

Building Regulations England Part L (BREL) Compliance Report

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

Date: Thu 01 Feb 2024 11:49:39

Project Information			
Assessed By	Daniel Watt	Building Type	Flat, Mid-terrace
OCDEA Registration	EES/027301	Assessment Date	2024-02-01

Dwelling Details			
Assessment Type	As designed	Total Floor Area	34 m ²
Site Reference	1D1P - Ground floor	Plot Reference	00001
Address	42-43 Drake Street		

Client Details	
Name	Paul Butler Associates
Company	Paul Butler Associates
Address	31 Blackfriars Road, Manchester, M3 7AQ

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	17.16 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	1.5 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	93.17 kWh _{PE} /m ²		
Dwelling primary energy	15.14 kWh _{PE} /m ²		OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	27.0 kWh/m ²		
Dwelling fabric energy efficiency	18.7 kWh/m ²		OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.15	Walls (1) (0.15)	OK
Party walls	0.2	N/A	N/A	N/A
Curtain walls	1.6	N/A	N/A	N/A
Floors	0.18	0.11	GF (0.11)	OK
Roofs	0.16	N/A	N/A	N/A
Windows, doors, and roof windows	1.6	0.8	NE (0.8)	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)	21.68	0.15	
Ground floor: GF, GF	34.25	0.11	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
NE, Windows	2	North East	0.7	0.8 (!)
S, Windows	2	South	0.7	0.8 (!)

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	0.03 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.04	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.05	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.07	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.09	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.06	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	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		1 m ³ /hm ² , Design value (!)		OK
Air permeability test certificate reference				

4 Space heating	
Main heating system 1: Room heaters - Electricity	
Efficiency	100.0%
Emitter type	
Flow temperature	
System type	Panel, convector or radiant heaters
Manufacturer	
Model	
Commissioning	
Main heating system 2: Heat pump with radiators or underfloor heating - Electricity	
Efficiency	0.0%
Emitter type	
Flow temperature	
System type	Heat Pump
Manufacturer	Auer
Model	EDL170-520RF
Commissioning	
Secondary heating system: N/A	
Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water	
Cylinder/store - type: N/A	
Capacity	N/A
Declared heat loss	N/A
Primary pipework insulated	N/A
Manufacturer	
Model	
Commissioning	
Waste water heat recovery system 1 - type: N/A	
Efficiency	
Manufacturer	
Model	

6 Controls	
Main heating 1 - type: Programmer and room thermostats	
Function	
Ecodesign class	
Manufacturer	
Model	
Main heating 2 - type: Not applicable	
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	120 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	0.47 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	89%	OK
Manufacturer/Model	Sentinel Kinetic FH, 408167A	
Commissioning		
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	1.27 kWp	
Orientation	South	
Pitch	Horizontal	
Overshading	None or very little	
Manufacturer		
MCS certificate		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Summary for Input Data

Property Reference	1D1P - Ground floor			Issued on Date	01/02/2024
Assessment Reference	00001	Prop Type Ref	1D1P - Mid Floor		
Property	42-43 Drake Street				

SAP Rating	96 A	DER	1.50	TER	17.16
Environmental	99 A	% DER < TER			91.26
CO ₂ Emissions (t/year)	0.05	DFEE	18.70	TFEE	27.03
Compliance Check	See BREL	% DFEE < TFEE			30.81
% DPER < TPER	83.75	DPER	15.14	TPER	93.17

Assessor Details	Mr. Daniel Watt	Assessor ID	AV75-0001
Client			

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

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Mid-Terrace
Position of Flat	Ground-floor flat
Which Floor	1
2.0 Number of Storeys	1
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	Yes
Smart gas meter fitted	Yes

7.0 Measurements			
	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Basement:	0.00 m	0.00 m ²	0.00 m
Ground floor:	10.70 m	34.25 m ²	2.40 m
1st Storey:	0.00 m	0.00 m ²	0.00 m
2nd Storey:	0.00 m	0.00 m ²	0.00 m
3rd Storey:	0.00 m	0.00 m ²	0.00 m
4th Storey:	0.00 m	0.00 m ²	0.00 m
5th Storey:	0.00 m	0.00 m ²	0.00 m
6th Storey:	0.00 m	0.00 m ²	0.00 m
7th Storey:	0.00 m	0.00 m ²	0.00 m

8.0 Living Area	15.00	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	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	25.68	21.68	0.00	None	4.00	Enter Gross Area

10.1 Party Ceilings			
Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	34.25

11.0 Heat Loss Floors									
Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)	
GF	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.11	None	0.00	110.00	34.25	

12.0 Opening Types									
Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m ² K)

Summary for Input Data



Windows Manufacturer Window Triple Low-E Soft 0.05 Air Filled 0.72 Wood 0.70 0.80

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
NE	Windows	External Wall 1	North East	2.00	0
S	Windows	External Wall 1	South	2.00	0

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	3.00	0.03	0.03	No
E3 Sill	Independently assessed	3.00	0.04	0.04	No
E4 Jamb	Independently assessed	6.00	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	10.70	0.07	0.07	No
E16 Corner (normal)	Independently assessed	4.80	0.09	0.09	No
E18 Party wall between dwellings	Independently assessed	4.80	0.06	0.06	No
E5 Ground floor (normal)	Independently assessed	10.70	0.16	0.16	No

Y-value 0.06 W/m²K

18.0 Pressure Testing

Yes

Designed AP₅₀ 1.00 m³/(h.m²) @ 50 Pa

Property Tested? Yes

Test Method Blower Door

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present Yes

Approved Installation Yes

Mechanical Ventilation data Type Database

Type Balanced mechanical ventilation with heat recovery

MV Reference Number 500811

Configuration 1

Manufacturer SFP 0.47

Duct Type Rigid

MVHR Efficiency 89.00

Wet Rooms 1

SFP from Installer Commissioning Certificate No

MVHR System Location Inside heated envelope (installed exclusively)

Duct Installation Specification Level 1

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

No

22.0 Lighting

No Fixed Lighting No

Name	Efficacy	Power	Capacity	Count
LED	120.00	2	240	10

24.0 Main Heating 1

SAP table

Percentage of Heat 100.00 %

Database Ref. No. 0

Fuel Type Electricity

SAP Code 691

In Winter 100.00

In Summer 302.95

Controls SAP Code 2605

Summary for Input Data

Delayed Start Stat	No
HETAS approved System	No
Oil Pump Inside	No
Fan Assisted Flue	No
Boiler Interlock	No

25.0 Main Heating 2

	Database	
Percentage of Heat	0.00	%
Database Ref. No.	105752	
Fuel Type	Electricity	
SAP Code	0	
In Winter	0.00	
In Summer	302.95	
Model Name	EDL170-520RF	
Manufacturer	Auer	
Controls	2100	
Delayed Start Stat	No	
HETAS approved System	No	
Oil Pump Inside	No	
FI Case	0.00	
Flue Type	None or Unknown	
Fan Assisted Flue	No	
Flow Temperature	Enter value	

26.0 Heat Networks

None

28.0 Water Heating

Water Heating	Main Heating 2
SAP Code	914
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From mains
Bath Count	0
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.3 Waste Water Heat Recovery System

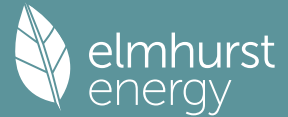
29.0 Hot Water Cylinder

	Internal Store	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	173.00	L
Loss	1.92	kWh/day
In Airing Cupboard	No	

Summary for Input Data

31.0 Thermal Store			None								
32.0 Photovoltaic Unit			Multiple Dwellings – Connected								
Export Capable Meter?			No								
Connected To Dwelling			Yes								
Diverter			No								
Battery Capacity [kWh]			0.00								
PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer			
1.27	South	Horizontal	None Or Little	No	No	1.00					
34.0 Small-scale Hydro			None								
Electricity Generated			0.00								
Apportioned			0.00								
Connected to dwelling's electricity meter			Yes								
Electricity Generation			Annual								
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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				30.81
% DPER < TPER	83.75	DPER	15.14	TPER	93.17	
Assessor Details	Mr. Daniel Watt				Assessor ID	AV75-0001
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	34.2500	2.4000	82.2000
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.2500		
Dwelling volume			82.2000

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	1.0000 (17)
Infiltration rate	0.0500 (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) = 0.0425 (21)

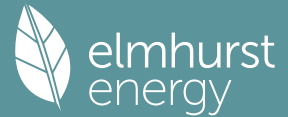
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.0542	0.0531	0.0521	0.0468	0.0457	0.0404	0.0404	0.0393	0.0425	0.0457	0.0478	0.0499 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.1537	0.1526	0.1516	0.1462	0.1452	0.1399	0.1399	0.1388	0.1420	0.1452	0.1473	0.1494 (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 = 0.80)			4.0000	0.7752	3.1008		(27)
GF			34.2500	0.1100	3.7675	110.0000	3767.5000 (28a)
External Wall 1	25.6800	4.0000	21.6800	0.1500	3.2520	70.0000	1517.6000 (29a)
Total net area of external elements Aum(A, m ²)			59.9300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		10.1203		(33)
Party Ceiling 1			34.2500			30.0000	1027.5000 (32b)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	6312.6000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							184.3095 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.0000	0.0300	0.0900	
E3 Sill				3.0000	0.0400	0.1200	
E4 Jamb				6.0000	0.0500	0.3000	
E7 Party floor between dwellings (in blocks of flats)				10.7000	0.0700	0.7490	

7. Mean internal temperature (heating season)

Full SAP Calculation Printout



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	97.5239	97.6805	97.8376	98.6306	98.7908	99.5994	99.5994	99.7627	99.2744	98.7908	98.4710	98.1533
alpha	7.5016	7.5120	7.5225	7.5754	7.5861	7.6400	7.6400	7.6508	7.6183	7.5861	7.5647	7.5436
util living area	0.8699	0.7934	0.7049	0.5677	0.4308	0.3004	0.2153	0.2340	0.3635	0.5829	0.7812	0.8872 (86)
MIT	20.8534	20.9254	20.9689	20.9938	20.9993	21.0000	21.0000	21.0000	20.9998	20.9937	20.9432	20.8318 (87)
Th 2	20.4980	20.4988	20.4995	20.5034	20.5041	20.5080	20.5080	20.5088	20.5065	20.5041	20.5026	20.5011 (88)
util rest of house	0.8552	0.7751	0.6838	0.5452	0.4080	0.2773	0.1912	0.2090	0.3375	0.5562	0.7598	0.8737 (89)
MIT 2	20.3365	20.4191	20.4679	20.4976	20.5035	20.5080	20.5080	20.5088	20.5063	20.4985	20.4440	20.3144 (90)
Living area fraction	fLA = Living area / (4) =											0.4380 (91)
MIT	20.5628	20.6408	20.6873	20.7149	20.7206	20.7234	20.7235	20.7239	20.7225	20.7154	20.6626	20.5410 (92)
Temperature adjustment												0.0000
adjusted MIT	20.5628	20.6408	20.6873	20.7149	20.7206	20.7234	20.7235	20.7239	20.7225	20.7154	20.6626	20.5410 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8572	0.7804	0.6918	0.5548	0.4179	0.2874	0.2018	0.2199	0.3489	0.5677	0.7668	0.8748 (94)
Useful gains	264.5648	268.3826	248.4347	208.9279	159.9878	107.8007	72.5955	75.9993	116.9487	178.4357	230.8952	260.0425 (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	292.4093	282.5698	254.2729	210.0506	160.1130	107.8063	72.5958	75.9999	116.9738	179.5445	241.5137	291.9306 (97)
Space heating kWh	20.7163	9.5338	4.3436	0.8083	0.0932	0.0000	0.0000	0.0000	0.0000	0.8250	7.6453	23.7247 (98a)
Space heating requirement - total per year (kWh/year)												67.6902
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	20.7163	9.5338	4.3436	0.8083	0.0932	0.0000	0.0000	0.0000	0.0000	0.8250	7.6453	23.7247 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												67.6902
Space heating per m2												(98c) / (4) = 1.9764 (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)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (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	20.7163	9.5338	4.3436	0.8083	0.0932	0.0000	0.0000	0.0000	0.0000	0.8250	7.6453	23.7247	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	20.7163	9.5338	4.3436	0.8083	0.0932	0.0000	0.0000	0.0000	0.0000	0.8250	7.6453	23.7247	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	158.5614	140.1651	148.8723	130.9442	126.9405	114.4045	112.9797	117.4894	118.7936	132.4303	140.7545	156.8482	(64)
Efficiency of water heater	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	(216)
(217)m	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	302.9550	(217)
Fuel for water heating, kWh/month	52.3383	46.2660	49.1401	43.2223	41.9008	37.7629	37.2926	38.7811	39.2116	43.7129	46.4605	51.7728	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m	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	5.0039	4.5196	5.0039	4.8425	5.0039	4.8425	5.0039	5.0039	4.8425	5.0039	4.8425	5.0039	(231)
Lighting	13.4810	10.8149	9.7377	7.1342	5.5107	4.5023	5.0270	6.5343	8.4874	11.1360	12.5781	13.8557	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-14.6297	-23.7318	-39.3752	-49.1291	-56.2063	-53.5708	-52.6815	-48.1504	-39.6664	-28.9601	-16.8520	-12.1645	(233a)
(233a)m	-14.6297	-23.7318	-39.3752	-49.1291	-56.2063	-53.5708	-52.6815	-48.1504	-39.6664	-28.9601	-16.8520	-12.1645	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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													67.6902 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													302.9550
Water heating fuel used													527.8618 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.5875)													
mechanical ventilation fans (SFP = 0.5875)													58.9168 (230a)
Total electricity for the above, kWh/year													58.9168 (231)
Electricity for lighting (calculated in Appendix L)													108.7992 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													

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PV generation	-435.1179	(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	328.1502	(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	67.6902	0.1600	10.8284 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	527.8618	0.1409	74.3616 (264)
Space and water heating			85.1900 (265)
Pumps, fans and electric keep-hot	58.9168	0.1387	8.1725 (267)
Energy for lighting	108.7992	0.1443	15.7031 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-435.1179	0.1324	-57.6252
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-57.6252 (269)
Total CO2, kg/year			51.4404 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			1.5000 (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	67.6902	1.5921	107.7676 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	527.8618	1.5209	802.8233 (278)
Space and water heating			910.5909 (279)
Pumps, fans and electric keep-hot	58.9168	1.5128	89.1294 (281)
Energy for lighting	108.7992	1.5338	166.8799 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-435.1179	1.4893	-648.0412
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-648.0412 (283)
Total Primary energy kWh/year			518.5590 (286)
Dwelling Primary energy Rate (DPER)			15.1400 (287)

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

1. Overall dwelling characteristics

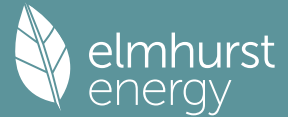
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	34.2500 (1b)	x 2.4000 (2b)	= 82.2000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.2500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 82.2000 (5)

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) = 0.2433 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4933 (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) = 0.4193 (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	0.5346	0.5241	0.5137	0.4612	0.4508	0.3983	0.3983	0.3879	0.4193	0.4508	0.4717	0.4927 (22b)
Effective ac	0.6429	0.6374	0.6319	0.6064	0.6016	0.5793	0.5793	0.5752	0.5879	0.6016	0.6113	0.6214 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K						
TER Opening Type (Uw = 1.20)			4.0000	1.1450	4.5802			(27)					
GF			34.2500	0.1300	4.4525			(28a)					
External Wall 1	25.6800	4.0000	21.6800	0.1800	3.9024			(29a)					
Total net area of external elements Aum(A, m2)			59.9300					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)... (30) + (32) =		12.9351			(33)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							194.3095	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.0000	0.0500		0.1500						
E3 Sill				3.0000	0.0500		0.1500						
E4 Jamb				6.0000	0.0500		0.3000						
E7 Party floor between dwellings (in blocks of flats)				10.7000	0.0700		0.7490						
E16 Corner (normal)				4.8000	0.0900		0.4320						
E18 Party wall between dwellings				4.8000	0.0600		0.2880						
E5 Ground floor (normal)				10.7000	0.1600		1.7120						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.7810	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	16.7161	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 17.4396	Feb 17.2891	Mar 17.1415	Apr 16.4485	May 16.3188	Jun 15.7152	Jul 15.7152	Aug 15.6034	Sep 15.9477	Oct 16.3188	Nov 16.5811	Dec 16.8554	(38)
Heat transfer coeff	34.1557	34.0051	33.8576	33.1645	33.0349	32.4312	32.4312	32.3195	32.6637	33.0349	33.2972	33.5714	(39)
Average = Sum(39)m / 12 =												33.1639	
HLP	Jan 0.9972	Feb 0.9929	Mar 0.9885	Apr 0.9683	May 0.9645	Jun 0.9469	Jul 0.9469	Aug 0.9436	Sep 0.9537	Oct 0.9645	Nov 0.9722	Dec 0.9802	(40)
HLP (average)												0.9683	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

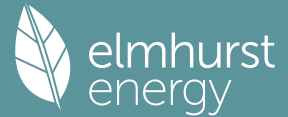
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.2633	(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	0.0000	(42a)
Hot water usage for baths														
52.2559	51.4798	50.3869	48.3719	46.8630	45.1899	44.2862	45.3714	46.5531	48.3433	50.3999	52.0792	52.0792	(42b)	
Hot water usage for other uses														
27.5674	26.5650	25.5625	24.5601	23.5576	22.5552	22.5552	23.5576	24.5601	25.5625	26.5650	27.5674	27.5674	(42c)	
Average daily hot water use (litres/day)													73.5107	(43)
Daily hot water use	Jan 79.8233	Feb 78.0448	Mar 75.9495	Apr 72.9319	May 70.4206	Jun 67.7451	Jul 66.8414	Aug 68.9291	Sep 71.1131	Oct 73.9058	Nov 76.9649	Dec 79.6467	(44)	
Energy conte	126.4206	111.1347	116.7315	99.8402	94.7997	83.3005	80.8389	85.3486	87.6896	100.2895	109.6505	124.7074	(45)	
Energy content (annual)										Total = Sum(45)m =	1220.7518			
Distribution loss (46)m = 0.15 x (45)m														
18.9631	16.6702	17.5097	14.9760	14.2200	12.4951	12.1258	12.8023	13.1534	15.0434	16.4476	18.7061	18.7061	(46)	
Water storage loss:														
Store volume													150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													0.7527	(55)
Total storage loss														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)	
If cylinder contains dedicated solar storage														
23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
173.0155	153.2205	163.3264	144.9320	141.3946	128.3923	127.4338	131.9435	132.7815	146.8844	154.7424	171.3023	171.3023	(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	173.0155	153.2205	163.3264	144.9320	141.3946	128.3923	127.4338	131.9435	132.7815	146.8844	154.7424	171.3023	(64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	1769.3692	1769	(64)	
Electric shower(s)														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)	
Heat gains from water heating, kWh/month														
79.3108	70.6209	76.0891	69.2703	68.7968	63.7709	64.1548	65.6543	65.2303	70.6222	72.5323	78.7411	78.7411	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	Jan 63.1649	Feb 63.1649	Mar 63.1649	Apr 63.1649	May 63.1649	Jun 63.1649	Jul 63.1649	Aug 63.1649	Sep 63.1649	Oct 63.1649	Nov 63.1649	Dec 63.1649	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
60.4838	66.9643	60.4838	62.5000	60.4838	62.5000	60.4838	60.4838	62.5000	60.4838	62.5000	60.4838	60.4838	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
107.3901	108.5045	105.6963	99.7180	92.1715	85.0788	80.3405	79.2261	82.0343	88.0126	95.5591	102.6518	102.6518	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	29.3165	(69)	
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	-50.5319	(71)	
Water heating gains (Table 5)														
106.6005	105.0906	102.2704	96.2088	92.4689	88.5707	86.2296	88.2451	90.5976	94.9223	100.7393	105.8349	105.8349	(72)	
Total internal gains	319.4239	325.5088	313.4000	303.3763	290.0737	278.0990	269.0034	269.9045	277.0813	288.3682	303.7478	313.9200	(73)	

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6. Solar gains

[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
Northeast				2.0000	11.2829		0.6300		0.7000	0.7700	6.8964 (75)
South				2.0000	46.7521		0.6300		0.7000	0.7700	28.5761 (78)
Solar gains	35.4725	60.8381	84.9070	108.9145	126.0452	127.0936	121.7031	108.5057	93.0936	67.6339	30.3243 (83)
Total gains	354.8964	386.3469	398.3070	412.2908	416.1189	405.1926	390.7066	378.4102	370.1749	356.0021	344.2443 (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	54.1239	54.3635	54.6004	55.7415	55.9602	57.0018	57.0018	57.1990	56.5961	55.9602	55.5194	55.0659	
alpha	4.6083	4.6242	4.6400	4.7161	4.7307	4.8001	4.8001	4.8133	4.7731	4.7307	4.7013	4.6711	
util living area	0.9544	0.9317	0.8967	0.8137	0.6825	0.5020	0.3634	0.3902	0.5852	0.8105	0.9204	0.9587 (86)	
MIT	20.0891	20.2619	20.4731	20.7396	20.9080	20.9834	20.9971	20.9960	20.9652	20.7820	20.4302	20.0765 (87)	
Th 2	20.0856	20.0893	20.0929	20.1098	20.1130	20.1278	20.1278	20.1306	20.1221	20.1130	20.1066	20.0999 (88)	
util rest of house	0.9450	0.9182	0.8765	0.7798	0.6314	0.4375	0.2923	0.3177	0.5189	0.7704	0.9028	0.9501 (89)	
MIT 2	19.0575	19.2724	19.5313	19.8546	20.0359	20.1175	20.1267	20.1289	20.0985	19.9097	19.4955	19.0529 (90)	
Living area fraction									fLA = Living area / (4) =				0.4380 (91)
MIT	19.5093	19.7058	19.9438	20.2422	20.4178	20.4968	20.5079	20.5086	20.4781	20.2917	19.9048	19.5012 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.5093	19.7058	19.9438	20.2422	20.4178	20.4968	20.5079	20.5086	20.4781	20.2917	19.9048	19.5012 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9379	0.9117	0.8728	0.7852	0.6496	0.4651	0.3234	0.3494	0.5464	0.7790	0.8983	0.9433 (94)
Useful gains	332.8700	352.2374	347.6557	323.7342	270.2972	188.4558	126.3523	132.2294	202.2534	277.3389	311.0795	324.7194 (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	519.4829	503.4720	455.1729	376.1587	287.9921	191.2394	126.7380	132.7884	208.3328	320.1653	426.3644	513.6820 (97)
Space heating kWh	138.8400	101.6297	79.9928	37.7457	13.1650	0.0000	0.0000	0.0000	0.0000	31.8628	83.0051	140.5882 (98a)
Space heating requirement - total per year (kWh/year)												626.8294
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	138.8400	101.6297	79.9928	37.7457	13.1650	0.0000	0.0000	0.0000	0.0000	31.8628	83.0051	140.5882 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												626.8294
Space heating per m2										(98c) / (4) =		18.3016 (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	138.8400	101.6297	79.9928	37.7457	13.1650	0.0000	0.0000	0.0000	0.0000	31.8628	83.0051	140.5882 (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)	150.4226	110.1080	86.6661	40.8945	14.2633	0.0000	0.0000	0.0000	0.0000	34.5210	89.9297	152.3166 (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	173.0155	153.2205	163.3264	144.9320	141.3946	128.3923	127.4338	131.9435	132.7815	146.8844	154.7424	171.3023 (64)
Efficiency of water heater	83.5709	83.1611	82.5506	81.5069	80.4949	79.8000	79.8000	79.8000	79.8000	81.2682	82.7273	79.8000 (216)
Fuel for water heating, kWh/month	207.0284	184.2453	197.8501	177.8157	175.6566	160.8927	159.6914	165.3427	166.3928	180.7403	187.0512	83.6202 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	12.5673	10.0820	9.0777	6.6507	5.1372	4.1971	4.6863	6.0915	7.9122	10.3813	11.7256	12.9166 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-6.6284	-10.1106	-15.7138	-19.1606	-22.0243	-21.0860	-20.8541	-19.0128	-16.0048	-12.2122	-7.5612	-5.6464 (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	-1.7297	-3.7666	-7.7268	-11.9614	-16.1607	-16.3454	-16.1296	-13.4778	-9.6632	-5.4760	-2.3391	-1.3570 (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)												

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(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												679.1217	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2167.5647	(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)												101.4257	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-282.1487	(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												2751.9634	(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	679.1217	0.2100	142.6156	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2167.5647	0.2100	455.1886	(264)
Space and water heating			597.8041	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	101.4257	0.1443	14.6389	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-176.0153	0.1329	-23.3996	
PV Unit electricity exported	-106.1334	0.1251	-13.2729	
Total			-36.6726	(269)
Total CO2, kg/year			587.6997	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.1600	(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	679.1217	1.1300	767.4076	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2167.5647	1.1300	2449.3481	(278)
Space and water heating			3216.7556	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	101.4257	1.5338	155.5701	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-176.0153	1.4912	-262.4797	
PV Unit electricity exported	-106.1334	0.4590	-48.7169	
Total			-311.1966	(283)
Total Primary energy kWh/year			3191.2300	(286)
Target Primary Energy Rate (TPER)			93.1700	(287)