

Building Regulations England Part L (BREL) Compliance Report

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

Date: Wed 03 Jul 2024 11:34:21

Project Information			
Assessed By	Matthew Carter	Building Type	Flat, Semi-detached
OCDEA Registration	EES/003584	Assessment Date	2024-07-03

Dwelling Details			
Assessment Type	As designed	Total Floor Area	70 m ²
Site Reference	01113	Plot Reference	00001
Address	Flat 7 Zoar Chapel South Street, Reading		

Client Details	
Name	Alex
Company	Pendor Property LTD
Address	Cedar Heights , Gerrards Cross, SL9 9TW

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	13.31 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	5.14 kgCO ₂ /m ²		OK

1b Target primary energy rate and dwelling primary energy			
Target primary energy	70.05 kWh _{PE} /m ²		
Dwelling primary energy	54.32 kWh _{PE} /m ²		OK

1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	37.9 kWh/m ²		
Dwelling fabric energy efficiency	37.9 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	0.18	Walls (1) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.1	Roof (1) (0.1)	OK
Windows, doors, and roof windows	1.6	1.03	Opening (1.4)	OK
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Walls (1)	64.5824	0.18	
Sheltered wall: Walls (2)	15.28	0.16	
Party wall: Party Wall (1)	28.19	0 (!)	
Exposed roof: Roof (1)	42.48	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]
Opening, Windows	1.89	East	0.7	1 (!)
Opening, Windows	0.5	East	0.7	1 (!)
Opening, Windows	6.3	East	0.7	1 (!)
Opening, Windows	2.1538	West	0.7	1 (!)
Opening, Windows	2.1538	West	0.7	1 (!)
Opening, Windows	0.5	West	0.7	1 (!)
Opening, Windows	6.3	West	0.7	1 (!)
Opening, Doo to Hall	1.8	North	N/A	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	0.006 (!)	TD5
External wall	E3: Sill	Calculated by person with suitable expertise	0.012 (!)	TD5
External wall	E4: Jamb	Calculated by person with suitable expertise	0.023 (!)	TD5
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.075	TD5
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.045	TD5
External wall	E18: Party wall between dwellings	SAP table default	0.24	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.022 (!)	TD5
External wall	E14: Flat roof	SAP table default	0.16	

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

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

4 Space heating

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

Efficiency	313.9%
Emitter type	Underfloor
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Vaillant Group UK Ltd
Model	aroTHERM 5kW
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	1.4 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: N/A

Manufacturer	
Model	

7 Lighting

Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	90 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed: Name:	Assessor ID: Date:	
b. Client Declaration		
N/A		

Summary for Input Data

Property Reference	01113	Issued on Date	03/07/2024
Assessment Reference	00001	Prop Type Ref	
Property	Zoar Chapel , Flat 7, South Street , Reading		

SAP Rating	80 C	DER	5.14	TER	13.31
Environmental	96 A	% DER < TER			61.38
CO ₂ Emissions (t/year)	0.34	DFEE	37.94	TFEE	37.94
Compliance Check	See BREL	% DFEE < TFEE			0.01
% DPER < TPER	22.45	DPER	54.32	TPER	70.05

Assessor Details	Mr. Matthew Carter	Assessor ID	7869-0001
Client			

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

Orientation	South
Property Tenture	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Top-floor flat
Which Floor	3
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
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	27.45 m	42.48 m ²	2.34 m
1st Storey:	14.89 m	27.80 m ²	2.50 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	27.00	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	External Wall 1	Steel Frame	Steel frame wall (warm frame or hybrid construction)	0.18	14.00	84.38	64.58	0.00	None	19.80	Calculate Wall Area
	Wall to Stairs	Steel Frame	Steel frame wall (warm frame or hybrid construction)	0.18	14.00	17.08	15.28	0.60	Stairwell Access Corridor 2	1.80	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 Wall 1	Filled Cavity with Edge Sealing	Steel frame	0.00	20.00	28.19	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Plasterboard on timber frame	9.00	35.33

Summary for Input Data

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	42.48	42.48	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	27.80

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	30.00	42.48

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.05		Air Filled	0.63	Wood	0.70	1.00
Doo to Hall	SAP table	Door to Corridor			Air Filled	0.00		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Opening	Windows	External Wall 1	East	8.69	0
Opening	Windows	External Wall 1	West	11.11	0
Opening	Doo to Hall	Wall to Stairs	North	1.80	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	10.32	0.01	0.01 TD5	No
E3 Sill	Independently assessed	3.42	0.01	0.01 TD5	No
E4 Jamb	Independently assessed	23.80	0.02	0.02 TD5	No
E16 Corner (normal)	Independently assessed	14.38	0.07	0.07 TD5	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	2.34	-0.04	-0.04 TD5	No
E18 Party wall between dwellings	Table K1 - Default	11.70	0.24	0.24 TD5	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	27.00	0.02	0.02 TD5	No
E14 Flat roof	Table K1 - Default	27.45	0.16	0.16 TD5	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

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	90.00	5	450	8

24.0 Main Heating 1

Percentage of Heat %

Database Ref. No.

Fuel Type

SAP Code

In Winter

Summary for Input Data

In Summer	182.15
Model Name	aroTHERM 5kW
Manufacturer	Vaillant Group UK Ltd
System Type	Heat Pump
Controls SAP Code	2207
Delayed Start Stat	No
Burner Control	Modulating
HETAS approved System	No
Oil Pump Inside	No
FI Case	0.00
Flue Type	None or Unknown
Fan Assisted Flue	No
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	35.00
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	None

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

28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
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	Vented hot water system	7.00		No	

28.3 Waste Water Heat Recovery System	
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29.0 Hot Water Cylinder	Hot Water Cylinder
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Summary for Input Data

Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	180.00	L
Loss	1.40	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store

Recommendations

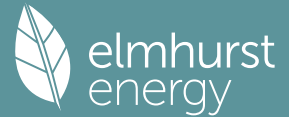
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE			0.01
% DPER < TPER	22.45	DPER	54.32	TPER	70.05
Assessor Details	Mr. Matthew Carter			Assessor ID	7869-0001
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	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1184 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3184 (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) = 0.2706 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3451	0.3383	0.3315	0.2977	0.2909	0.2571	0.2571	0.2504	0.2706	0.2909	0.3045	0.3180 (22b)
Effective ac	0.5595	0.5572	0.5550	0.5443	0.5423	0.5331	0.5331	0.5313	0.5366	0.5423	0.5464	0.5506 (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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Doo to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.8753		(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32d)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		4331.5020 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							61.6321 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				10.3200	0.0060	0.0619	
E3 Sill				3.4200	0.0120	0.0410	
E4 Jamb				23.8000	0.0230	0.5474	

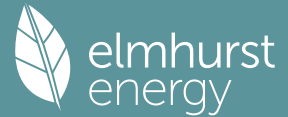
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1451	1.1433	1.1415	1.1331	1.1315	1.1241	1.1241	1.1228	1.1270	1.1315	1.1347	1.1380
HLP (average)												1.1331
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Total per year (kWh/year) = Sum(64)m =											2851.2280	(64)
Electric shower(s)											2851	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	64a
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000	(64a)
Heat gains from water heating, kWh/month												
110.4892	98.2446	105.4607	95.0375	93.7615	61.7809	60.9872	63.3443	63.9753	96.5382	100.1547	109.5615	(65)

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
East				8.6900	19.6403	0.6300	0.7000	0.7700	52.1602 (76)
West				11.1100	19.6403	0.6300	0.7000	0.7700	66.6858 (80)
Solar gains	118.8459	232.4879	382.8744	558.3995	684.3395	666.9458	572.8965	445.2988	97.7331 (83)
Total gains	621.9390	746.0229	876.0866	1034.1685	1136.8970	1103.1384	1053.6439	960.7087	590.8453 (84)

Full SAP Calculation Printout



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	14.9501	14.9741	14.9977	15.1094	15.1305	15.2295	15.2295	15.2480	15.1912	15.1305	15.0879	15.0436	
alpha	1.9967	1.9983	1.9998	2.0073	2.0087	2.0153	2.0153	2.0165	2.0127	2.0087	2.0059	2.0029	
util living area	0.8719	0.8256	0.7555	0.6436	0.5184	0.4014	0.3054	0.3430	0.5166	0.7107	0.8323	0.8819 (86)	
Living	18.5762	18.9260	19.4251	19.9997	20.4207	20.6695	20.7753	20.7534	20.5353	19.9587	19.1698	18.5097	
Non living	17.1597	17.5889	18.1972	18.8850	19.3684	19.6423	19.7433	19.7277	19.5130	18.8597	17.9034	17.0806	
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	19.7606	18.9260	19.4251	19.9997	20.4207	20.6695	20.7753	20.7534	20.5353	19.9587	19.1698	18.8582 (87)	
Th 2	19.9641	19.9656	19.9671	19.9739	19.9752	19.9812	19.9812	19.9823	19.9789	19.9752	19.9726	19.9699 (88)	
util rest of house	0.8595	0.8095	0.7336	0.6131	0.4781	0.3486	0.2414	0.2762	0.4615	0.6771	0.8141	0.8703 (89)	
MIT 2	18.8343	17.5889	18.1972	18.8850	19.3684	19.6423	19.7433	19.7277	19.5130	18.8597	17.9034	17.5970 (90)	
Living area fraction									fLA = Living area / (4) =				0.3842 (91)
MIT	19.1902	18.1026	18.6689	19.3132	19.7726	20.0369	20.1398	20.1218	19.9058	19.2819	18.3899	18.0816 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.1902	18.1026	18.6689	19.3132	19.7726	20.0369	20.1398	20.1218	19.9058	19.2819	18.3899	18.0816 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8490	0.7748	0.7020	0.5917	0.4696	0.3517	0.2517	0.2857	0.4573	0.6514	0.7800	0.8443 (94)
Useful gains	528.0288	577.9990	615.0266	611.8777	533.9359	387.9201	265.2115	274.4563	386.5619	471.9442	486.2240	498.8698 (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	1198.3713	1060.8511	976.2555	829.2269	641.9445	429.5389	279.6575	293.6792	459.8367	690.3957	900.3204	1110.2527 (97)
Space heating kWh	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98a)
Space heating requirement - total per year (kWh/year)												2244.3619
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	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2244.3619
Space heating per m2										(98c) / (4) =		31.9346 (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 %)												313.9328 (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	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98)
Space heating efficiency (main heating system 1)	313.9328	313.9328	313.9328	313.9328	313.9328	0.0000	0.0000	0.0000	0.0000	313.9328	313.9328	313.9328 (210)
Space heating fuel (main heating system)	158.8667	103.3586	85.6089	49.8487	25.5973	0.0000	0.0000	0.0000	0.0000	51.7716	94.9724	144.8937 (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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)
Efficiency of water heater	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532 (216)
Fuel for water heating, kWh/month	158.6684	140.7509	150.3659	133.9228	131.0495	102.6142	101.3239	105.2157	106.2374	135.6341	142.3717	157.1368 (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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												714.9179 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												182.1532
Water heating fuel used												1565.2912 (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)												199.8805 (232)

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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	2480.0896 (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	714.9179	0.1553	111.0375 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1565.2912	0.1416	221.7020 (264)
Space and water heating			332.7395 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	199.8805	0.1443	28.8489 (268)
Total CO2, kg/year			361.5884 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1400 (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	714.9179	1.5750	1125.9622 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1565.2912	1.5238	2385.1469 (278)
Space and water heating			3511.1090 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	199.8805	1.5338	306.5833 (282)
Total Primary energy kWh/year			3817.6924 (286)
Dwelling Primary energy Rate (DPER)			54.3200 (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	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

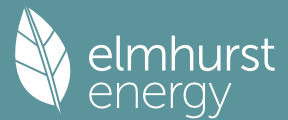
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1776 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4276	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3635 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4634	0.4543	0.4453	0.3998	0.3907	0.3453	0.3453	0.3362	0.3635	0.3907	0.4089	0.4271 (22b)
Effective ac	0.6074	0.6032	0.5991	0.5799	0.5763	0.5596	0.5596	0.5565	0.5661	0.5763	0.5836	0.5912 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8000	1.0000	1.8000		(26)

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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
East	6.9300				19.6403	0.6300		0.7000		0.7700	41.5961	(76)
West	8.8500				19.6403	0.6300		0.7000		0.7700	53.1205	(80)
Solar gains	94.7166	185.2858	305.1393	445.0275	545.3979	558.3118	531.5356	456.5812	354.8896	219.8572	118.1005	77.8903 (83)
Total gains	594.7605	695.7705	795.3024	917.7469	994.9063	988.8307	946.1579	872.3176	782.8445	665.4317	590.2611	567.9534 (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	14.8099	14.8524	14.8943	15.0942	15.1322	15.3117	15.3117	15.3454	15.2421	15.1322	15.0556	14.9762
alpha	1.9873	1.9902	1.9930	2.0063	2.0088	2.0208	2.0208	2.0230	2.0161	2.0088	2.0037	1.9984
util living area	0.8808	0.8423	0.7837	0.6838	0.5652	0.4353	0.3336	0.3698	0.5426	0.7370	0.8448	0.8890 (86)
MIT	17.8691	18.2961	18.9335	19.7204	20.3264	20.7229	20.8847	20.8542	20.5423	19.7204	18.6783	17.8053 (87)
Th 2	19.9554	19.9580	19.9607	19.9730	19.9753	19.9861	19.9861	19.9881	19.9819	19.9753	19.9706	19.9658 (88)
util rest of house	0.8689	0.8272	0.7631	0.6543	0.5242	0.3803	0.2653	0.2996	0.4870	0.7047	0.8274	0.8779 (89)
MIT 2	16.3549	16.8805	17.6617	18.6120	19.3164	19.7565	19.9128	19.8908	19.5789	18.6399	17.3693	16.2791 (90)
Living area fraction	16.9366	17.4243	18.1503	19.0378	19.7044	20.1277	20.2862	20.2609	19.9490	FLA = Living area / (4) = 19.0550	17.8722	16.8654 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9366	17.4243	18.1503	19.0378	19.7044	20.1277	20.2862	20.2609	19.9490	19.0550	17.8722	16.8654 (93)
8. Space heating requirement												
Utilisation	0.8232	0.7807	0.7201	0.6241	0.5126	0.3883	0.2862	0.3193	0.4850	0.6711	0.7824	0.8332 (94)
Useful gains	489.6195	543.1761	572.7174	572.7871	510.0072	383.9682	270.7539	278.5046	379.7095	446.5395	461.8064	473.2107 (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	1026.6282	1014.5957	941.1391	808.1094	636.4451	434.3700	289.6630	302.7254	461.7160	672.2738	860.8815	1017.5429 (97)
Space heating kWh	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (98a)
Space heating requirement - total per year (kWh/year)												2114.1997
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	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2114.1997
Space heating per m2										(98c) / (4) =		30.0825 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (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)	432.8651	343.2221	296.9727	183.5667	101.9174	0.0000	0.0000	0.0000	0.0000	181.9570	311.3045	438.7683 (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	221.2119	195.6699	208.1830	184.0178	178.9895	161.9653	160.4471	166.5062	167.9647	186.4548	197.1915	218.9468 (64)
Efficiency of water heater (217)m	85.3689	85.1339	84.6776	83.8750	82.6871	79.8000	79.8000	79.8000	79.8000	83.8261	84.9030	79.8000 (216)
Fuel for water heating, kWh/month	259.1246	229.8378	245.8536	219.3952	216.4660	202.9640	201.0615	208.6543	210.4821	222.4304	232.2551	256.3198 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.7430	16.6408	14.9832	10.9773	8.4792	6.9276	7.7350	10.0543	13.0595	17.1348	19.3537	21.3195 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-23.8981	-34.7752	-51.5799	-59.9114	-66.2696	-62.4680	-61.7054	-57.4304	-50.1667	-40.6179	-26.6564	-20.5370 (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	-10.4031	-22.1761	-44.6192	-67.8115	-90.4395	-91.1484	-90.0733	-75.9091	-55.1732	-31.9738	-13.9738	-8.2047 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2290.5739 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2704.8445 (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)	167.4077 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1157.9217 (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	4090.9045 (238)

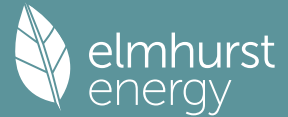
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2290.5739	0.2100	481.0205 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2704.8445	0.2100	568.0174 (264)
Space and water heating			1049.0379 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	167.4077	0.1443	24.1621 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-556.0159	0.1339	-74.4607
PV Unit electricity exported	-601.9058	0.1256	-75.5700
Total			-150.0308 (269)
Total CO2, kg/year			935.0985 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.3100 (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	2290.5739	1.1300	2588.3485 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2704.8445	1.1300	3056.4743 (278)
Space and water heating			5644.8229 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.4077	1.5338	256.7755 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-556.0159	1.4949	-831.1892
PV Unit electricity exported	-601.9058	0.4608	-277.3843
Total			-1108.5735 (283)
Total Primary energy kWh/year			4923.1257 (286)
Target Primary Energy Rate (TPER)			70.0500 (287)

Full SAP Calculation Printout



Property Reference	01113				Issued on Date	03/07/2024		
Assessment Reference	00001			Prop Type Ref				
Property	Zoar Chapel , Flat 7, South Street , Reading							
SAP Rating	80 C		DER	5.14		TER	13.31	
Environmental	96 A		% DER < TER				61.38	
CO ₂ Emissions (t/year)	0.34		DFEE	37.94		TFEE	37.94	
Compliance Check	See BREL		% DFEE < TFEE				0.01	
% DPER < TPER	22.45		DPER	54.32		TPER	70.05	
Assessor Details	Mr. Matthew Carter					Assessor ID	7869-0001	
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	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

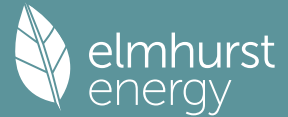
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1776 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3776 (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) = 0.3210 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4092	0.4012	0.3932	0.3531	0.3450	0.3049	0.3049	0.2969	0.3210	0.3450	0.3611	0.3771 (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	0.5837	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711 (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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Doo to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.8753		(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32a)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4331.5020 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							61.6321 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				10.3200	0.0060	0.0619	

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E3 Sill	3.4200	0.0120	0.0410
E4 Jamb	23.8000	0.0230	0.5474
E16 Corner (normal)	14.3800	0.0750	1.0785
E17 Corner (inverted - internal area greater than external area)	2.3400	-0.0450	-0.1053
E18 Party wall between dwellings	11.7000	0.2400	2.8080
E7 Party floor between dwellings (in blocks of flats)	27.0000	0.0220	0.5940
E14 Flat roof	27.4500	0.1600	4.3920
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.4176 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.2929 (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	32.5365	32.3553	32.1776	31.3432	31.1870	30.4603	30.4603	30.3257	30.7402	31.1870	31.5029	31.8331 (38)
Average = Sum(39)m / 12 =	81.8294	81.6481	81.4705	80.6360	80.4799	79.7531	79.7531	79.6185	80.0331	80.4799	80.7957	81.1259 (39)
												80.6353
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1643	1.1618	1.1592	1.1474	1.1451	1.1348	1.1348	1.1329	1.1388	1.1451	1.1496	1.1543 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2529 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919 (42b)
Hot water usage for other uses	37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020 (42c)
Average daily hot water use (litres/day)												59.1061 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	64.4844	62.7157	60.7846	58.3808	56.2365	54.0080	53.5449	55.4720	57.4486	59.7372	62.1622	64.3939 (44)
Energy content (annual)	102.1275	89.3063	93.4236	79.9204	75.7052	66.4092	64.7579	68.6860	70.8399	81.0628	88.5614	100.8252 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		981.6254
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 (46)
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 (56)
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	86.8084	75.9103	79.4101	67.9324	64.3494	56.4478	55.0442	58.3831	60.2139	68.9034	75.2772	85.7015 (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	86.8084	75.9103	79.4101	67.9324	64.3494	56.4478	55.0442	58.3831	60.2139	68.9034	75.2772	85.7015 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		834.3816 (64)
Electric shower(s)	49.6464	44.2354	48.3033	46.0953	46.9602	44.7955	46.2887	46.9602	46.0953	48.3033	47.3950	49.6464 (64a)
Heat gains from water heating, kWh/month	34.1137	30.0364	31.9283	28.5069	27.8274	25.3108	25.3332	26.3358	26.5773	29.3017	30.6681	33.8370 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												564.7250 (64a)

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	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.8429	110.5403	99.8429	103.1710	99.8429	103.1710	99.8429	99.8429	103.1710	99.8429	103.1710	99.8429 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.9497	200.0038	194.8275	183.8079	169.8975	156.8238	148.0897	146.0356	151.2119	162.2315	176.1419	189.2156 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645 (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)	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161 (71)
Water heating gains (Table 5)	45.8518	44.6971	42.9144	39.5929	37.4024	35.1539	34.0500	35.3976	36.9129	39.3840	42.5945	45.4798 (72)
Total internal gains	400.4379	412.0347	394.3784	383.3653	363.9364	351.9423	338.7762	338.0697	348.0893	358.2519	378.7009	391.3318 (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
East	8.6900	19.6403	0.6300	0.7000	0.7700	52.1602 (76)
West	11.1100	19.6403	0.6300	0.7000	0.7700	66.6858 (80)
Solar gains	118.8459	232.4879	382.8744	558.3995	684.3395	700.5433
Total gains	519.2838	644.5226	777.2528	941.7648	1048.2759	1052.4855
						1005.7219
						910.9662
						445.2988
						793.3881
						275.8664
						148.1869
						526.8878
						97.7331 (83)
						489.0650 (84)

7. Mean internal temperature (heating season)

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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	14.7037	14.7363	14.7685	14.9213	14.9503	15.0865	15.0865	15.1120	15.0337	14.9503	14.8918	14.8312
alpha	1.9802	1.9824	1.9846	1.9948	1.9967	2.0058	2.0058	2.0075	2.0022	1.9967	1.9928	1.9887
util living area	0.9033	0.8591	0.7911	0.6778	0.5500	0.4190	0.3202	0.3608	0.5416	0.7534	0.8689	0.9124 (86)
MIT	17.6395	18.1477	18.8738	19.7267	20.3506	20.7363	20.8904	20.8572	20.5356	19.6428	18.4919	17.5514 (87)
Th 2	19.9486	19.9507	19.9528	19.9623	19.9641	19.9725	19.9725	19.9741	19.9693	19.9641	19.9605	19.9567 (88)
util rest of house	0.8932	0.8451	0.7708	0.6479	0.5088	0.3644	0.2533	0.2909	0.4854	0.7219	0.8534	0.9032 (89)
MIT 2	16.8906	17.3857	18.0876	18.8984	19.4666	19.8021	19.9184	19.8999	19.6486	18.8464	17.7383	16.8095 (90)
Living area fraction									fLA = Living area / (4) =			0.3842 (91)
MIT	17.1783	17.6785	18.3897	19.2166	19.8062	20.1610	20.2918	20.2677	19.9894	19.1523	18.0278	17.0945 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1783	17.6785	18.3897	19.2166	19.8062	20.1610	20.2918	20.2677	19.9894	19.1523	18.0278	17.0945 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8579	0.8070	0.7349	0.6240	0.5022	0.3748	0.2747	0.3117	0.4866	0.6932	0.8168	0.8691 (94)
Useful gains	445.4698	520.1314	571.2351	587.6860	526.3937	394.5172	276.2602	283.9130	386.0285	439.5744	430.3510	425.0580 (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	1053.8224	1043.3372	968.6558	831.8908	652.3851	443.5051	294.4345	307.9386	471.3434	688.2895	882.9188	1046.0804 (97)
Space heating kWh	452.6143	351.5943	295.6810	175.8274	93.7376	0.0000	0.0000	0.0000	0.0000	185.0440	325.8488	462.0407 (98a)
Space heating requirement - total per year (kWh/year)												2342.3882
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	452.6143	351.5943	295.6810	175.8274	93.7376	0.0000	0.0000	0.0000	0.0000	185.0440	325.8488	462.0407 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2342.3882
Space heating per m2										(98c) / (4) =		33.3294 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	749.6795	590.1732	605.1010	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8054	0.8506	0.8226	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	603.8208	501.9745	497.7287	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1192.6004	1139.8943	1031.0787	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	423.9213	474.6123	396.8124	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	105.9803	118.6531	99.2031	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												323.8365 (107)
Energy for space heating												33.3294 (99)
Energy for space cooling												4.6078 (108)
Total												37.9372 (109)
Fabric Energy Efficiency (DFEE)												37.9 (109)

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

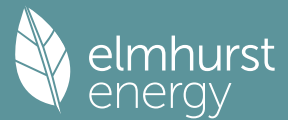
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	168.9032 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1776 (8)
Pressure test	Yes

Full SAP Calculation Printout



Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.4276 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 (20)$$
$$(21) = (18) \times (20) = 0.3635 (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4634	0.4543	0.4453	0.3998	0.3907	0.3453	0.3453	0.3362	0.3635	0.3907	0.4089	0.4271	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.6074	0.6032	0.5991	0.5799	0.5763	0.5596	0.5596	0.5565	0.5661	0.5763	0.5836	0.5912	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Opaque door			1.8000	1.0000	1.8000			(26)
TER Opening Type (Uw = 1.20)			15.7800	1.1450	18.0687			(27)
External Wall 1	84.3780	15.7800	68.5980	0.1800	12.3476			(29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1800	2.7504			(29a)
External Roof 1	42.4800		42.4800	0.1100	4.6728			(30)
Total net area of external elements Aum (A, m2)			143.9380					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	39.6395		(33)
Party Wall 1			28.1900	0.0000	0.0000			(32)

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

61.6321 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.3200	0.0500	0.5160	
E3 Sill	3.4200	0.0500	0.1710	
E4 Jamb	23.8000	0.0500	1.1900	
E16 Corner (normal)	14.3800	0.0900	1.2942	
E17 Corner (inverted - internal area greater than external area)	2.3400	-0.0900	-0.2106	
E18 Party wall between dwellings	11.7000	0.0600	0.7020	
E7 Party floor between dwellings (in blocks of flats)	27.0000	0.0700	1.8900	
E14 Flat roof	27.4500	0.0800	2.1960	

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

7.7486 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 47.3881 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	33.8544	33.6220	33.3941	32.3241	32.1239	31.1919	31.1919	31.0193	31.5509	32.1239	32.5289	32.9523	(38)
Heat transfer coeff	81.2425	81.0101	80.7823	79.7122	79.5120	78.5801	78.5801	78.4075	78.9390	79.5120	79.9170	80.3405	(39)
Average = Sum(39)m / 12 =												79.7113	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1560	1.1527	1.1494	1.1342	1.1314	1.1181	1.1181	1.1156	1.1232	1.1314	1.1371	1.1431	(40)
HLP (average)												1.1342	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2529 (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	0.0000	(42a)
Hot water usage for baths													
26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919	26.6919	(42b)
Hot water usage for other uses													
37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020	37.7020	(42c)
Average daily hot water use (litres/day)												59.1061	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.4844	62.7157	60.7846	58.3808	56.2365	54.0080	53.5449	55.4720	57.4486	59.7372	62.1622	64.3939	(44)
Energy conte	102.1275	89.3063	93.4236	79.9204	75.7052	66.4092	64.7579	68.6860	70.8399	81.0628	88.5614	100.8252	(45)
Energy content (annual)										Total = Sum(45)m =		981.6254	
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	0.0000	(46)

Water storage loss:

Total storage loss

0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)

If cylinder contains dedicated solar storage

0.0000 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 0.0000 (59)

Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)

Total heat required for water heating calculated for each month

86.8084 75.9103 79.4101 67.9324 64.3494 56.4478 55.0442 58.3831 60.2139 68.9034 75.2772 85.7015 (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 86.8084 75.9103 79.4101 67.9324 64.3494 56.4478 55.0442 58.3831 60.2139 68.9034 75.2772 85.7015 (64)

12Total per year (kWh/year) Total per year (kWh/year) = Sum(64)m = 834.3816 (64)

Electric shower(s) 49.6464 44.2354 48.3033 46.0953 46.9602 44.7955 46.2887 46.9602 46.0953 48.3033 47.3950 49.6464 (64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 564.7250 (64a)

Heat gains from water heating, kWh/month 34.1137 30.0364 31.9283 28.5069 27.8274 25.3108 25.3332 26.3358 26.5773 29.3017 30.6681 33.8370 (65)

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

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Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	112.6452	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.8313	110.5275	99.8313	103.1590	99.8313	103.1590	99.8313	99.8313	103.1590	99.8313	103.1590	99.8313	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.9497	200.0038	194.8275	183.8079	169.8975	156.8238	148.0897	146.0356	151.2119	162.2315	176.1419	189.2156	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	34.2645	(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)	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	(71)
Water heating gains (Table 5)	45.8518	44.6971	42.9144	39.5929	37.4024	35.1539	34.0500	35.3976	36.9129	39.3840	42.5945	45.4798	(72)
Total internal gains	400.4263	412.0219	394.3668	383.3534	363.9248	351.9303	338.7646	338.0581	348.0774	358.2404	378.6890	391.3203	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d			Gains W
East					6.9300	19.6403	0.6300	0.7000			0.7700			41.5961 (76)
West					8.8500	19.6403	0.6300	0.7000			0.7700			53.1205 (80)
Solar gains	94.7166	185.2858	305.1393	445.0275	545.3979	558.3118	531.5356	456.5812	354.8896	219.8572	118.1005	77.8903 (83)		
Total gains	495.1429	597.3077	699.5061	828.3808	909.3227	910.2421	870.3002	794.6393	702.9670	578.0976	496.7895	469.2106 (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	14.8099	14.8524	14.8943	15.0942	15.1322	15.3117	15.3117	15.3454	15.2421	15.1322	15.0556	14.9762		
alpha	1.9873	1.9902	1.9930	2.0063	2.0088	2.0208	2.0208	2.0230	2.0161	2.0088	2.0037	1.9984		
util living area	0.9099	0.8732	0.8166	0.7167	0.5967	0.4631	0.3578	0.3987	0.5805	0.7777	0.8790	0.9176	(86)	
MIT	17.5934	18.0532	18.7372	19.5917	20.2515	20.6885	20.8685	20.8319	20.4785	19.5651	18.4433	17.5239	(87)	
Th 2	19.9554	19.9580	19.9607	19.9730	19.9753	19.9861	19.9861	19.9881	19.9819	19.9753	19.9706	19.9658	(88)	
util rest of house	0.9004	0.8603	0.7980	0.6883	0.5558	0.4062	0.2858	0.3248	0.5244	0.7480	0.8645	0.9088	(89)	
MIT 2	16.8501	17.3000	17.9653	18.7864	19.3950	19.7815	19.9198	19.8990	19.6166	18.7851	17.6986	16.7884	(90)	
Living area fraction									fLA = Living area / (4) =			0.3842	(91)	
MIT	17.1357	17.5893	18.2619	19.0957	19.7241	20.1299	20.2842	20.2574	19.9477	19.0847	17.9847	17.0710	(92)	
Temperature adjustment												0.0000		
adjusted MIT	17.1357	17.5893	18.2619	19.0957	19.7241	20.1299	20.2842	20.2574	19.9477	19.0847	17.9847	17.0710	(93)	

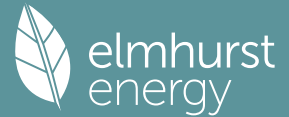
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Useful gains	0.8660	0.8229	0.7612	0.6610	0.5449	0.4147	0.3077	0.3453	0.5223	0.7177	0.8285	0.8758	(94)	
Ext temp.	428.7898	491.4988	532.4901	547.5405	495.5291	377.4594	267.8316	274.3968	367.1744	414.8786	411.6032	410.9204	(95)	
Heat loss rate W	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)	
Space heating kWh	1042.8036	1027.9636	950.1498	812.7255	638.0088	434.5415	289.5073	302.4512	461.6147	674.6396	869.8732	1034.0607	(97)	
Space heating requirement - total per year (kWh/year)	456.8263	360.5044	310.7388	190.9332	106.0049	0.0000	0.0000	0.0000	0.0000	193.2622	329.9544	463.6164	(98a)	
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	456.8263	360.5044	310.7388	190.9332	106.0049	0.0000	0.0000	0.0000	0.0000	193.2622	329.9544	463.6164	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2411.8406		
Space heating per m2										(98c) / (4) =		34.3176	(99)	

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000		
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	738.6526	581.4924	595.8968	0.0000	0.0000	0.0000	0.0000	(100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7710	0.8219	0.7926	0.0000	0.0000	0.0000	0.0000	(101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	569.5253	477.9189	472.3215	0.0000	0.0000	0.0000	0.0000	(102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1026.3547	981.6215	895.1242	0.0000	0.0000	0.0000	0.0000	(103)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	328.9172	374.7547	314.5653	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	82.2293	93.6887	78.6413	0.0000	0.0000	0.0000	0.0000	(107)	
Space cooling requirement												254.5593	(107)	
Energy for space heating												34.3176	(99)	
Energy for space cooling												3.6221	(108)	
Total												37.9397	(109)	
Fabric Energy Efficiency (TFEE)												37.9	(109)	

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Property Reference	01113	Issued on Date	03/07/2024
Assessment Reference	00001	Prop Type Ref	
Property	Zoar Chapel , Flat 7, South Street , Reading		
SAP Rating	80 C	DER	5.14
Environmental	96 A	% DER < TER	13.31
CO ₂ Emissions (t/year)	0.34	DFEE	37.94
Compliance Check	See BREL	TFEE	37.94
% DPER < TPER	22.45	% DFEE < TFEE	0.01
		DPER	54.32
		TPER	70.05
Assessor Details	Mr. Matthew Carter	Assessor ID	7869-0001
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	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1184 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3184 (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) = 0.2706 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3451	0.3383	0.3315	0.2977	0.2909	0.2571	0.2571	0.2504	0.2706	0.2909	0.3045	0.3180 (22b)
Effective ac	0.5595	0.5572	0.5550	0.5443	0.5423	0.5331	0.5331	0.5313	0.5366	0.5423	0.5464	0.5506 (25)

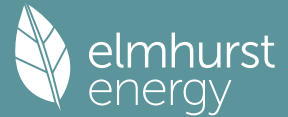
3. Heat losses and heat loss parameter

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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Doo to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	39.8753			(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32d)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)
Heat capacity Cm = Sum(A x k)			(28)...(30) + (32) + (32a)...(32e) =				4331.5020 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							61.6321 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				10.3200	0.0060	0.0619	
E3 Sill				3.4200	0.0120	0.0410	
E4 Jamb				23.8000	0.0230	0.5474	

elmhurst
energy

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.9501	14.9741	14.9977	15.1094	15.1305	15.2295	15.2295	15.2480	15.1912	15.1305	15.0879	15.0436	
alpha	1.9967	1.9983	1.9998	2.0073	2.0087	2.0153	2.0153	2.0165	2.0127	2.0087	2.0059	2.0029	
util living area	0.8719	0.8256	0.7555	0.6436	0.5184	0.4014	0.3054	0.3430	0.5166	0.7107	0.8323	0.8819 (86)	
Living	18.5762	18.9260	19.4251	19.9997	20.4207	20.6695	20.7753	20.7534	20.5353	19.9587	19.1698	18.5097	
Non living	17.1597	17.5889	18.1972	18.8850	19.3684	19.6423	19.7433	19.7277	19.5130	18.8597	17.9034	17.0806	
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	19.7606	18.9260	19.4251	19.9997	20.4207	20.6695	20.7753	20.7534	20.5353	19.9587	19.1698	18.8582 (87)	
Th 2	19.9641	19.9656	19.9671	19.9739	19.9752	19.9812	19.9812	19.9823	19.9789	19.9752	19.9726	19.9699 (88)	
util rest of house	0.8595	0.8095	0.7336	0.6131	0.4781	0.3486	0.2414	0.2762	0.4615	0.6771	0.8141	0.8703 (89)	
MIT 2	18.8343	17.5889	18.1972	18.8850	19.3684	19.6423	19.7433	19.7277	19.5130	18.8597	17.9034	17.5970 (90)	
Living area fraction									fLA = Living area / (4) =				0.3842 (91)
MIT	19.1902	18.1026	18.6689	19.3132	19.7726	20.0369	20.1398	20.1218	19.9058	19.2819	18.3899	18.0816 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.1902	18.1026	18.6689	19.3132	19.7726	20.0369	20.1398	20.1218	19.9058	19.2819	18.3899	18.0816 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8490	0.7748	0.7020	0.5917	0.4696	0.3517	0.2517	0.2857	0.4573	0.6514	0.7800	0.8443 (94)
Useful gains	528.0288	577.9990	615.0266	611.8777	533.9359	387.9201	265.2115	274.4563	386.5619	471.9442	486.2240	498.8698 (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	1198.3713	1060.8511	976.2555	829.2269	641.9445	429.5389	279.6575	293.6792	459.8367	690.3957	900.3204	1110.2527 (97)
Space heating kWh	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98a)
Space heating requirement - total per year (kWh/year)												2244.3619
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	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2244.3619
Space heating per m2										(98c) / (4) =		31.9346 (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 %)												313.9328 (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	498.7348	324.4766	268.7543	156.4914	80.3584	0.0000	0.0000	0.0000	0.0000	162.5279	298.1494	454.8689 (98)
Space heating efficiency (main heating system 1)	313.9328	313.9328	313.9328	313.9328	313.9328	0.0000	0.0000	0.0000	0.0000	313.9328	313.9328	313.9328 (210)
Space heating fuel (main heating system)	158.8667	103.3586	85.6089	49.8487	25.5973	0.0000	0.0000	0.0000	0.0000	51.7716	94.9724	144.8937 (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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)
Efficiency of water heater	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532 (216)
Fuel for water heating, kWh/month	158.6684	140.7509	150.3659	133.9228	131.0495	102.6142	101.3239	105.2157	106.2374	135.6341	142.3717	157.1368 (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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												714.9179 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												182.1532
Water heating fuel used												1565.2912 (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)												199.8805 (232)

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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	2480.0896 (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	714.9179	0.1553	111.0375 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1565.2912	0.1416	221.7020 (264)
Space and water heating			332.7395 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	199.8805	0.1443	28.8489 (268)
Total CO2, kg/year			361.5884 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1400 (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	714.9179	1.5750	1125.9622 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1565.2912	1.5238	2385.1469 (278)
Space and water heating			3511.1090 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	199.8805	1.5338	306.5833 (282)
Total Primary energy kWh/year			3817.6924 (286)
Dwelling Primary energy Rate (DPER)			54.3200 (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	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

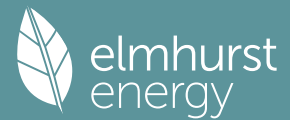
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1776 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4276	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3635 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4634	0.4543	0.4453	0.3998	0.3907	0.3453	0.3453	0.3362	0.3635	0.3907	0.4089	0.4271 (22b)
Effective ac	0.6074	0.6032	0.5991	0.5799	0.5763	0.5596	0.5596	0.5565	0.5661	0.5763	0.5836	0.5912 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
TER Opaque door			1.8000	1.0000	1.8000		(26)

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[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
East	6.9300				19.6403	0.6300		0.7000		0.7700	41.5961	(76)
West	8.8500				19.6403	0.6300		0.7000		0.7700	53.1205	(80)
Solar gains	94.7166	185.2858	305.1393	445.0275	545.3979	558.3118	531.5356	456.5812	354.8896	219.8572	118.1005	77.8903 (83)
Total gains	594.7605	695.7705	795.3024	917.7469	994.9063	988.8307	946.1579	872.3176	782.8445	665.4317	590.2611	567.9534 (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	14.8099	14.8524	14.8943	15.0942	15.1322	15.3117	15.3117	15.3454	15.2421	15.1322	15.0556	14.9762
alpha	1.9873	1.9902	1.9930	2.0063	2.0088	2.0208	2.0208	2.0230	2.0161	2.0088	2.0037	1.9984
util living area	0.8808	0.8423	0.7837	0.6838	0.5652	0.4353	0.3336	0.3698	0.5426	0.7370	0.8448	0.8890 (86)
MIT	17.8691	18.2961	18.9335	19.7204	20.3264	20.7229	20.8847	20.8542	20.5423	19.7204	18.6783	17.8053 (87)
Th 2	19.9554	19.9580	19.9607	19.9730	19.9753	19.9861	19.9861	19.9881	19.9819	19.9753	19.9706	19.9658 (88)
util rest of house	0.8689	0.8272	0.7631	0.6543	0.5242	0.3803	0.2653	0.2996	0.4870	0.7047	0.8274	0.8779 (89)
MIT 2	16.3549	16.8805	17.6617	18.6120	19.3164	19.7565	19.9128	19.8908	19.5789	18.6399	17.3693	16.2791 (90)
Living area fraction	16.9366	17.4243	18.1503	19.0378	19.7044	20.1277	20.2862	20.2609	19.9490	FLA = Living area / (4) = 19.0550	17.8722	16.8654 (92)
Temperature adjustment												0.0000
adjusted MIT	16.9366	17.4243	18.1503	19.0378	19.7044	20.1277	20.2862	20.2609	19.9490	19.0550	17.8722	16.8654 (93)
8. Space heating requirement												
Utilisation	0.8232	0.7807	0.7201	0.6241	0.5126	0.3883	0.2862	0.3193	0.4850	0.6711	0.7824	0.8332 (94)
Useful gains	489.6195	543.1761	572.7174	572.7871	510.0072	383.9682	270.7539	278.5046	379.7095	446.5395	461.8064	473.2107 (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	1026.6282	1014.5957	941.1391	808.1094	636.4451	434.3700	289.6630	302.7254	461.7160	672.2738	860.8815	1017.5429 (97)
Space heating kWh	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (98a)
Space heating requirement - total per year (kWh/year)												2114.1997
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	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2114.1997
Space heating per m2										(98c) / (4) =		30.0825 (99)
9a. Energy requirements - Individual heating systems, including micro-CHP												
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	399.5345	316.7940	274.1058	169.4321	94.0698	0.0000	0.0000	0.0000	0.0000	167.9463	287.3341	404.9832 (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)	432.8651	343.2221	296.9727	183.5667	101.9174	0.0000	0.0000	0.0000	0.0000	181.9570	311.3045	438.7683 (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	221.2119	195.6699	208.1830	184.0178	178.9895	161.9653	160.4471	166.5062	167.9647	186.4548	197.1915	218.9468 (64)
Efficiency of water heater (217)m	85.3689	85.1339	84.6776	83.8750	82.6871	79.8000	79.8000	79.8000	79.8000	83.8261	84.9030	79.8000 (216)
Fuel for water heating, kWh/month	259.1246	229.8378	245.8536	219.3952	216.4660	202.9640	201.0615	208.6543	210.4821	222.4304	232.2551	256.3198 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.7430	16.6408	14.9832	10.9773	8.4792	6.9276	7.7350	10.0543	13.0595	17.1348	19.3537	21.3195 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-23.8981	-34.7752	-51.5799	-59.9114	-66.2696	-62.4680	-61.7054	-57.4304	-50.1667	-40.6179	-26.6564	-20.5370 (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	-10.4031	-22.1761	-44.6192	-67.8115	-90.4395	-91.1484	-90.0733	-75.9091	-55.1732	-31.9738	-13.9738	-8.2047 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												2290.5739 (211)
Space heating fuel - main system 2												0.0000 (213)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	2704.8445 (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)	167.4077 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1157.9217 (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	4090.9045 (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	2290.5739	0.2100	481.0205 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2704.8445	0.2100	568.0174 (264)
Space and water heating			1049.0379 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	167.4077	0.1443	24.1621 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-556.0159	0.1339	-74.4607
PV Unit electricity exported	-601.9058	0.1256	-75.5700
Total			-150.0308 (269)
Total CO2, kg/year			935.0985 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.3100 (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	2290.5739	1.1300	2588.3485 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2704.8445	1.1300	3056.4743 (278)
Space and water heating			5644.8229 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	167.4077	1.5338	256.7755 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-556.0159	1.4949	-831.1892
PV Unit electricity exported	-601.9058	0.4608	-277.3843
Total			-1108.5735 (283)
Total Primary energy kWh/year			4923.1257 (286)
Target Primary Energy Rate (TPER)			70.0500 (287)

Full SAP Calculation Printout



Property Reference	01113	Issued on Date	03/07/2024
Assessment Reference	00001	Prop Type Ref	
Property	Zoar Chapel , Flat 7, South Street , Reading		
SAP Rating	80 C	DER	5.14
Environmental	96 A	% DER < TER	13.31
CO ₂ Emissions (t/year)	0.34	DFEE	37.94
Compliance Check	See BREL	TFEE	37.94
% DPER < TPER	22.45	% DFEE < TFEE	0.01
		TPER	70.05
Assessor Details	Mr. Matthew Carter	Assessor ID	7869-0001
Client			

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

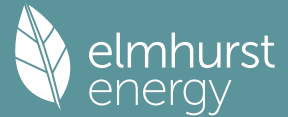
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) = 0.1184 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3184 (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) = 0.2706 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3451	0.3383	0.3315	0.2977	0.2909	0.2571	0.2571	0.2504	0.2706	0.2909	0.3045	0.3180 (22b)
Effective ac	0.5595	0.5572	0.5550	0.5443	0.5423	0.5331	0.5331	0.5313	0.5366	0.5423	0.5464	0.5506 (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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Doo to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.8753		(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32d)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4331.5020 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							61.6321 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				10.3200	0.0060	0.0619	
E3 Sill				3.4200	0.0120	0.0410	
E4 Jamb				23.8000	0.0230	0.5474	

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E16 Corner (normal)	14.3800	0.0750	1.0785
E17 Corner (inverted - internal area greater than external area)	2.3400	-0.0450	-0.1053
E18 Party wall between dwellings	11.7000	0.2400	2.8080
E7 Party floor between dwellings (in blocks of flats)	27.0000	0.0220	0.5940
E14 Flat roof	27.4500	0.1600	4.3920
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.4176 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.2929 (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	31.1876	31.0588	30.9325	30.3392	30.2282	29.7114	29.7114	29.6157	29.9105	30.2282	30.4527	30.6875	(38)
Average = Sum(39)m / 12 =	80.4805	80.3516	80.2253	79.6320	79.5210	79.0043	79.0043	78.9086	79.2033	79.5210	79.7456	79.9803	(39)
												79.6315	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1451	1.1433	1.1415	1.1331	1.1315	1.1241	1.1241	1.1228	1.1270	1.1315	1.1347	1.1380	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

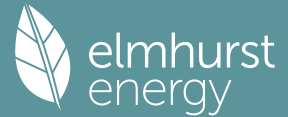
4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.2529 (42)
Hot water usage for mixer showers													
	61.9934	61.0618	59.7042	57.1067	55.1898	53.0521	51.8371	53.1844	54.6613	56.9565	59.6098	61.7559	(42a)
Hot water usage for baths													
	26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919	(42b)
Hot water usage for other uses													
	37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020	(42c)
Average daily hot water use (litres/day)													116.2619 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	126.4778	123.7775	120.4888	115.4875	111.4263	107.0602	105.3819	108.6564	112.1099	116.6937	121.7720	126.1498	(44)
Energy conte	200.3100	176.2575	185.1868	158.0967	150.0013	131.6430	127.4503	134.5394	138.2428	158.3522	173.4865	197.5201	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
	30.0465	26.4386	27.7780	23.7145	22.5002	19.7464	19.1175	20.1809	20.7364	23.7528	26.0230	29.6280	(46)
Water storage loss:													
Store volume													180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.4000 (48)
Temperature factor from Table 2b													0.7800 (49)
Enter (49) or (54) in (55)													1.0920 (55)
Total storage loss													
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520	(56)
If cylinder contains dedicated solar storage													
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520	(57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576	(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													
	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297	(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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297	(64)
													2851.2280 (64)
Electric shower(s)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
	110.4892	98.2446	105.4607	95.0375	93.7615	61.7809	60.9872	63.3443	63.9753	96.5382	100.1547	109.5615	(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	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	28.2951	25.1315	20.4383	15.4731	11.5663	9.7648	10.5512	13.7148	18.4080	23.3732	27.2800	29.0816	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	295.4473	298.5131	290.7873	274.3401	253.5784	234.0654	221.0295	217.9636	225.6894	242.1366	262.8983	282.4114	(68)
Pumps, fans	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	(69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	(71)
Total internal gains	148.5069	146.1974	141.7482	131.9966	126.0235	85.8068	81.9720	85.1401	88.8546	129.7556	139.1037	147.2601	(72)
	568.0778	565.6704	548.8023	517.6382	486.9967	425.4653	409.3810	412.6470	428.7804	491.0939	525.1104	554.5814	(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								
East	8.6900	19.6403	0.6300	0.7000	0.7700	52.1602	(76)						
West	11.1100	19.6403	0.6300	0.7000	0.7700	66.6858	(80)						
Solar gains	118.8459	232.4879	382.8744	558.3995	684.3395	700.5433	666.9458	572.8965	445.2988	275.8664	148.1869	97.7331	(83)
Total gains	686.9237	798.1582	931.6767	1076.0377	1171.3362	1126.0086	1076.3268	985.5436	874.0792	766.9603	673.2973	652.3145	(84)

7. Mean internal temperature (heating season)

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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	14.9501	14.9741	14.9977	15.1094	15.1305	15.2295	15.2295	15.2480	15.1912	15.1305	15.0879	15.0436	
alpha	1.9967	1.9983	1.9998	2.0073	2.0087	2.0153	2.0153	2.0165	2.0127	2.0087	2.0059	2.0029	
util living area	0.8522	0.8092	0.7373	0.6300	0.5080	0.3949	0.2998	0.3357	0.5050	0.6925	0.8140	0.8634 (86)	
Living	18.6984	19.0110	19.4962	20.0348	20.4369	20.6749	20.7779	20.7572	20.5487	20.0049	19.2529	18.6295	
Non living	17.3085	17.6911	18.2804	18.9241	19.3849	19.6470	19.7450	19.7303	19.5255	18.9110	18.0026	17.2270	
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	19.8231	19.0110	19.4962	20.0348	20.4369	20.6749	20.7779	20.7572	20.5487	20.0049	19.2529	18.9613 (87)	
Th 2	19.9641	19.9656	19.9671	19.9739	19.9752	19.9812	19.9812	19.9823	19.9789	19.9752	19.9726	19.9699 (88)	
util rest of house	0.8384	0.7922	0.7146	0.5993	0.4679	0.3427	0.2368	0.2699	0.4503	0.6581	0.7945	0.8505 (89)	
MIT 2	18.8943	17.6911	18.2804	18.9241	19.3849	19.6470	19.7450	19.7303	19.5255	18.9110	18.0026	17.7173 (90)	
Living area fraction									fLA = Living area / (4) =				0.3842 (91)
MIT	19.2511	18.1982	18.7475	19.3508	19.7890	20.0419	20.1418	20.1249	19.9186	19.3313	18.4830	18.1952 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.2511	18.1982	18.7475	19.3508	19.7890	20.0419	20.1418	20.1249	19.9186	19.3313	18.4830	18.1952 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8278	0.7577	0.6842	0.5790	0.4602	0.3459	0.2470	0.2795	0.4468	0.6339	0.7607	0.8237 (94)
Useful gains	568.6268	604.7785	637.4615	623.0449	539.0853	389.5358	265.8662	275.4605	390.5612	486.1887	512.1514	537.2988 (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	1203.2743	1068.5291	982.5596	832.2184	643.2492	429.9311	279.8160	293.9234	460.8527	694.3204	907.7403	1119.3389 (97)
Space heating kWh	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98a)
Space heating requirement - total per year (kWh/year)												2141.3860
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	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2141.3860
Space heating per m2										(98c) / (4) =		30.4694 (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 %)													313.9328 (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	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98)	
Space heating efficiency (main heating system 1)	313.9328	313.9328	313.9328	313.9328	313.9328	0.0000	0.0000	0.0000	0.0000	313.9328	313.9328	313.9328 (210)	
Space heating fuel (main heating system)	150.4073	99.2698	81.7860	47.9736	24.6862	0.0000	0.0000	0.0000	0.0000	49.3259	90.7277	137.9396 (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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)	
Efficiency of water heater	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532 (216)	
Fuel for water heating, kWh/month	158.6684	140.7509	150.3659	133.9228	131.0495	102.6142	101.3239	105.2157	106.2374	135.6341	142.3717	157.1368 (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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)	
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)	
Annual totals kWh/year													
Space heating fuel - main system 1													682.1160 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													182.1532
Water heating fuel used													1565.2912 (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)													199.8805 (232)

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

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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	2447.2877	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	682.1160	16.4900	112.4809 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1565.2912	16.4900	258.1165 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	199.8805	16.4900	32.9603 (250)
Additional standing charges			0.0000 (251)
Total energy cost			403.5577 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	1.2602 (257)
SAP value		79.5715
SAP rating (Section 12)		80 (258)
SAP band		C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	682.1160	0.1553	105.9240 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1565.2912	0.1416	221.7020 (264)
Space and water heating			327.6260 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	199.8805	0.1443	28.8489 (268)
Total CO2, kg/year			356.4749 (272)
CO2 emissions per m2			5.0700 (273)
EI value			95.8564
EI rating			96 (274)
EI band			A

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

1. Overall dwelling characteristics

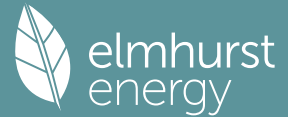
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	168.9032 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1184 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3184 (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) = 0.2706 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	4.2000	4.0000	4.0000	3.7000	3.7000	3.3000	3.4000	3.2000	3.3000	3.5000	3.5000	3.8000 (22)

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Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500 (22a)
Adj infilt rate												
Effective ac	0.2842	0.2706	0.2706	0.2504	0.2504	0.2233	0.2301	0.2165	0.2233	0.2368	0.2368	0.2571 (22b)
	0.5404	0.5366	0.5366	0.5313	0.5313	0.5249	0.5265	0.5234	0.5249	0.5280	0.5280	0.5331 (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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Doo to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.8753		(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32d)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 4331.5020 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 61.6321 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	10.3200	0.0060	0.0619
E3 Sill	3.4200	0.0120	0.0410
E4 Jamb	23.8000	0.0230	0.5474
E16 Corner (normal)	14.3800	0.0750	1.0785
E17 Corner (inverted - internal area greater than external area)	2.3400	-0.0450	-0.1053
E18 Party wall between dwellings	11.7000	0.2400	2.8080
E7 Party floor between dwellings (in blocks of flats)	27.0000	0.0220	0.5940
E14 Flat roof	27.4500	0.1600	4.3920

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.4176 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.2929 (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	30.1197	29.9105	29.9105	29.6157	29.6157	29.2585	29.3440	29.1755	29.2585	29.4320	29.4320	29.7114 (38)
Heat transfer coeff	79.4126	79.2033	79.2033	78.9086	78.9086	78.5513	78.6368	78.4684	78.5513	78.7249	78.7249	79.0043 (39)
Average = Sum(39)m / 12 =												78.8582

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1299	1.1270	1.1270	1.1228	1.1228	1.1177	1.1189	1.1165	1.1177	1.1202	1.1202	1.1241 (40)
HLP (average)												1.1221
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2529 (42)
Hot water usage for mixer showers												
61.9934	61.0618	59.7042	57.1067	55.1898	53.0521	51.8371	53.1844	54.6613	56.9565	59.6098	61.7559	(42a)
Hot water usage for baths												
26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919	(42b)
Hot water usage for other uses												
37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020	(42c)
Average daily hot water use (litres/day)												116.2619 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.4778	123.7775	120.4888	115.4875	111.4263	107.0602	105.3819	108.6564	112.1099	116.6937	121.7720	126.1498 (44)
Energy conte	200.3100	176.2575	185.1868	158.0967	150.0013	131.6430	127.4503	134.5394	138.2428	158.3522	173.4865	197.5201 (45)
Energy content (annual)										Total = Sum(45)m =		1931.0864
Distribution loss (46)m = 0.15 x (45)m	30.0465	26.4386	27.7780	23.7145	22.5002	19.7464	19.1175	20.1809	20.7364	23.7528	26.0230	29.6280 (46)

Water storage loss: 180.0000 (47)

Store volume 1.4000 (48)

a) If manufacturer declared loss factor is known (kWh/day): 0.7800 (49)

Enter (49) or (54) in (55) 1.0920 (55)

Total storage loss

33.8520 30.5760 33.8520 32.7600 33.8520 32.7600 33.8520 33.8520 32.7600 33.8520 32.7600 33.8520 (56)

If cylinder contains dedicated solar storage

33.8520 30.5760 33.8520 32.7600 33.8520 32.7600 33.8520 33.8520 32.7600 33.8520 32.7600 33.8520 (57)

Primary loss 54.8576 49.5488 54.8576 53.0880 54.8576 22.5120 23.2624 23.2624 22.5120 54.8576 53.0880 54.8576 (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

289.0196 256.3823 273.8964 243.9447 238.7109 186.9150 184.5647 191.6538 193.5148 247.0618 259.3345 286.2297 (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 289.0196 256.3823 273.8964 243.9447 238.7109 186.9150 184.5647 191.6538 193.5148 247.0618 259.3345 286.2297 (64)

Total per year (kWh/year) = Sum(64)m = 2851.2280 (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)

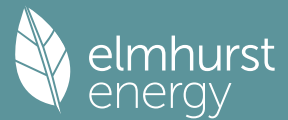
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

Heat gains from water heating, kWh/month 110.4892 98.2446 105.4607 95.0375 93.7615 61.7809 60.9872 63.3443 63.9753 96.5382 100.1547 109.5615 (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	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	28.2951	25.1315	20.4383	15.4731	11.5663	9.7648	10.5512	13.7148	18.4080	23.3732	27.2800	29.0816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	295.4473	298.5131	290.7873	274.3401	253.5784	234.0654	221.0295	217.9636	225.6894	242.1366	262.8983	282.4114 (68)
Pumps, fans	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703 (69)
Losses e.g. evaporation	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)
Water heating gains (Table 5)	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161 (71)
Total internal gains	148.5069	146.1974	141.7482	131.9966	126.0235	85.8068	81.9720	85.1401	88.8546	129.7556	139.1037	147.2601 (72)
	568.0778	565.6704	548.8023	517.6382	486.9967	425.4653	409.3810	412.6470	428.7804	491.0939	525.1104	554.5814 (73)

6. Solar gains

[Jan]												
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W
East					8.6900	22.3313	0.6300	0.7000	0.7700			59.3070 (76)
West					11.1100	22.3313	0.6300	0.7000	0.7700			75.8229 (80)
Solar gains	135.1299	237.7806	386.1136	578.6736	689.5141	754.7993	711.0514	625.5566	486.2221	301.0935	172.6118	110.0460 (83)
Total gains	703.2076	803.4509	934.9159	1096.3118	1176.5107	1180.2646	1120.4324	1038.2037	915.0026	792.1874	697.7223	664.6274 (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	15.1512	15.1912	15.1912	15.2480	15.2480	15.3173	15.3007	15.3335	15.3173	15.2835	15.2835	15.2295
alpha	2.0101	2.0127	2.0127	2.0165	2.0165	2.0212	2.0200	2.0222	2.0212	2.0189	2.0189	2.0153
util living area	0.8351	0.7942	0.7141	0.5913	0.4529	0.3079	0.2097	0.2313	0.4284	0.6457	0.7858	0.8470 (86)
Living	18.9214	19.1869	19.6787	20.1975	20.5676	20.7653	20.8242	20.8184	20.6671	20.1945	19.4872	18.8656
Non living	17.5909	17.9149	18.5089	19.1198	19.5339	19.7368	19.7837	19.7826	19.6517	19.1379	18.2954	17.5260
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	19.9370	19.1869	19.6787	20.1975	20.5676	20.7653	20.8242	20.8184	20.6671	20.1945	19.4872	19.1643 (87)
Th 2	19.9765	19.9789	19.9789	19.9823	19.9823	19.9864	19.9854	19.9874	19.9864	19.9844	19.9844	19.9812 (88)
util rest of house	0.8195	0.7756	0.6891	0.5575	0.4083	0.2517	0.1438	0.1617	0.3679	0.6062	0.7631	0.8322 (89)
MIT 2	19.0160	17.9149	18.5089	19.1198	19.5339	19.7368	19.7837	19.7826	19.6517	19.1379	18.2954	17.9651 (90)
Living area fraction	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (91)
MIT	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (92)
Temperature adjustment	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (93)
adjusted MIT	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8092	0.7421	0.6610	0.5414	0.4059	0.2600	0.1569	0.1753	0.3713	0.5873	0.7309	0.8055 (94)
Ext temp.	569.0420	596.2699	618.0048	593.5967	477.5912	306.8966	175.8166	181.9952	339.7793	465.2499	509.9649	535.3543 (95)
Heat loss rate W	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	18.0000	15.2000	11.6000	8.0000	5.1000 (96)
Space heating kWh	1133.2046	1014.0854	915.4580	760.1900	546.9195	324.5702	179.5649	186.7955	380.3283	625.3782	846.5520	1052.7938 (97)
Space heating requirement - total per year (kWh/year)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98a)
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)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98c)
Space heating per m ²	(98c) / (4) = 26.1781 (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 %)	314.3555 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98)
Space heating fuel (main heating system)	314.3555	314.3555	314.3555	314.3555	314.3555	0.0000	0.0000	0.0000	0.0000	314.3555	314.3555	314.3555 (210)
Space heating efficiency (main heating system 2)	133.5231	89.3167	70.3997	38.1566	16.4083	0.0000	0.0000	0.0000	0.0000	37.8983	77.0919	122.4649 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)
Efficiency of water heater (217)m	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290 (216)
Fuel for water heating, kWh/month	158.6024	140.6923	150.3034	133.8671	130.9950	102.5715	101.2817	105.1719	106.1932	135.5777	142.3124	157.0714 (219)
Space cooling fuel requirement												

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(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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												585.2594	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												182.2290	
Water heating fuel used												1564.6399	(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)												199.8805	(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												2349.7798	(238)

10a. Fuel costs - using BEDF prices (550)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	585.2594	26.0600	152.5186	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1564.6399	26.0600	407.7452	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	199.8805	26.0600	52.0889	(250)
Additional standing charges			0.0000	(251)
Total energy cost			612.3526	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	585.2594	0.1558	91.2052	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1564.6399	0.1416	221.6097	(264)
Space and water heating			312.8149	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	199.8805	0.1443	28.8489	(268)
Total CO2, kg/year			341.6639	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	585.2594	1.5769	922.8928	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1564.6399	1.5238	2384.1543	(278)
Space and water heating			3307.0471	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	199.8805	1.5338	306.5833	(282)
Total Primary energy kWh/year			3613.6304	(286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating: C 80
Current environmental impact rating: A 96

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

Recommended measures: SAP change Cost change CO2 change
(none)

Typical annual savings Energy Environmental
efficiency impact

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Recommended measures
(none)

Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 80
Potential environmental impact rating: A 96

Fuel prices for cost data on this page from database revision number 550 TEST (28 Jun 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

Electricity	Current £612	Potential £612	Saving £0
Space heating	£153	£153	£0
Water heating	£408	£408	£0
Lighting	£52	£52	£0
Total cost of fuels	£612	£612	£0
Total cost of uses	£613	£613	£0
Delivered energy	33 kWh/m ²	33 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m ²	5 kg/m ²	5 kg/m ²	0 kg/m ²
Primary energy	51 kWh/m ²	51 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 168.9032 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (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) =	20.0000 / (5) =	0.1184 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.3184	(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) =		0.2706 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3451	0.3383	0.3315	0.2977	0.2909	0.2571	0.2571	0.2504	0.2706	0.2909	0.3045	0.3180 (22b)
Effective ac	0.5595	0.5572	0.5550	0.5443	0.5423	0.5331	0.5331	0.5313	0.5366	0.5423	0.5464	0.5506 (25)

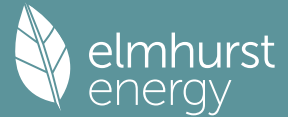
3. Heat losses and heat loss parameter

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
Windows (Uw = 1.00)			19.8000	0.9615	19.0385		(27)
Door to Hall			1.8000	1.4000	2.5200		(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920 (29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200 (29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200 (30)
Total net area of external elements Aum(A, m ²)			143.9380				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		39.8753		(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000 (32)
Party Floor 1			42.4800			40.0000	1699.2000 (32d)
Internal Wall 1			35.3300			9.0000	317.9700 (32c)
Internal Ceiling 1			27.8000			9.0000	250.2000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	4331.5020 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		61.6321 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	10.3200	0.0060	0.0619
E2 Other lintels (including other steel lintels)			

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E3 Sill						3.4200	0.0120	0.0410				
E4 Jamb						23.8000	0.0230	0.5474				
E16 Corner (normal)						14.3800	0.0750	1.0785				
E17 Corner (inverted - internal area greater than external area)						2.3400	-0.0450	-0.1053				
E18 Party wall between dwellings						11.7000	0.2400	2.8080				
E7 Party floor between dwellings (in blocks of flats)						27.0000	0.0220	0.5940				
E14 Flat roof						27.4500	0.1600	4.3920				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)											9.4176	(36)
Point Thermal bridges											0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	49.2929 (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	31.1876	31.0588	30.9325	30.3392	30.2282	29.7114	29.7114	29.6157	29.9105	30.2282	30.4527	30.6875 (38)
Average = Sum(39)m / 12 =	80.4805	80.3516	80.2253	79.6320	79.5210	79.0043	79.0043	78.9086	79.2033	79.5210	79.7456	79.9803 (39)
												79.6315
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1451	1.1433	1.1415	1.1331	1.1315	1.1241	1.1241	1.1228	1.1270	1.1315	1.1347	1.1380 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												1.1331
												31

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.2529 (42)
Hot water usage for mixer showers												
	61.9934	61.0618	59.7042	57.1067	55.1898	53.0521	51.8371	53.1844	54.6613	56.9565	59.6098	61.7559 (42a)
Hot water usage for baths												
	26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919 (42b)
Hot water usage for other uses												
	37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020 (42c)
Average daily hot water use (litres/day)												116.2619 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	126.4778	123.7775	120.4888	115.4875	111.4263	107.0602	105.3819	108.6564	112.1099	116.6937	121.7720	126.1498 (44)
Energy conte	200.3100	176.2575	185.1868	158.0967	150.0013	131.6430	127.4503	134.5394	138.2428	158.3522	173.4865	197.5201 (45)
Energy content (annual)										Total = Sum(45)m =		1931.0864
Distribution loss (46)m = 0.15 x (45)m												
	30.0465	26.4386	27.7780	23.7145	22.5002	19.7464	19.1175	20.1809	20.7364	23.7528	26.0230	29.6280 (46)
Water storage loss:												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.0920 (55)
Total storage loss												
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520 (56)
If cylinder contains dedicated solar storage												
	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (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												
	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (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												
	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (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												
	110.4892	98.2446	105.4607	95.0375	93.7615	61.7809	60.9872	63.3443	63.9753	96.5382	100.1547	109.5615 (65)

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

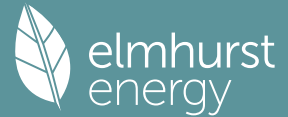
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742	135.1742 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	28.2951	25.1315	20.4383	15.4731	11.5663	9.7648	10.5512	13.7148	18.4080	23.3732	27.2800	29.0816 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	295.4473	298.5131	290.7873	274.3401	253.5784	234.0654	221.0295	217.9636	225.6894	242.1366	262.8983	282.4114 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703 (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)												
	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161 (71)
Water heating gains (Table 5)												
	148.5069	146.1974	141.7482	131.9966	126.0235	85.8068	81.9720	85.1401	88.8546	129.7556	139.1037	147.2601 (72)
Total internal gains												
	568.0778	565.6704	548.8023	517.6382	486.9967	425.4653	409.3810	412.6470	428.7804	491.0939	525.1104	554.5814 (73)

6. Solar gains												

[Jan]												
				Area		Solar flux	g	FF		Access		Gains
				m2		Table 6a	or Table 6b	Specific data		factor		W
						W/m2		or Table 6c		Table 6d		
East				8.6900		19.6403	0.6300	0.7000		0.7700		52.1602 (76)
West				11.1100		19.6403	0.6300	0.7000		0.7700		66.6858 (80)

Solar gains	118.8459	232.4879	382.8744	558.3995	684.3395	700.5433	666.9458	572.8965	445.2988	275.8664	148.1869	97.7331 (83)
Total gains	686.9237	798.1582	931.6767	1076.0377	1171.3362	1126.0086	1076.3268	985.5436	874.0792	766.9603	673.2973	652.3145 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	14.9501	14.9741	14.9977	15.1094	15.1305	15.2295	15.2295	15.2480	15.1912	15.1305	15.0879	15.0436
alpha	1.9967	1.9983	1.9998	2.0073	2.0087	2.0153	2.0153	2.0165	2.0127	2.0087	2.0059	2.0029
util living area	0.8522	0.8092	0.7373	0.6300	0.5080	0.3949	0.2998	0.3357	0.5050	0.6925	0.8140	0.8634 (86)
Living	18.6984	19.0110	19.4962	20.0348	20.4369	20.6749	20.7779	20.7572	20.5487	20.0049	19.2529	18.6295
Non living	17.3085	17.6911	18.2804	18.9241	19.3849	19.6470	19.7450	19.7303	19.5255	18.9110	18.0026	17.2270
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	19.8231	19.0110	19.4962	20.0348	20.4369	20.6749	20.7779	20.7572	20.5487	20.0049	19.2529	18.9613 (87)
Th 2	19.9641	19.9656	19.9671	19.9739	19.9752	19.9812	19.9812	19.9823	19.9789	19.9752	19.9726	19.9699 (88)
util rest of house	0.8384	0.7922	0.7146	0.5993	0.4679	0.3427	0.2368	0.2699	0.4503	0.6581	0.7945	0.8505 (89)
MIT 2	18.8943	17.6911	18.2804	18.9241	19.3849	19.6470	19.7450	19.7303	19.5255	18.9110	18.0026	17.7173 (90)
Living area fraction									FLA = Living area / (4) =			0.3842 (91)
MIT	19.2511	18.1982	18.7475	19.3508	19.7890	20.0419	20.1418	20.1249	19.9186	19.3313	18.4830	18.1952 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2511	18.1982	18.7475	19.3508	19.7890	20.0419	20.1418	20.1249	19.9186	19.3313	18.4830	18.1952 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8278	0.7577	0.6842	0.5790	0.4602	0.3459	0.2470	0.2795	0.4468	0.6339	0.7607	0.8237 (94)
Useful gains	568.6268	604.7785	637.4615	623.0449	539.0853	389.5358	265.8662	275.4605	390.5612	486.1887	512.1514	537.2988 (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	1203.2743	1068.5291	982.5596	832.2184	643.2492	429.9311	279.8160	293.9234	460.8527	694.3204	907.7403	1119.3389 (97)
Space heating kWh	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98a)
Space heating requirement - total per year (kWh/year)												2141.3860
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	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2141.3860
Space heating per m2										(98c) / (4) =		30.4694 (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 %)												313.9328 (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	472.1778	311.6404	256.7530	150.6049	77.4980	0.0000	0.0000	0.0000	0.0000	154.8501	284.8240	433.0378 (98)
Space heating efficiency (main heating system 1)	313.9328	313.9328	313.9328	313.9328	313.9328	0.0000	0.0000	0.0000	0.0000	313.9328	313.9328	313.9328 (210)
Space heating fuel (main heating system)	150.4073	99.2698	81.7860	47.9736	24.6862	0.0000	0.0000	0.0000	0.0000	49.3259	90.7277	137.9396 (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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)
Efficiency of water heater	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532	182.1532 (216)
Fuel for water heating, kWh/month	158.6684	140.7509	150.3659	133.9228	131.0495	102.6142	101.3239	105.2157	106.2374	135.6341	142.3717	157.1368 (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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)												
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												682.1160 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												182.1532
Water heating fuel used												1565.2912 (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)												199.8805 (232)

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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	2447.2877 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	682.1160	16.4900	112.4809 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1565.2912	16.4900	258.1165 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	199.8805	16.4900	32.9603 (250)
Additional standing charges			0.0000 (251)
Total energy cost			403.5577 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.2602 (257)
SAP value	79.5715
SAP rating (Section 12)	80 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	682.1160	0.1553	105.9240 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1565.2912	0.1416	221.7020 (264)
Space and water heating			327.6260 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	199.8805	0.1443	28.8489 (268)
Total CO2, kg/year			356.4749 (272)
CO2 emissions per m2			5.0700 (273)
EI value			95.8564
EI rating			96 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	42.4800 (1b)	x 2.3400 (2b)	= 99.4032 (1b) - (3b)
First floor	27.8000 (1c)	x 2.5000 (2c)	= 69.5000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.2800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	168.9032 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1184 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3184 (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) = 0.2706 (21)

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Wind speed	Jan 4.2000	Feb 4.0000	Mar 4.0000	Apr 3.7000	May 3.7000	Jun 3.3000	Jul 3.4000	Aug 3.2000	Sep 3.3000	Oct 3.5000	Nov 3.5000	Dec 3.8000	(22)
Wind factor	1.0500	1.0000	1.0000	0.9250	0.9250	0.8250	0.8500	0.8000	0.8250	0.8750	0.8750	0.9500	(22a)
Adj infilt rate													
Effective ac	0.2842	0.2706	0.2706	0.2504	0.2504	0.2233	0.2301	0.2165	0.2233	0.2368	0.2368	0.2571	(22b)
	0.5404	0.5366	0.5366	0.5313	0.5313	0.5249	0.5265	0.5234	0.5249	0.5280	0.5280	0.5331	(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	
Windows (Uw = 1.00)			19.8000	0.9615	19.0385			(27)
Doo to Hall			1.8000	1.4000	2.5200			(26)
External Wall 1	84.3780	19.8000	64.5780	0.1800	11.6240	14.0000	904.0920	(29a)
Wall to Stairs	17.0800	1.8000	15.2800	0.1600	2.4448	14.0000	213.9200	(29a)
External Roof 1	42.4800		42.4800	0.1000	4.2480	9.0000	382.3200	(30)
Total net area of external elements Aum(A, m ²)			143.9380					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	39.8753			(33)
Party Wall 1			28.1900	0.0000	0.0000	20.0000	563.8000	(32)
Party Floor 1			42.4800			40.0000	1699.2000	(32d)
Internal Wall 1			35.3300			9.0000	317.9700	(32c)
Internal Ceiling 1			27.8000			9.0000	250.2000	(32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	4331.5020	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							61.6321	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	10.3200	0.0060	0.0619	
E3 Sill	3.4200	0.0120	0.0410	
E4 Jamb	23.8000	0.0230	0.5474	
E16 Corner (normal)	14.3800	0.0750	1.0785	
E17 Corner (inverted - internal area greater than external area)	2.3400	-0.0450	-0.1053	
E18 Party wall between dwellings	11.7000	0.2400	2.8080	
E7 Party floor between dwellings (in blocks of flats)	27.0000	0.0220	0.5940	
E14 Flat roof	27.4500	0.1600	4.3920	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.4176	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	49.2929 (37)

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

(38)m	Jan 30.1197	Feb 29.9105	Mar 29.9105	Apr 29.6157	May 29.6157	Jun 29.2585	Jul 29.3440	Aug 29.1755	Sep 29.2585	Oct 29.4320	Nov 29.4320	Dec 29.7114	(38)
Heat transfer coeff	79.4126	79.2033	79.2033	78.9086	78.9086	78.5513	78.6368	78.4684	78.5513	78.7249	78.7249	79.0043	(39)
Average = Sum(39)m / 12 =												78.8582	

HLP	Jan 1.1299	Feb 1.1270	Mar 1.1270	Apr 1.1228	May 1.1228	Jun 1.1177	Jul 1.1189	Aug 1.1165	Sep 1.1177	Oct 1.1202	Nov 1.1202	Dec 1.1241	(40)
HLP (average)												1.1221	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

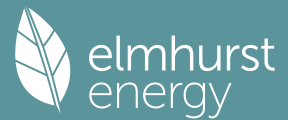
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2529	(42)	
Hot water usage for mixer showers	61.9934	61.0618	59.7042	57.1067	55.1898	53.0521	51.8371	53.1844	54.6613	56.9565	59.6098	61.7559	(42a)		
Hot water usage for baths	26.7824	26.3847	25.8245	24.7918	24.0185	23.1610	22.6978	23.2540	23.8596	24.7771	25.8312	26.6919	(42b)		
Hot water usage for other uses	37.7020	36.3310	34.9600	33.5890	32.2181	30.8471	30.8471	32.2181	33.5890	34.9600	36.3310	37.7020	(42c)		
Average daily hot water use (litres/day)													116.2619	(43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Energy conte	126.4778	123.7775	120.4888	115.4875	111.4263	107.0602	105.3819	108.6564	112.1099	116.6937	121.7720	126.1498	(44)		
Energy content (annual)	200.3100	176.2575	185.1868	158.0967	150.0013	131.6430	127.4503	134.5394	138.2428	158.3522	173.4865	197.5201	(45)		
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m =	1931.0864	
Water storage loss:	30.0465	26.4386	27.7780	23.7145	22.5002	19.7464	19.1175	20.1809	20.7364	23.7528	26.0230	29.6280	(46)		
Store volume													180.0000	(47)	
a) If manufacturer declared loss factor is known (kWh/day):													1.4000	(48)	
Temperature factor from Table 2b													0.7800	(49)	
Enter (49) or (54) in (55)													1.0920	(55)	
Total storage loss	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520	(56)		
If cylinder contains dedicated solar storage	33.8520	30.5760	33.8520	32.7600	33.8520	32.7600	33.8520	33.8520	32.7600	33.8520	32.7600	33.8520	(57)		
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576	(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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297	(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	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297	(64)		
Electric shower(s)													Total per year (kWh/year) = Sum(64)m =	2851.2280	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)		
Heat gains from water heating, kWh/month													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	0.0000	(64a)
	110.4892	98.2446	105.4607	95.0375	93.7615	61.7809	60.9872	63.3443	63.9753	96.5382	100.1547	109.5615	(65)		

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 135.1742	Feb 135.1742	Mar 135.1742	Apr 135.1742	May 135.1742	Jun 135.1742	Jul 135.1742	Aug 135.1742	Sep 135.1742	Oct 135.1742	Nov 135.1742	Dec 135.1742	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	28.2951	25.1315	20.4383	15.4731	11.5663	9.7648	10.5512	13.7148	18.4080	23.3732	27.2800	29.0816 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	295.4473	298.5131	290.7873	274.3401	253.5784	234.0654	221.0295	217.9636	225.6894	242.1366	262.8983	282.4114 (68)
Pumps, fans	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703	50.7703 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161	-90.1161 (71)
Total internal gains	148.5069	146.1974	141.7482	131.9966	126.0235	85.8068	81.9720	85.1401	88.8546	129.7556	139.1037	147.2601 (72)
	568.0778	565.6704	548.8023	517.6382	486.9967	425.4653	409.3810	412.6470	428.7804	491.0939	525.1104	554.5814 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d			Gains W
East					8.6900	22.3313	0.6300	0.7000	0.7700			59.3070 (76)
West					11.1100	22.3313	0.6300	0.7000	0.7700			75.8229 (80)
Solar gains	135.1299	237.7806	386.1136	578.6736	689.5141	754.7993	711.0514	625.5566	486.2221	301.0935	172.6118	110.0460 (83)
Total gains	703.2076	803.4509	934.9159	1096.3118	1176.5107	1180.2646	1120.4324	1038.2037	915.0026	792.1874	697.7223	664.6274 (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	15.1512	15.1912	15.1912	15.2480	15.2480	15.3173	15.3007	15.3335	15.3173	15.2835	15.2835	15.2295
alpha	2.0101	2.0127	2.0127	2.0165	2.0165	2.0212	2.0200	2.0222	2.0212	2.0189	2.0189	2.0153
util living area	0.8351	0.7942	0.7141	0.5913	0.4529	0.3079	0.2097	0.2313	0.4284	0.6457	0.7858	0.8470 (86)
Living	18.9214	19.1869	19.6787	20.1975	20.5676	20.7653	20.8242	20.8184	20.6671	20.1945	19.4872	18.8656
Non living	17.5909	17.9149	18.5089	19.1198	19.5339	19.7368	19.7837	19.7826	19.6517	19.1379	18.2954	17.5260
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	19.9370	19.1869	19.6787	20.1975	20.5676	20.7653	20.8242	20.8184	20.6671	20.1945	19.4872	19.1643 (87)
Th 2	19.9765	19.9789	19.9789	19.9823	19.9823	19.9864	19.9854	19.9874	19.9864	19.9844	19.9844	19.9812 (88)
util rest of house	0.8195	0.7756	0.6891	0.5575	0.4083	0.2517	0.1438	0.1617	0.3679	0.6062	0.7631	0.8322 (89)
MIT 2	19.0160	17.9149	18.5089	19.1198	19.5339	19.7368	19.7837	19.7826	19.6517	19.1379	18.2954	17.9651 (90)
Living area fraction	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (91)
MIT	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (92)
Temperature adjustment	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (93)
adjusted MIT	19.3698	18.4036	18.9583	19.5338	19.9311	20.1319	20.1835	20.1805	20.0418	19.5438	18.7533	18.4258 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.8092	0.7421	0.6610	0.5414	0.4059	0.2600	0.1569	0.1753	0.3713	0.5873	0.7309	0.8055 (94)
Ext temp.	569.0420	596.2699	618.0048	593.5967	477.5912	306.8966	175.8166	181.9952	339.7793	465.2499	509.9649	535.3543 (95)
Heat loss rate W	5.1000	5.6000	7.4000	9.9000	13.0000	16.0000	17.9000	18.8000	15.2000	11.6000	8.0000	5.1000 (96)
Space heating kWh	1133.2046	1014.0854	915.4580	760.1900	546.9195	324.5702	179.5649	186.7955	380.3283	625.3782	846.5520	1052.7938 (97)
Space heating requirement - total per year (kWh/year)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98a)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98c)
Space heating kWh	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98c)
Space heating per m2	(98c) / (4) = 26.1781 (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 %)	314.3555 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	419.7370	280.7721	221.3052	119.9472	51.5802	0.0000	0.0000	0.0000	0.0000	119.1355	242.3427	384.9750 (98)
Space heating fuel (main heating system)	314.3555	314.3555	314.3555	314.3555	314.3555	0.0000	0.0000	0.0000	0.0000	314.3555	314.3555	314.3555 (210)
Space heating efficiency (main heating system 2)	133.5231	89.3167	70.3997	38.1566	16.4083	0.0000	0.0000	0.0000	0.0000	37.8983	77.0919	122.4649 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Water heating requirement	289.0196	256.3823	273.8964	243.9447	238.7109	186.9150	184.5647	191.6538	193.5148	247.0618	259.3345	286.2297 (64)
Efficiency of water heater	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290 (216)
Fuel for water heating, kWh/month	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290	182.2290 (217)

Full SAP Calculation Printout



	158.6024	140.6923	150.3034	133.8671	130.9950	102.5715	101.2817	105.1719	106.1932	135.5777	142.3124	157.0714	(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	24.7666	19.8687	17.8895	13.1066	10.1239	8.2713	9.2354	12.0045	15.5927	20.4585	23.1078	25.4549	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												585.2594	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												182.2290	
Water heating fuel used												1564.6399	(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)												199.8805	(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												2349.7798	(238)

10a. Fuel costs - using BEDF prices (550)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	585.2594	26.0600	152.5186	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1564.6399	26.0600	407.7452	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	199.8805	26.0600	52.0889	(250)
Additional standing charges			0.0000	(251)
Total energy cost			612.3526	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	585.2594	0.1558	91.2052	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1564.6399	0.1416	221.6097	(264)
Space and water heating			312.8149	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	199.8805	0.1443	28.8489	(268)
Total CO2, kg/year			341.6639	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	585.2594	1.5769	922.8928	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1564.6399	1.5238	2384.1543	(278)
Space and water heating			3307.0471	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	199.8805	1.5338	306.5833	(282)
Total Primary energy kWh/year			3613.6304	(286)

Predicted Energy Assessment



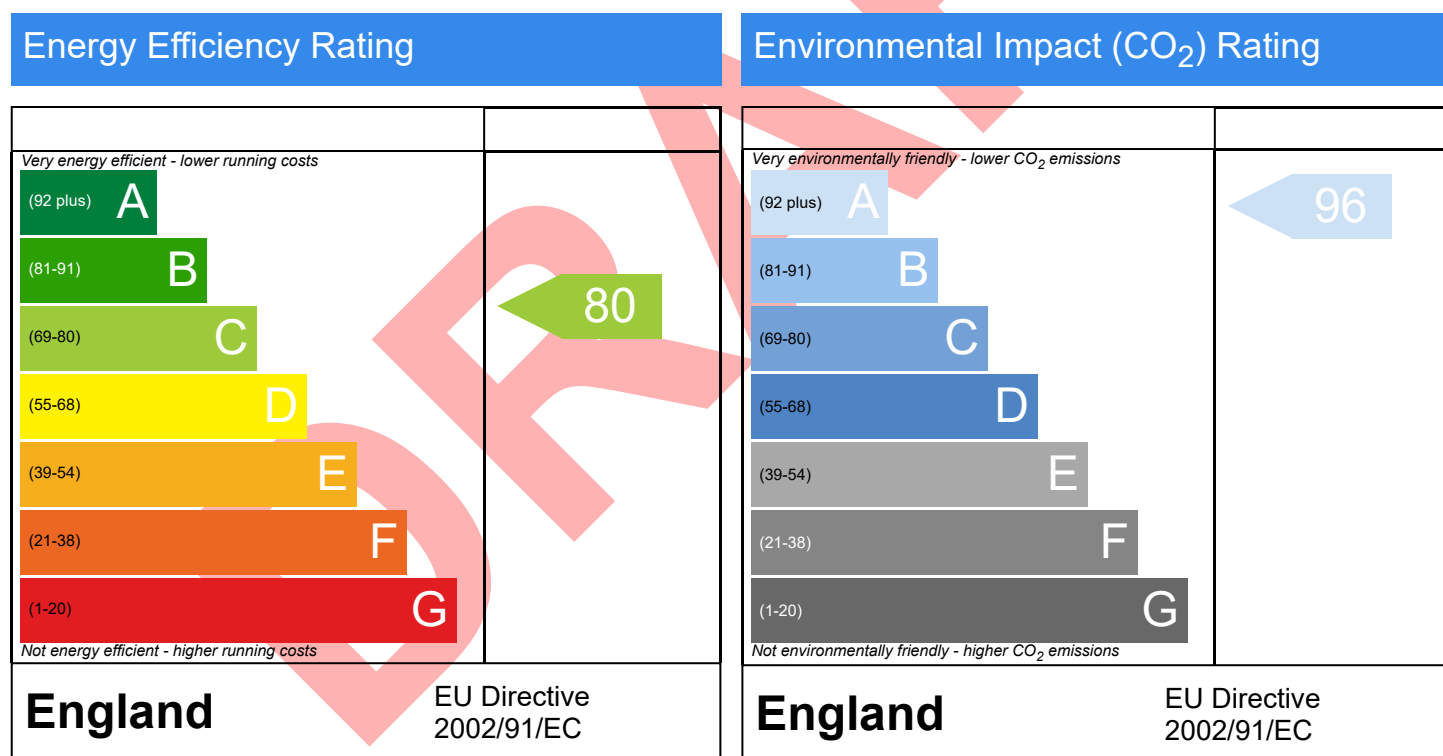
Zoar Chapel , Flat 7, South Street , Reading

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

Flat, Semi-Detached
03/07/2024
Matthew Carter
70.28 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.

Thermal Bridging

Property Reference	01113	Issued on Date	03/07/2024
Assessment Reference	00001	Prop Type Ref	Semi-Detached Flat
Property	Zoar Chapel , Flat 7, South Street , Reading		

SAP Rating	80 C	DER	5.14	TER	13.31
Environmental	96 A	% DER < TER			61.38
CO ₂ Emissions (t/year)	0.34	DFEE	37.94	TFEE	37.94
Compliance Check	See BREL	% DFEE < TFEE			0.01
% DPER < TPER	22.45	DPER	54.32	TPER	70.05

Assessor Details	Mr. Matthew Carter	Assessor ID	7869-0001
Client			

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.006	10.32	0.06	TD5
External wall	E3 Sill	Independently assessed	0.012	3.42	0.04	TD5
External wall	E4 Jamb	Independently assessed	0.023	23.80	0.55	TD5
External wall	E16 Corner (normal)	Independently assessed	0.075	14.38	1.08	TD5
External wall	E17 Corner (inverted – internal area greater than external area)	Independently assessed	-0.045	2.34	-0.11	TD5
External wall	E18 Party wall between dwellings	Table K1 - Default	0.240	11.70	2.81	
External wall	E7 Party floor between dwellings (in blocks of flats)	Independently assessed	0.022	27.00	0.59	TD5
External wall	E14 Flat roof	Table K1 - Default	0.160	27.45	4.39	

Total: 120.41 W/mK:
Y-Value: 0.07 W/m²K: