993	0.9979	0.9937	0.9731	0.9021	0.7353	0.5603	0.6265	0.8782	0.9868	0.9982	0.9995 (86)
Living	19.9051	20.0357	20.2383	20.5238	20.7659	20.9040	20.9365	20.9308	20.8333	20.5113	20.1608	19.8889
Non living	18.8140	18.9828	19.2432	19.6106	19.9004	20.0468	20.0698	20.0686	19.9828	19.6000	19.1508	18.7993
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4399	20.0357	20.2383	20.5238	20.7659	20.9040	20.9365	20.9308	20.8333	20.5113	20.1608	20.0443 (87)
Th 2	20.1219	20.1239	20.1259	20.1350	20.1367	20.1447	20.1447	20.1462	20.1416	20.1367	20.1333	20.1296 (88)
util rest of house	0.9990	0.9973	0.9915	0.9635	0.8678	0.6582	0.4571	0.5208	0.8233	0.9806	0.9975	0.9993 (89)
MIT 2	19.6005	18.9828	19.2432	19.6106	19.9004	20.0468	20.0698	20.0686	19.9828	19.6000	19.1508	19.0390 (90)
Living area fraction									fLA = Living area / (4) =			0.3007 (91)
MIT	19.8529	19.2994	19.5424	19.8851	20.1606	20.3045	20.3304	20.3279	20.2385	19.8740	19.4545	19.3413 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8529	19.2994	19.5424	19.8851	20.1606	20.3045	20.3304	20.3279	20.2385	19.8740	19.4545	19.3413 (93)

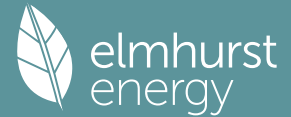
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9990	0.9964	0.9897	0.9601	0.8688	0.6736	0.4801	0.5442	0.8304	0.9781	0.9968	0.9991 (94)
Useful gains	1138.7898	1352.3392	1524.6709	1700.8774	1666.6741	1290.2567	878.1743	915.6365	1261.7433	1263.1775	1134.9391	1082.1675 (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	3804.0240	3513.2012	3174.3907	2643.1242	2031.2986	1355.7788	886.5948	931.7624	1464.6488	2226.5780	2979.1736	3667.8601 (97)
Space heating kWh	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98a)
Space heating requirement - total per year (kWh/year)												9580.4976
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	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9580.4976
Space heating per m2												(98c) / (4) = 37.3640 (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 %)												410.3180 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98)
Space heating efficiency (main heating system 1)	410.3180	410.3180	410.3180	410.3180	410.3180	0.0000	0.0000	0.0000	0.0000	410.3180	410.3180	410.3180 (210)
Space heating fuel (main heating system)	483.2677	353.8961	299.1318	165.3395	66.1147	0.0000	0.0000	0.0000	0.0000	174.6865	323.6146	468.8450 (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	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (64)
Efficiency of water heater	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565 (216)
Fuel for water heating, kWh/month	187.1906	165.4693	175.3025	152.6317	147.0111	131.4113	128.7781	134.3861	136.4366	153.4341	164.7820	184.9211 (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	63.8238	51.2018	46.1015	33.7760	26.0895	21.3154	23.7997	30.9358	40.1825	52.7217	59.5490	65.5976 (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)

Full SAP Calculation Printout



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												2334.8957	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												178.1565	
Water heating fuel used												1861.7547	(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)												515.0943	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4711.7448	(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	2334.8957	0.1553	362.5787 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1861.7547	0.1411	262.6918 (264)
Space and water heating			625.2705 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	515.0943	0.1443	74.3440 (268)
Total CO2, kg/year			699.6145 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.7300 (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	2334.8957	1.5749	3677.2191 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1861.7547	1.5217	2833.1123 (278)
Space and water heating			6510.3314 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	515.0943	1.5338	790.0689 (282)
Total Primary energy kWh/year			7300.4003 (286)
Dwelling Primary energy Rate (DPER)			28.4700 (287)

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

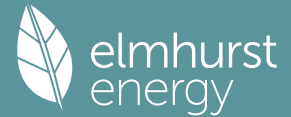
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (5)

2. Ventilation rate

	Value	Unit
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)
Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	40.0000 / (5) =	0.0552 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3052 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2594 (21)

Full SAP Calculation Printout



	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													
Effective ac	0.3307	0.3243	0.3178	0.2853	0.2789	0.2464	0.2464	0.2399	0.2594	0.2789	0.2918	0.3048	(22b)
	0.5547	0.5526	0.5505	0.5407	0.5389	0.5304	0.5304	0.5288	0.5336	0.5389	0.5426	0.5465	(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)			16.5200	1.1450	18.9160			(27)
RL1			1.2600	2.0221	2.5478			(27a)
RL2			1.2600	2.0221	2.5478			(27a)
RL3			1.2600	2.0221	2.5478			(27a)
RL4			1.2600	2.0221	2.5478			(27a)
RL5			1.2600	2.0221	2.5478			(27a)
RL6			1.2600	2.0221	2.5478			(27a)
Ground Floor			145.6200	0.1300	18.9306			(28a)
External Walls	148.9900	16.5200	132.4700	0.1800	23.8446			(29a)
Roof Room Walls	28.4300		28.4300	0.1800	5.1174			(29a)
Roof at Joist	39.9100		39.9100	0.1100	4.3901			(30)
Roof at Rafter	91.4900	7.5600	83.9300	0.1100	9.2323			(30)
Roof at Joist (adj. Roof Room)	34.8300		34.8300	0.1100	3.8313			(30)
Total net area of external elements Aum(A, m2)			489.2700					(31)
Fabric heat loss, W/K = Sum (A x U)					99.5491			(33)
Party Walls			79.3100	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 226.5769 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.5000	0.0500	0.5250	
E3 Sill	10.5000	0.0500	0.5250	
E4 Jamb	25.1200	0.0500	1.2560	
E5 Ground floor (normal)	35.3500	0.1600	5.6560	
E6 Intermediate floor within a dwelling	35.3500	0.0000	0.0000	
E8 Party wall between dwellings	19.8900	0.0600	1.1934	
E12 Gable (insulation at ceiling level)	1.8000	0.0600	0.1080	
E10 Eaves (insulation at ceiling level)	31.9200	0.0600	1.9152	
E13 Gable (insulation at rafter level)	6.2200	0.0800	0.4976	
E16 Corner (normal)	5.7900	0.0900	0.5211	
E17 Corner (inverted - internal area greater than external area)	3.9400	-0.0900	-0.3546	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.8427 (36)

Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 111.3918 (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	132.6889	132.1808	131.6828	129.3438	128.9061	126.8689	126.8689	126.4917	127.6536	128.9061	129.7915	130.7170	(38)
Average = Sum(39)m / 12 =	244.0806	243.5726	243.0746	240.7356	240.2979	238.2607	238.2607	237.8834	239.0454	240.2979	241.1833	242.1088	(39)
													240.7335

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9519	0.9499	0.9480	0.9389	0.9372	0.9292	0.9292	0.9277	0.9323	0.9372	0.9406	0.9442	(40)
HLP (average)												0.9389	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0753 (42)

Hot water usage for mixer showers 97.0116 (42a)

Hot water usage for baths 0.0000 (42b)

Hot water usage for other uses 46.1238 (42c)

Average daily hot water use (litres/day) 131.7161 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.5085	140.3677	136.5579	130.8003	126.1119	121.0766	119.1678	122.9615	126.9588	132.2416	138.0868	143.1353	(44)
Energy content (annual)	227.2823	199.8818	209.8844	179.0591	169.7708	148.8778	144.1232	152.2521	156.5529	179.4506	196.7300	224.1154	(45)
Distribution loss (46)m = 0.15 x (45)m	34.0923	29.9823	31.4827	26.8589	25.4656	22.3317	21.6185	22.8378	23.4829	26.9176	29.5095	33.6173	(46)

Water storage loss: 180.0000 (47)

Store volume 1.5520 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 0.8381 (55)

Enter (49) or (54) in (55) 0.8381 (55)

Total storage loss 25.9803 (56)

If cylinder contains dedicated solar storage 25.9803 (57)

Primary loss 23.2624 (59)

Combi loss 0.0000 (61)

Total heat required for water heating calculated for each month 273.3580 (62)

WWHRS -44.5202 (63a)

PV diverter -0.0000 (63b)

Solar input 0.0000 (63c)

FGHRS 0.0000 (63d)

Output from w/h 232.0048 (64)

Total per year (kWh/year) = Sum(64)m = 2354.1097 (64)

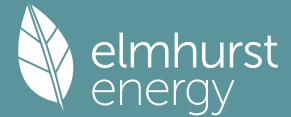
Electric shower(s) 2354 (64)

Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 114.9655 (65)

114.9655 102.0425 109.1807 97.6605 95.8429 87.6252 87.3151 90.0179 90.1772 99.0615 103.5361 113.9125 (65)

Full SAP Calculation Printout



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	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763 (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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105 (71)
Water heating gains (Table 5)	154.5235	151.8489	146.7482	135.6396	128.8211	121.7017	117.3590	120.9919	125.2461	133.1471	143.8001	153.1082 (72)
Total internal gains	894.3426	922.3783	879.9125	853.5079	808.8478	779.0542	747.9029	747.1575	770.6370	796.8339	845.3286	874.3108 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
North	4.8800	10.6334	0.6300	0.7000	0.7700	15.8585 (74)						
South	7.2400	46.7521	0.6300	0.7000	0.7700	103.4454 (78)						
West	4.4000	19.6403	0.6300	0.7000	0.7700	26.4102 (80)						
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
South	5.0400	26.0000	0.6300	0.7000	1.0000	52.0098 (82)						
Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371 (83)
Total gains	1118.0715	1335.7961	1520.3551	1754.3094	1902.6301	1898.7350	1813.5829	1666.0095	1502.0106	1274.9827	1119.4593	1061.6480 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	66.1172	66.2552	66.3909	67.0360	67.1580	67.7323	67.7323	67.8397	67.5099	67.1580	66.9115	66.6557
alpha	5.4078	5.4170	5.4261	5.4691	5.4772	5.5155	5.5155	5.5226	5.5007	5.4772	5.4608	5.4437
util living area	0.9993	0.9981	0.9940	0.9742	0.9049	0.7410	0.5658	0.6332	0.8829	0.9876	0.9983	0.9995 (86)
MIT	19.6099	19.7835	20.0534	20.4329	20.7582	20.9444	20.9895	20.9814	20.8475	20.4157	19.9476	19.5854 (87)
Th 2	20.1236	20.1253	20.1269	20.1346	20.1360	20.1427	20.1427	20.1440	20.1402	20.1360	20.1331	20.1301 (88)
util rest of house	0.9991	0.9975	0.9920	0.9649	0.8711	0.6640	0.4617	0.5266	0.8290	0.9817	0.9977	0.9994 (89)
MIT 2	18.4687	18.6922	19.0384	19.5230	19.9124	20.1065	20.1387	20.1359	20.0199	19.5073	18.9086	18.4419 (90)
Living area fraction	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (92)
MIT	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9987	0.9963	0.9896	0.9604	0.8725	0.6846	0.4931	0.5585	0.8383	0.9784	0.9967	0.9990 (94)
Useful gains	1116.5723	1330.9178	1504.4764	1684.7935	1660.0165	1299.9086	894.2321	930.4440	1259.0932	1247.4821	1115.7970	1060.5777 (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	3542.0528	3439.3351	3121.9495	2623.1969	2034.5420	1372.0040	904.0875	949.1935	1474.6035	2206.0328	2923.3842	3531.3327 (97)
Space heating kWh	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (98a)
Space heating requirement - total per year (kWh/year)												9231.9776
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	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9231.9776
Space heating per m2										(98c) / (4) =		36.0047 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												
Efficiency of main space heating system 1 (in %)												
Efficiency of main space heating system 2 (in %)												
Efficiency of secondary/supplementary heating system, %												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (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)	1955.1002	1535.0557	1303.7920	732.0156	301.8927	0.0000	0.0000	0.0000	0.0000	772.6563	1410.0355	1991.5945 (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)												

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating														
Water heating requirement	232.0048	204.9850	217.8968	192.5730	187.1960	169.3055	167.8454	174.3563	176.0376	195.4845	206.7627	229.6623	79.8000	(64)
Efficiency of water heater	87.6736	87.5520	87.2907	86.6329	84.9500	79.8000	79.8000	79.8000	79.8000	86.6964	87.4479	87.7015	79.8000	(216)
Fuel for water heating, kWh/month	264.6234	234.1295	249.6220	222.2863	220.3602	212.1623	210.3326	218.4916	220.5985	225.4816	236.4409	261.8681	79.8000	(217)
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	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	7.0685	(231)
Lighting	51.0652	40.9664	36.8857	27.0240	20.8741	17.0544	19.0421	24.7516	32.1499	42.1824	47.6450	52.4844	52.4844	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-112.9536	-148.6298	-199.3455	-208.3814	-211.9189	-193.0294	-190.3055	-185.5404	-175.8517	-161.7856	-120.1926	-98.9178	-98.9178	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-100.2627	-205.3790	-398.6271	-585.5432	-762.1835	-761.8493	-753.1501	-643.2967	-478.9410	-289.4437	-132.3643	-79.7405	-79.7405	(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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													10002.1426	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	(216)
Water heating fuel used													2776.3969	(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)													412.1252	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-7197.6333	(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													6079.0314	(238)

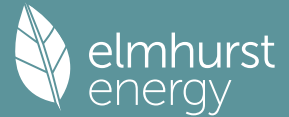
 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	10002.1426	0.2100	2100.4500 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2776.3969	0.2100	583.0433 (264)
Space and water heating			2683.4933 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	412.1252	0.1443	59.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2006.8522	0.1362	-273.2613
PV Unit electricity exported	-5190.7812	0.1266	-656.9206
Total			-930.1819 (269)
Total CO2, kg/year			1824.7230 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.1200 (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	10002.1426	1.1300	11302.4212 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2776.3969	1.1300	3137.3285 (278)
Space and water heating			14439.7497 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	412.1252	1.5338	632.1314 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2006.8522	1.5033	-3016.9532
PV Unit electricity exported	-5190.7812	0.4646	-2411.4972
Total			-5428.4503 (283)
Total Primary energy kWh/year			9773.5315 (286)
Target Primary Energy Rate (TPER)			38.1200 (287)

Full SAP Calculation Printout



Property Reference	Unit 8		Issued on Date	27/03/2024	
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621		
Property	Burrill Development, 8, Cowling Road, Burrill, Bedale, DL8 1RG				
SAP Rating	85 B	DER	2.73	TER	7.12
Environmental	97 A	% DER < TER			61.66
CO ₂ Emissions (t/year)	0.74	DFEE	38.64	TFEE	39.09
Compliance Check	See BREL	% DFEE < TFEE			1.15
% DPER < TPER	25.31	DPER	28.47	TPER	38.12
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 FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (5)

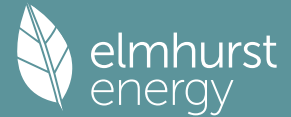
2. Ventilation rate

	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) =											0.0552 (8)
Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.3052 (18)
Number of sides sheltered												2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.2594 (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	0.3307	0.3243	0.3178	0.2853	0.2789	0.2464	0.2464	0.2399	0.2594	0.2789	0.2918	0.3048 (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	0.5547	0.5526	0.5505	0.5407	0.5389	0.5304	0.5304	0.5288	0.5336	0.5389	0.5426	0.5465 (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)			10.9200	1.3258	14.4773		(27)
Window (Uw = 1.40)			5.6000	1.3258	7.4242		(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)
RL5			1.2600	1.3258	1.6705		(27a)
RL6			1.2600	1.3258	1.6705		(27a)
Ground Floor			145.6200	0.1000	14.5620	110.0000	16018.2000 (28a)
External Walls	148.9900	16.5200	132.4700	0.1800	23.8446	60.0000	7948.2000 (29a)
Roof Room Walls	28.4300		28.4300	0.2300	6.5389	9.0000	255.8700 (29a)
Roof at Joist	39.9100		39.9100	0.1000	3.9910	9.0000	359.1900 (30)
Roof at Rafter	91.4900	7.5600	83.9300	0.1500	12.5895	9.0000	755.3700 (30)
Roof at Joist (adj. Roof Room)	34.8300		34.8300	0.0952	3.3171	9.0000	313.4700 (30)
Total net area of external elements Aum(A, m ²)			489.2700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	96.7674		(32)
Party Walls			79.3100	0.0000	0.0000	70.0000	5551.7000 (33)

Full SAP Calculation Printout



Block	318.7100	75.0000	23903.2500 (32c)
FF	110.7900	18.0000	1994.2200 (32d)
GF	110.7900	9.0000	997.1100 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 58096.5800 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 226.5769 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.5000	0.0500	0.5250
E3 Sill	10.5000	0.0400	0.4200
E4 Jamb	25.1200	0.0500	1.2560
E5 Ground floor (normal)	35.3500	0.1200	4.2420
E6 Intermediate floor within a dwelling	35.3500	0.0700	2.4745
E8 Party wall between dwellings	19.8900	0.0600	1.1934
E12 Gable (insulation at ceiling level)	1.8000	0.1200	0.2160
E10 Eaves (insulation at ceiling level)	31.9200	0.0600	1.9152
E13 Gable (insulation at rafter level)	6.2200	0.0400	0.2488
E16 Corner (normal)	5.7900	0.0900	0.5211
E17 Corner (inverted - internal area greater than external area)	3.9400	-0.0900	-0.3546

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.6574 (36)

Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 109.4248 (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	132.6889	132.1808	131.6828	129.3438	128.9061	126.8689	126.8689	126.4917	127.6536	128.9061	129.7915	130.7170 (38)
Average = Sum(39)m / 12 =	242.1136	241.6056	241.1076	238.7686	238.3309	236.2937	236.2937	235.9164	237.0784	238.3309	239.2162	240.1418 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9442	0.9423	0.9403	0.9312	0.9295	0.9215	0.9215	0.9201	0.9246	0.9295	0.9329	0.9366 (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 3.0753 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 32.7119 32.2261 31.5420 30.2806 29.3360 28.2887 27.7230 28.4023 29.1420 30.2627 31.5501 32.6013 (42b)

Hot water usage for other uses 46.1238 44.4465 42.7693 41.0921 39.4149 37.7376 37.7376 39.4149 41.0921 42.7693 44.4465 46.1238 (42c)

Average daily hot water use (litres/day) 72.2598 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	78.8357	76.6727	74.3113	71.3726	68.7509	66.0263	65.4606	67.8172	70.2341	73.0320	75.9966	78.7251 (44)
Energy content (annual)	124.8565	109.1808	114.2137	97.7056	92.5519	81.1871	79.1689	83.9718	86.6056	99.1037	108.2711	123.2645 (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	106.1280	92.8037	97.0816	83.0497	78.6691	69.0090	67.2936	71.3760	73.6148	84.2382	92.0305	104.7748 (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	106.1280	92.8037	97.0816	83.0497	78.6691	69.0090	67.2936	71.3760	73.6148	84.2382	92.0305	104.7748 (64)
12Total per year (kWh/year)												1020.0691 (64)
Electric shower(s)	60.6887	54.0741	59.0469	56.3477	57.4051	54.7589	56.5841	57.4051	56.3477	59.0469	57.9366	60.6887 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												690.3304 (64a)
Heat gains from water heating, kWh/month	41.7042	36.7195	39.0321	34.8494	34.0185	30.9420	30.9694	32.1953	32.4906	35.8213	37.4918	41.3659 (65)

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

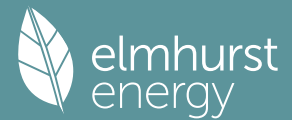
Metabolic gains (Table 5), Watts

(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763 (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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105 (71)
Water heating gains (Table 5)	56.0540	54.6421	52.4625	48.4019	45.7238	42.9749	41.6256	43.2732	45.1259	48.1469	52.0719	55.5993 (72)
Total internal gains	792.8731	822.1714	782.6268	763.2703	722.7505	700.3274	672.1694	669.4388	690.5167	708.8336	750.6004	773.8020 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
-------	---------------------	--------------------------------------	-----------------------------	------------------------------	------------------------	---------

Full SAP Calculation Printout



North			3.7800		10.6334		0.6300		0.7000		0.7700		12.2839 (74)
South			5.0400		46.7521		0.6300		0.7000		0.7700		72.0117 (78)
West			2.1000		19.6403		0.6300		0.7000		0.7700		12.6049 (80)
North			1.1000		10.6334		0.6300		0.7000		0.7700		3.5747 (74)
South			2.2000		46.7521		0.6300		0.7000		0.7700		31.4337 (78)
West			2.3000		19.6403		0.6300		0.7000		0.7700		13.8053 (80)
North			2.5200		26.0000		0.6300		0.7000		1.0000		26.0049 (82)
South			5.0400		26.0000		0.6300		0.7000		1.0000		52.0098 (82)

Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371 (83)
Total gains	1016.6019	1235.5893	1423.0694	1664.0717	1816.5328	1820.0083	1737.8495	1588.2908	1421.8903	1186.9825	1024.7310	961.1391 (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	66.6544	66.7946	66.9325	67.5882	67.7123	68.2961	68.2961	68.4053	68.0700	67.7123	67.4617	67.2017
alpha	5.4436	5.4530	5.4622	5.5059	5.5142	5.5531	5.5531	5.5604	5.5380	5.5142	5.4974	5.4801
util living area	0.9996	0.9987	0.9956	0.9791	0.9171	0.7595	0.5839	0.6549	0.8997	0.9909	0.9989	0.9997 (86)
MIT	19.5756	19.7497	20.0208	20.4056	20.7401	20.9385	20.9882	20.9787	20.8315	20.3853	19.9145	19.5514 (87)
Th 2	20.1301	20.1317	20.1334	20.1411	20.1425	20.1492	20.1492	20.1505	20.1466	20.1425	20.1396	20.1365 (88)
util rest of house	0.9995	0.9983	0.9941	0.9714	0.8863	0.6835	0.4782	0.5473	0.8505	0.9866	0.9985	0.9996 (89)
MIT 2	18.8047	18.9800	19.2516	19.6374	19.9527	20.1175	20.1456	20.1431	20.0407	19.6218	19.1510	18.7857 (90)
Living area fraction										fLA = Living area / (4) =		0.3007 (91)
MIT	19.0365	19.2114	19.4829	19.8684	20.1895	20.3643	20.3990	20.3944	20.2785	19.8514	19.3806	19.0159 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0365	19.2114	19.4829	19.8684	20.1895	20.3643	20.3990	20.3944	20.2785	19.8514	19.3806	19.0159 (93)

8. Space heating requirement

Utilisation	0.9992	0.9976	0.9926	0.9683	0.8882	0.7041	0.5101	0.5796	0.8593	0.9845	0.9980	0.9994 (94)
Useful gains	1015.8195	1232.6826	1412.5354	1611.3547	1613.4707	1281.4714	886.4491	920.6051	1221.8994	1168.6367	1022.6881	960.6006 (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	3567.9025	3457.7251	3130.2711	2618.9015	2023.3022	1362.0781	897.6717	942.3421	1464.7873	2204.8856	2937.7111	3557.9250 (97)
Space heating kWh	1898.7497	1495.2286	1277.9954	725.4337	304.9146	0.0000	0.0000	0.0000	0.0000	770.9692	1378.8165	1932.4093 (98a)
Space heating requirement - total per year (kWh/year)												9784.5171
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	1898.7497	1495.2286	1277.9954	725.4337	304.9146	0.0000	0.0000	0.0000	0.0000	770.9692	1378.8165	1932.4093 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9784.5171
Space heating per m2												(98c) / (4) = 38.1597 (99)

8c. Space cooling requirement

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

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	2221.1608	1748.5734	1792.9649	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7713	0.8603	0.8104	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1713.2039	1504.2511	1453.0410	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1888.8152	1803.8666	1650.5400	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	126.4402	222.9140	146.9393	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	31.6100	55.7285	36.7348	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												124.0734 (107)
Energy for space heating												38.1597 (99)
Energy for space cooling												0.4839 (108)
Total												38.6435 (109)
Fabric Energy Efficiency (DFEE)												38.6 (109)

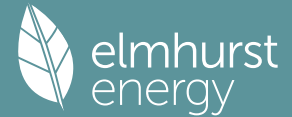
SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (5)

Full SAP Calculation Printout



Water 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	(46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	106.1280	92.8037	97.0816	83.0497	78.6691	69.0090	67.2936	71.3760	73.6148	84.2382	92.0305	104.7748	(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	106.1280	92.8037	97.0816	83.0497	78.6691	69.0090	67.2936	71.3760	73.6148	84.2382	92.0305	104.7748	(64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											1020.0691 (64)	
Electric shower(s)												1020 (64)	
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											690.3304 (64a)	
Heat gains from water heating, kWh/month	41.7042	36.7195	39.0321	34.8494	34.0185	30.9420	30.9694	32.1953	32.4906	35.8213	37.4918	41.3659	(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	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	(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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	(71)
Water heating gains (Table 5)	56.0540	54.6421	52.4625	48.4019	45.7238	42.9749	41.6256	43.2732	45.1259	48.1469	52.0719	55.5993	(72)
Total internal gains	792.8731	822.1714	782.6268	763.2703	722.7505	700.3274	672.1694	669.4388	690.5167	708.8336	750.6004	773.8020	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								
North	4.8800	10.6334	0.6300	0.7000	0.7700	15.8585 (74)							
South	7.2400	46.7521	0.6300	0.7000	0.7700	103.4454 (78)							
West	4.4000	19.6403	0.6300	0.7000	0.7700	26.4102 (80)							
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)							
South	5.0400	26.0000	0.6300	0.7000	1.0000	52.0098 (82)							
Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371	(83)
Total gains	1016.6019	1235.5893	1423.0694	1664.0717	1816.5328	1820.0083	1737.8495	1588.2908	1421.8903	1186.9825	1024.7310	961.1391	(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	66.1172	66.2552	66.3909	67.0360	67.1580	67.7323	67.7323	67.8397	67.5099	67.1580	66.9115	66.6557	
alpha	5.4078	5.4170	5.4261	5.4691	5.4772	5.5155	5.5155	5.5226	5.5007	5.4772	5.4608	5.4437	
util living area	0.9996	0.9987	0.9956	0.9794	0.9186	0.7630	0.5879	0.6589	0.9015	0.9910	0.9989	0.9997	(86)
MIT	19.5624	19.7368	20.0090	20.3955	20.7332	20.9357	20.9874	20.9775	20.8266	20.3767	19.9033	19.5382	(87)
Th 2	20.1236	20.1253	20.1269	20.1346	20.1360	20.1427	20.1427	20.1440	20.1402	20.1360	20.1331	20.1301	(88)
util rest of house	0.9995	0.9983	0.9941	0.9718	0.8880	0.6869	0.4810	0.5504	0.8526	0.9867	0.9985	0.9996	(89)
MIT 2	18.7864	18.9620	19.2347	19.6223	19.9409	20.1095	20.1389	20.1362	20.0309	19.6081	19.1347	18.7673	(90)
Living area fraction	FLA = Living area / (4) =											0.3007 (91)	
MIT	19.0197	19.1950	19.4675	19.8548	20.1791	20.3579	20.3940	20.3892	20.2702	19.8392	19.3658	18.9991	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0197	19.1950	19.4675	19.8548	20.1791	20.3579	20.3940	20.3892	20.2702	19.8392	19.3658	18.9991	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9992	0.9976	0.9926	0.9687	0.8898	0.7074	0.5133	0.5830	0.8612	0.9847	0.9980	0.9994	(94)
Useful gains	1015.8116	1232.6734	1412.5725	1611.9275	1616.2733	1287.4409	892.0080	925.9429	1224.5819	1168.7706	1022.6796	960.5941	(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	3592.8024	3481.8642	3152.0648	2637.2127	2037.5170	1371.8826	903.9703	948.9622	1474.9501	2220.1584	2958.3143	3582.9933	(97)
Space heating kWh	1917.2812	1511.4562	1294.1823	738.2053	313.4053	0.0000	0.0000	0.0000	0.0000	782.2325	1393.6570	1951.0650	(98a)
Space heating requirement - total per year (kWh/year)												9901.4847	
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	1917.2812	1511.4562	1294.1823	738.2053	313.4053	0.0000	0.0000	0.0000	0.0000	782.2325	1393.6570	1951.0650	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9901.4847	
Space heating per m2												(98c) / (4) = 38.6158 (99)	

Full SAP Calculation Printout

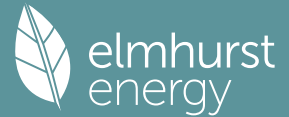


 8c. Space cooling requirement

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	2239.6507	1763.1293	1807.9142	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7664	0.8560	0.8057	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1716.3715	1509.2726	1456.5539	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1888.8152	1803.8666	1650.5400	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	124.1595	219.1779	144.3256	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	31.0399	54.7945	36.0814	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												121.9158 (107)
Energy for space heating												38.6158 (99)
Energy for space cooling												0.4755 (108)
Total												39.0913 (109)
Fabric Energy Efficiency (TFEE)												39.1 (109)

Full SAP Calculation Printout



Property Reference	Unit 8		Issued on Date	27/03/2024	
Assessment Reference	CEPCN4621	Prop Type Ref	CEPCN4621		
Property	Burrill Development, 8, Cowling Road, Burrill, Bedale, DL8 1RG				
SAP Rating	85 B	DER	2.73	TER	7.12
Environmental	97 A	% DER < TER			61.66
CO ₂ Emissions (t/year)	0.74	DFEE	38.64	TFEE	39.09
Compliance Check	See BREL	% DFEE < TFEE			1.15
% DPER < TPER	25.31	DPER	28.47	TPER	38.12
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	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (5)

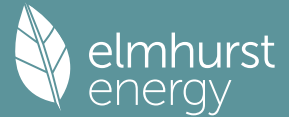
2. Ventilation rate

	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	6 * 10 =											60.0000 (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) =	60.0000 / (5) =											0.0828 (8)
Pressure test	Yes											
Pressure Test Method	Blower Door											
Measured/design AP50	5.0000											(17)
Infiltration rate	0.3328											(18)
Number of sides sheltered	2											(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.2829 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
Effective ac	0.3606	0.3536	0.3465	0.3111	0.3041	0.2687	0.2687	0.2616	0.2829	0.3041	0.3182	0.3324 (22b)
	0.5650	0.5625	0.5600	0.5484	0.5462	0.5361	0.5361	0.5342	0.5400	0.5462	0.5506	0.5552 (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)			10.9200	1.3258	14.4773		(27)
Window (Uw = 1.40)			5.6000	1.3258	7.4242		(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)
RL5			1.2600	1.3258	1.6705		(27a)
RL6			1.2600	1.3258	1.6705		(27a)
Ground Floor			145.6200	0.1000	14.5620	110.0000	16018.2000 (28a)
External Walls	148.9900	16.5200	132.4700	0.1800	23.8446	60.0000	7948.2000 (29a)
Roof Room Walls	28.4300		28.4300	0.2300	6.5389	9.0000	255.8700 (29a)
Roof at Joist	39.9100		39.9100	0.1000	3.9910	9.0000	359.1900 (30)
Roof at Rafter	91.4900	7.5600	83.9300	0.1500	12.5895	9.0000	755.3700 (30)
Roof at Joist (adj. Roof Room)	34.8300		34.8300	0.0952	3.3171	9.0000	313.4700 (30)
Total net area of external elements Aum(A, m ²)			489.2700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	96.7674		(33)
Party Walls			79.3100	0.0000	0.0000	70.0000	5551.7000 (32)
Block			318.7100			75.0000	23903.2500 (32c)
FF			110.7900			18.0000	1994.2200 (32d)

Full SAP Calculation Printout



GF 110.7900 9.0000 997.1100 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 58096.5800 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 226.5769 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.5000	0.0500	0.5250
E3 Sill	10.5000	0.0400	0.4200
E4 Jamb	25.1200	0.0500	1.2560
E5 Ground floor (normal)	35.3500	0.1200	4.2420
E6 Intermediate floor within a dwelling	35.3500	0.0700	2.4745
E8 Party wall between dwellings	19.8900	0.0600	1.1934
E12 Gable (insulation at ceiling level)	1.8000	0.1200	0.2160
E10 Eaves (insulation at ceiling level)	31.9200	0.0600	1.9152
E13 Gable (insulation at rafter level)	6.2200	0.0400	0.2488
E16 Corner (normal)	5.7900	0.0900	0.5211
E17 Corner (inverted - internal area greater than external area)	3.9400	-0.0900	-0.3546
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.6574 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			(33) + (36) + (36a) = 109.4248 (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	135.1615	134.5574	133.9653	131.1842	130.6639	128.2417	128.2417	127.7931	129.1747	130.6639	131.7165	132.8170 (38)
Heat transfer coeff	244.5863	243.9822	243.3901	240.6090	240.0887	237.6664	237.6664	237.2179	238.5995	240.0887	241.1413	242.2418 (39)
Average = Sum(39)m / 12 =												240.6065
HLP	0.9539	0.9515	0.9492	0.9384	0.9363	0.9269	0.9269	0.9252	0.9305	0.9363	0.9405	0.9447 (40)
HLP (average)												0.9384
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	133.9040	131.8916	128.9593	123.3488	119.2084	114.5910	111.9665	114.8767	118.0667	123.0244	128.7554	133.3909 (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	46.1238	44.4465	42.7693	41.0921	39.4149	37.7376	37.7376	39.4149	41.0921	42.7693	44.4465	46.1238 (42c)
Average daily hot water use (litres/day)												165.3857 (43)
Daily hot water use	180.0277	176.3382	171.7286	164.4409	158.6232	152.3287	149.7042	154.2915	159.1588	165.7937	173.2019	179.5147 (44)
Energy conte	285.1199	251.1032	263.9405	225.1113	213.5374	187.3059	181.0542	191.0452	196.2588	224.9805	246.7579	281.0766 (45)
Energy content (annual)												Total = Sum(45)m = 2747.2913
Distribution loss (46)m = 0.15 x (45)m	42.7680	37.6655	39.5911	33.7667	32.0306	28.0959	27.1581	28.6568	29.4388	33.7471	37.0137	42.1615 (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	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (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	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 3316.8373 (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	133.5003	118.4448	126.4581	112.2991	109.6991	99.7288	98.8984	102.2204	102.7056	113.5039	119.4966	132.1559 (65)

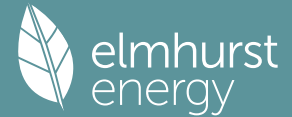
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763 (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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105 (71)
Water heating gains (Table 5)	179.4359	176.2571	169.9706	155.9710	147.4450	138.5122	132.9280	137.3931	142.6467	152.5590	165.9675	177.6289 (72)
Total internal gains	916.2550	943.7865	900.1349	870.8394	824.4717	795.8647	763.4719	763.5587	788.0376	813.2458	864.4960	895.8315 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
-------	---------	---------------------	-----------------	------------------	---------------	---------

Full SAP Calculation Printout



			W/m2	or Table 6b	or Table 6c	Table 6d	
North			3.7800	10.6334	0.6300	0.7000	12.2839 (74)
South			5.0400	46.7521	0.6300	0.7000	72.0117 (78)
West			2.1000	19.6403	0.6300	0.7000	12.6049 (80)
North			1.1000	10.6334	0.6300	0.7000	3.5747 (74)
South			2.2000	46.7521	0.6300	0.7000	31.4337 (78)
West			2.3000	19.6403	0.6300	0.7000	13.8053 (80)
North			2.5200	26.0000	0.6300	1.0000	26.0049 (82)
South			5.0400	26.0000	0.6300	1.0000	52.0098 (82)

Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371 (83)
Total gains	1139.9838	1357.2043	1540.5775	1771.6408	1918.2539	1915.5456	1829.1519	1682.4107	1519.4112	1291.3947	1138.6267	1083.1687 (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	65.9806	66.1439	66.3048	67.0712	67.2166	67.9016	67.9016	68.0300	67.6361	67.2166	66.9232	66.6191
alpha	5.3987	5.4096	5.4203	5.4714	5.4811	5.5268	5.5268	5.5353	5.5091	5.4811	5.4615	5.4413
util living area	0.9993	0.9979	0.9937	0.9731	0.9021	0.7353	0.5603	0.6265	0.8782	0.9868	0.9982	0.9995 (86)
Living	19.9051	20.0357	20.2383	20.5238	20.7659	20.9040	20.9365	20.9308	20.8333	20.5113	20.1608	19.8889
Non living	18.8140	18.9828	19.2432	19.6106	19.9004	20.0468	20.0698	20.0686	19.9828	19.6000	19.1508	18.7993
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4399	20.0357	20.2383	20.5238	20.7659	20.9040	20.9365	20.9308	20.8333	20.5113	20.1608	20.0443 (87)
Th 2	20.1219	20.1239	20.1259	20.1350	20.1367	20.1447	20.1447	20.1462	20.1416	20.1367	20.1333	20.1296 (88)
util rest of house	0.9990	0.9973	0.9915	0.9635	0.8678	0.6582	0.4571	0.5208	0.8233	0.9806	0.9975	0.9993 (89)
MIT 2	19.6005	18.9828	19.2432	19.6106	19.9004	20.0468	20.0698	20.0686	19.9828	19.6000	19.1508	19.0390 (90)
Living area fraction									fLA = Living area / (4) =			0.3007 (91)
MIT	19.8529	19.2994	19.5424	19.8851	20.1606	20.3045	20.3304	20.3279	20.2385	19.8740	19.4545	19.3413 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8529	19.2994	19.5424	19.8851	20.1606	20.3045	20.3304	20.3279	20.2385	19.8740	19.4545	19.3413 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9990	0.9964	0.9897	0.9601	0.8688	0.6736	0.4801	0.5442	0.8304	0.9781	0.9968	0.9991 (94)
Useful gains	1138.7898	1352.3392	1524.6709	1700.8774	1666.6741	1290.2567	878.1743	915.6365	1261.7433	1263.1775	1134.9391	1082.1675 (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	3804.0240	3513.2012	3174.3907	2643.1242	2031.2986	1355.7788	886.5948	931.7624	1464.6488	2226.5780	2979.1736	3667.8601 (97)
Space heating kWh	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98a)
Space heating requirement - total per year (kWh/year)												9580.4976
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	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9580.4976
Space heating per m2												(98c) / (4) = 37.3640 (99)

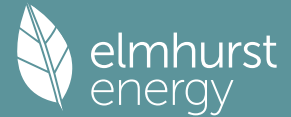
9a. Energy requirements - Individual heating systems, including micro-CHP

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 %) 410.3180 (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	1982.9342	1452.0993	1227.3915	678.4177	271.2807	0.0000	0.0000	0.0000	0.0000	716.7700	1327.8488	1923.7553 (98)
Space heating efficiency (main heating system 1)	410.3180	410.3180	410.3180	410.3180	410.3180	0.0000	0.0000	0.0000	0.0000	410.3180	410.3180	410.3180 (210)
Space heating fuel (main heating system)	483.2677	353.8961	299.1318	165.3395	66.1147	0.0000	0.0000	0.0000	0.0000	174.6865	323.6146	468.8450 (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 requirement	333.4923	294.7944	312.3129	271.9233	261.9098	234.1179	229.4266	239.4176	243.0708	273.3529	293.5699	329.4490 (64)
Efficiency of water heater	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565	178.1565 (216)
Fuel for water heating, kWh/month	187.1906	165.4693	175.3025	152.6317	147.0111	131.4113	128.7781	134.3861	136.4366	153.4341	164.7820	184.9211 (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	63.8238	51.2018	46.1015	33.7760	26.0895	21.3154	23.7997	30.9358	40.1825	52.7217	59.5490	65.5976 (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)

Full SAP Calculation Printout



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												2334.8957	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												178.1565	
Water heating fuel used												1861.7547	(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)												515.0943	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												4711.7448	(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	2334.8957	0.1553	362.5787 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1861.7547	0.1411	262.6918 (264)
Space and water heating			625.2705 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	515.0943	0.1443	74.3440 (268)
Total CO2, kg/year			699.6145 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.7300 (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	2334.8957	1.5749	3677.2191 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1861.7547	1.5217	2833.1123 (278)
Space and water heating			6510.3314 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	515.0943	1.5338	790.0689 (282)
Total Primary energy kWh/year			7300.4003 (286)
Dwelling Primary energy Rate (DPER)			28.4700 (287)

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

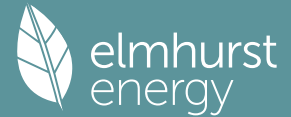
1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	145.6200 (1b)	x 2.8400 (2b)	= 413.5608 (1b) - (3b)
First floor	110.7900 (1c)	x 2.8100 (2c)	= 311.3199 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	256.4100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	724.8807 (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) = 0.0552 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3052 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2594 (21)

Full SAP Calculation Printout



	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													
Effective ac	0.3307	0.3243	0.3178	0.2853	0.2789	0.2464	0.2464	0.2399	0.2594	0.2789	0.2918	0.3048	(22b)
	0.5547	0.5526	0.5505	0.5407	0.5389	0.5304	0.5304	0.5288	0.5336	0.5389	0.5426	0.5465	(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)			16.5200	1.1450	18.9160			(27)
RL1			1.2600	2.0221	2.5478			(27a)
RL2			1.2600	2.0221	2.5478			(27a)
RL3			1.2600	2.0221	2.5478			(27a)
RL4			1.2600	2.0221	2.5478			(27a)
RL5			1.2600	2.0221	2.5478			(27a)
RL6			1.2600	2.0221	2.5478			(27a)
Ground Floor			145.6200	0.1300	18.9306			(28a)
External Walls	148.9900	16.5200	132.4700	0.1800	23.8446			(29a)
Roof Room Walls	28.4300		28.4300	0.1800	5.1174			(29a)
Roof at Joist	39.9100		39.9100	0.1100	4.3901			(30)
Roof at Rafter	91.4900	7.5600	83.9300	0.1100	9.2323			(30)
Roof at Joist (adj. Roof Room)	34.8300		34.8300	0.1100	3.8313			(30)
Total net area of external elements Aum(A, m2)			489.2700					(31)
Fabric heat loss, W/K = Sum (A x U)					99.5491			(33)
Party Walls			79.3100	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 226.5769 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.5000	0.0500	0.5250	
E3 Sill	10.5000	0.0500	0.5250	
E4 Jamb	25.1200	0.0500	1.2560	
E5 Ground floor (normal)	35.3500	0.1600	5.6560	
E6 Intermediate floor within a dwelling	35.3500	0.0000	0.0000	
E18 Party wall between dwellings	19.8900	0.0600	1.1934	
E12 Gable (insulation at ceiling level)	1.8000	0.0600	0.1080	
E10 Eaves (insulation at ceiling level)	31.9200	0.0600	1.9152	
E13 Gable (insulation at rafter level)	6.2200	0.0800	0.4976	
E16 Corner (normal)	5.7900	0.0900	0.5211	
E17 Corner (inverted - internal area greater than external area)	3.9400	-0.0900	-0.3546	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.8427 (36)

Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 111.3918 (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	132.6889	132.1808	131.6828	129.3438	128.9061	126.8689	126.8689	126.4917	127.6536	128.9061	129.7915	130.7170	(38)
Average = Sum(39)m / 12 =	244.0806	243.5726	243.0746	240.7356	240.2979	238.2607	238.2607	237.8834	239.0454	240.2979	241.1833	242.1088	(39)
													240.7335

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9519	0.9499	0.9480	0.9389	0.9372	0.9292	0.9292	0.9277	0.9323	0.9372	0.9406	0.9442	(40)
HLP (average)												0.9389	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 3.0753 (42)

Hot water usage for mixer showers 97.0116 (42a)

Hot water usage for baths 0.0000 (42b)

Hot water usage for other uses 46.1238 (42c)

Average daily hot water use (litres/day) 131.7161 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	143.5085	140.3677	136.5579	130.8003	126.1119	121.0766	119.1678	122.9615	126.9588	132.2416	138.0868	143.1353	(44)
Energy content (annual)	227.2823	199.8818	209.8844	179.0591	169.7708	148.8778	144.1232	152.2521	156.5529	179.4506	196.7300	224.1154	(45)
Distribution loss (46)m = 0.15 x (45)m	34.0923	29.9823	31.4827	26.8589	25.4656	22.3317	21.6185	22.8378	23.4829	26.9176	29.5095	33.6173	(46)

Water storage loss: 180.0000 (47)

Store volume 1.5520 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.5400 (49)

Temperature factor from Table 2b 0.8381 (55)

Enter (49) or (54) in (55) 0.8381 (55)

Total storage loss 25.9803 (56)

If cylinder contains dedicated solar storage 25.9803 (57)

Primary loss 23.2624 (59)

Combi loss 0.0000 (61)

Total heat required for water heating calculated for each month 273.3580 (62)

WWHRS -44.5202 (63a)

PV diverter -0.0000 (63b)

Solar input 0.0000 (63c)

FGHRS 0.0000 (63d)

Output from w/h 232.0048 (64)

Total per year (kWh/year) = Sum(64)m = 2354.1097 (64)

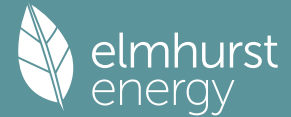
Electric shower(s) 0.0000 (64a)

Total Energy used by instantaneous electric shower (s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 114.9655 (65)

114.9655 102.0425 109.1807 97.6605 95.8429 87.6252 87.3151 90.0179 90.1772 99.0615 103.5361 113.9125 (65)

Full SAP Calculation Printout



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	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631	153.7631 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	245.7653	272.0973	245.7653	253.9575	245.7653	253.9575	245.7653	245.7653	253.9575	245.7653	253.9575	245.7653 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	421.9249	426.3031	415.2700	391.7819	362.1324	334.2661	315.6496	311.2714	322.3044	345.7925	375.4420	403.3084 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763	38.3763 (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)	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105	-123.0105 (71)
Water heating gains (Table 5)	154.5235	151.8489	146.7482	135.6396	128.8211	121.7017	117.3590	120.9919	125.2461	133.1471	143.8001	153.1082 (72)
Total internal gains	894.3426	922.3783	879.9125	853.5079	808.8478	779.0542	747.9029	747.1575	770.6370	796.8339	845.3286	874.3108 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W					
North	4.8800	10.6334	0.6300	0.7000	0.7700	15.8585 (74)						
South	7.2400	46.7521	0.6300	0.7000	0.7700	103.4454 (78)						
West	4.4000	19.6403	0.6300	0.7000	0.7700	26.4102 (80)						
North	2.5200	26.0000	0.6300	0.7000	1.0000	26.0049 (82)						
South	5.0400	26.0000	0.6300	0.7000	1.0000	52.0098 (82)						
Solar gains	223.7288	413.4178	640.4426	900.8015	1093.7822	1119.6808	1065.6801	918.8520	731.3736	478.1488	274.1307	187.3371 (83)
Total gains	1118.0715	1335.7961	1520.3551	1754.3094	1902.6301	1898.7350	1813.5829	1666.0095	1502.0106	1274.9827	1119.4593	1061.6480 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	66.1172	66.2552	66.3909	67.0360	67.1580	67.7323	67.7323	67.8397	67.5099	67.1580	66.9115	66.6557
alpha	5.4078	5.4170	5.4261	5.4691	5.4772	5.5155	5.5155	5.5226	5.5007	5.4772	5.4608	5.4437
util living area	0.9993	0.9981	0.9940	0.9742	0.9049	0.7410	0.5658	0.6332	0.8829	0.9876	0.9983	0.9995 (86)
MIT	19.6099	19.7835	20.0534	20.4329	20.7582	20.9444	20.9895	20.9814	20.8475	20.4157	19.9476	19.5854 (87)
Th 2	20.1236	20.1253	20.1269	20.1346	20.1360	20.1427	20.1427	20.1440	20.1402	20.1360	20.1331	20.1301 (88)
util rest of house	0.9991	0.9975	0.9920	0.9649	0.8711	0.6640	0.4617	0.5266	0.8290	0.9817	0.9977	0.9994 (89)
MIT 2	18.4687	18.6922	19.0384	19.5230	19.9124	20.1065	20.1387	20.1359	20.0199	19.5073	18.9086	18.4419 (90)
Living area fraction	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (92)
MIT	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8118	19.0204	19.3436	19.7966	20.1667	20.3584	20.3945	20.3902	20.2687	19.7804	19.2210	18.7857 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9987	0.9963	0.9896	0.9604	0.8725	0.6846	0.4931	0.5585	0.8383	0.9784	0.9967	0.9990 (94)
Useful gains	1116.5723	1330.9178	1504.4764	1684.7935	1660.0165	1299.9086	894.2321	930.4440	1259.0932	1247.4821	1115.7970	1060.5777 (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	3542.0528	3439.3351	3121.9495	2623.1969	2034.5420	1372.0040	904.0875	949.1935	1474.6035	2206.0328	2923.3842	3531.3327 (97)
Space heating kWh	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (98a)
Space heating requirement - total per year (kWh/year)												9231.9776
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	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												9231.9776
Space heating per m2										(98c) / (4) =		36.0047 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												
Efficiency of main space heating system 1 (in %)												
Efficiency of main space heating system 2 (in %)												
Efficiency of secondary/supplementary heating system, %												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	1804.5575	1416.8564	1203.4000	675.6504	278.6470	0.0000	0.0000	0.0000	0.0000	713.1618	1301.4628	1838.2417 (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)	1955.1002	1535.0557	1303.7920	732.0156	301.8927	0.0000	0.0000	0.0000	0.0000	772.6563	1410.0355	1991.5945 (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)												

Full SAP Calculation Printout



	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating														
Water heating requirement	232.0048	204.9850	217.8968	192.5730	187.1960	169.3055	167.8454	174.3563	176.0376	195.4845	206.7627	229.6623	79.8000	(64)
Efficiency of water heater													79.8000	(216)
(217)m	87.6736	87.5520	87.2907	86.6329	84.9500	79.8000	79.8000	79.8000	79.8000	86.6964	87.4479	87.7015	87.7015	(217)
Fuel for water heating, kWh/month	264.6234	234.1295	249.6220	222.2863	220.3602	212.1623	210.3326	218.4916	220.5985	225.4816	236.4409	261.8681	261.8681	(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	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	7.3041	(231)
Lighting	51.0652	40.9664	36.8857	27.0240	20.8741	17.0544	19.0421	24.7516	32.1499	42.1824	47.6450	52.4844	52.4844	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-112.9536	-148.6298	-199.3455	-208.3814	-211.9189	-193.0294	-190.3055	-185.5404	-175.8517	-161.7856	-120.1926	-98.9178	-98.9178	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-100.2627	-205.3790	-398.6271	-585.5432	-762.1835	-761.8493	-753.1501	-643.2967	-478.9410	-289.4437	-132.3643	-79.7405	-79.7405	(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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													10002.1426	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	(216)
Water heating fuel used													2776.3969	(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)													412.1252	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-7197.6333	(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													6079.0314	(238)

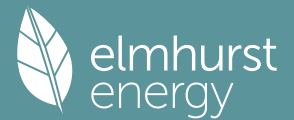
 12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	10002.1426	0.2100	2100.4500 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2776.3969	0.2100	583.0433 (264)
Space and water heating			2683.4933 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	412.1252	0.1443	59.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2006.8522	0.1362	-273.2613
PV Unit electricity exported	-5190.7812	0.1266	-656.9206
Total			-930.1819 (269)
Total CO2, kg/year			1824.7230 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			7.1200 (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	10002.1426	1.1300	11302.4212 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2776.3969	1.1300	3137.3285 (278)
Space and water heating			14439.7497 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	412.1252	1.5338	632.1314 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-2006.8522	1.5033	-3016.9532
PV Unit electricity exported	-5190.7812	0.4646	-2411.4972
Total			-5428.4503 (283)
Total Primary energy kWh/year			9773.5315 (286)
Target Primary Energy Rate (TPER)			38.1200 (287)

Predicted Energy Assessment



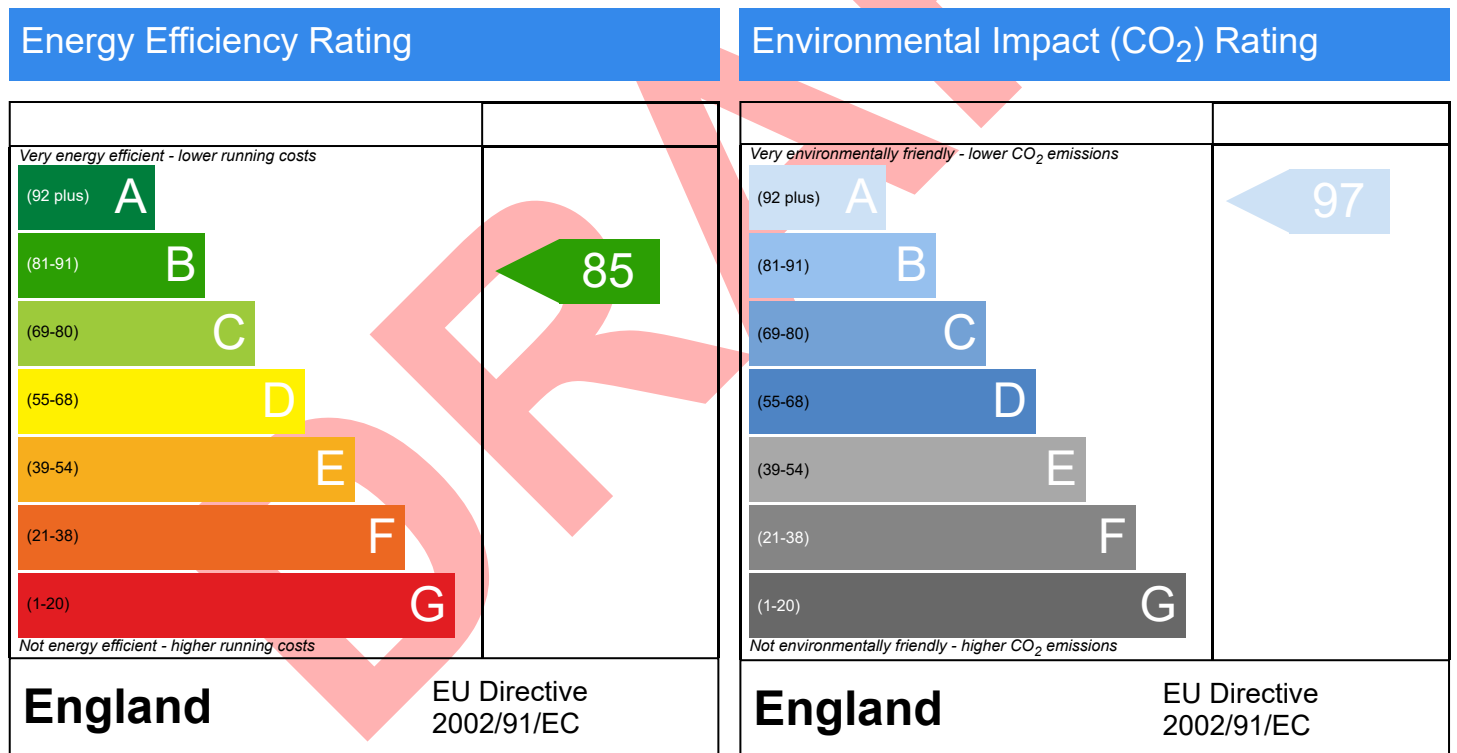
Burrill Development, 8, Cowling Road, Burrill , Bedale, DL8 1RG

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

House, Mid-Terrace
27/03/2024
Cory Skrzypkowski
256.41 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.