

Building Regulations England Part L (BREL) Compliance Report

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

Date: Thu 04 Sep 2025 07:25:52

Project Information			
Assessed By	William Linley	Building Type	Flat, Semi-detached
OCDEA Registration	EES/013386	Assessment Date	2025-09-04

Dwelling Details			
Assessment Type	As designed	Total Floor Area	54 m ²
Site Reference	1a Eaton Place FF	Plot Reference	1a FF
Address	1a Eaton Place, RG1 7LP		

Client Details	
Name	Array
Company	Array
Address	

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

1a Target emission rate and dwelling emission rate			
Fuel for main heating system	Electricity		
Target carbon dioxide emission rate	14.48 kgCO ₂ /m ²		
Dwelling carbon dioxide emission rate	8.19 kgCO ₂ /m ²		OK
1b Target primary energy rate and dwelling primary energy			
Target primary energy	76.3 kWh _{PE} /m ²		
Dwelling primary energy	84.62 kWh _{PE} /m ²		FAIL
1c Target fabric energy efficiency and dwelling fabric energy efficiency			
Target fabric energy efficiency	45.8 kWh/m ²		
Dwelling fabric energy efficiency	43.4 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	0.17	Walls (1) (0.17)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.18	Exposed FF (0.25)	OK
Roofs	0.16	0.11	Roof (1) (0.11)	OK
Windows, doors, and roof windows	1.6	1.35	Front (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)	83.3155	0.17
Party wall: Party Wall (1)	9.34	0 (!)
Upper floor: GF, GF	4.28	0.12
Party floor: Exposed FF, Exposed FF	3.49	0.25
Exposed roof: Roof (1)	50.18	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]
Front, Door	1.89	West	N/A	1.2
Front, Windows	1.4145	West	0.7	1.4
Front, Windows	1.4145	West	0.7	1.4
Front, Windows	1.0465	West	0.7	1.4
Front, Windows	1.0465	West	0.7	1.4
Side, Windows	0.55	North	0.7	1.4
Side, Windows	0.6325	North	0.7	1.4

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))	
Building part 1: Thermal bridging calculated from linear thermal transmittances for each junction	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.023 (!)	
External wall	E3: Sill	Calculated by person with suitable expertise	0.021 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.016 (!)	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.058	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.043	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.037 (!)	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.043	
Party wall	P1: Ground floor	Calculated by person with suitable expertise	0.043	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	
External wall	E6: Intermediate floor within a dwelling	Calculated by person with suitable expertise	0.043	
External wall	E20: Exposed floor (normal)	SAP table default	0.32	
External wall	E21: Exposed floor (inverted)	SAP table default	0.32	
External wall	E10: Eaves (insulation at ceiling level)	Calculated by person with suitable expertise	0.063	

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

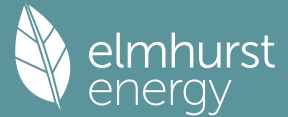
Main heating system 1: Room heaters - Electricity		
Efficiency	100.0%	
Emitter type		
Flow temperature		
System type	Panel, convector or radiant heaters	
Manufacturer		
Model		
Commissioning		
Main heating system 2: Heat pump with radiators or underfloor heating - Electricity		
Efficiency	0.0%	
Emitter 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 appliance 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	75 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery efficiency	N/A	
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		
9 Local generation		
N/A		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Full SAP Calculation Printout



Property Reference	1a Eaton Place FF				Issued on Date	04/09/2025	
Assessment Reference	1a FF			Prop Type Ref			
Property	1a Eaton Place, RG1 7LP						
SAP Rating	73 C		DER	8.19		TER	14.48
Environmental	94 A		% DER < TER				43.44
CO ₂ Emissions (t/year)	0.38		DFEE	43.42		TFEE	45.83
Compliance Check	See BREL		% DFEE < TFEE				5.24
% DPER < TPER	-10.90		DPER	84.62		TPER	76.30
Assessor Details	Mr. William Linley					Assessor ID	P977-0001
Client	,						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.5600 (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) = 0.1520 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3520 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2728 (21)

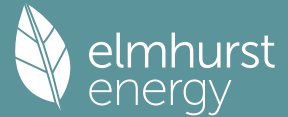
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.3478	0.3410	0.3342	0.3001	0.2933	0.2592	0.2592	0.2524	0.2728	0.2933	0.3069	0.3206 (22b)
Effective ac	0.5605	0.5581	0.5558	0.5450	0.5430	0.5336	0.5336	0.5318	0.5372	0.5430	0.5471	0.5514 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			1.8900	1.2000	2.2680		(26)
Windows			6.1000	1.3258	8.0871		(27)
GF			4.2800	0.1200	0.5136	110.0000	470.8000 (28b)
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000 (28b)
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800 (29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200 (30)
Total net area of external elements Aum (A, m ²)			149.2580				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.4251		(33)
Main dwelling							
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000 (32)
Party Floor 1			38.1100			40.0000	1524.4000 (32d)
Internal Wall 1			108.1900			9.0000	973.7100 (32c)
Internal Floor 1			4.2800			30.0000	128.4000 (32d)
Internal Ceiling 1			4.2800			30.0000	128.4000 (32e)
Heat capacity Cm = Sum (A x k)					(28)...(30) + (32) + (32a)...(32e) =		9480.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							174.0839 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	

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
North	1.1800	10.6334	0.6600	0.7000	0.7700	4.0173 (74)
West	4.9200	19.6403	0.6600	0.7000	0.7700	30.9377 (80)

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Solar gains	34.9549	68.1978	112.7143	166.3154	206.3728	212.5818	201.8301	171.5180	131.6038	80.9515	43.5314	28.7906 (83)
Total gains	413.8583	456.3680	483.0949	522.1518	542.7100	535.8654	511.6657	482.5280	453.0856	414.4508	399.5496	399.5719 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.8267	38.8852	38.9427	39.2149	39.2663	39.5072	39.5072	39.5522	39.4141	39.2663	39.1625	39.0546
alpha	3.5884	3.5923	3.5962	3.6143	3.6178	3.6338	3.6338	3.6368	3.6276	3.6178	3.6108	3.6036
util living area	0.9827	0.9741	0.9586	0.9169	0.8344	0.6875	0.5382	0.5842	0.7907	0.9321	0.9729	0.9847 (86)
MIT	19.1616	19.3639	19.6885	20.1523	20.5658	20.8518	20.9544	20.9379	20.7386	20.2095	19.6139	19.1245 (87)
Th 2	19.8838	19.8853	19.8868	19.8936	19.8949	19.9009	19.9009	19.9020	19.8986	19.8949	19.8923	19.8896 (88)
util rest of house	0.9787	0.9680	0.9484	0.8951	0.7884	0.6015	0.4184	0.4649	0.7189	0.9098	0.9654	0.9812 (89)
MIT 2	17.7654	18.0223	18.4327	19.0107	19.4980	19.7996	19.8814	19.8730	19.6971	19.0918	18.3466	17.7221 (90)
Living area fraction									fLA = Living area / (4) =			0.1970 (91)
MIT	18.0404	18.2866	18.6801	19.2356	19.7083	20.0069	20.0928	20.0828	19.9023	19.3120	18.5963	17.9984 (92)
Temperature adjustment												0.0000
adjusted MIT	18.0404	18.2866	18.6801	19.2356	19.7083	20.0069	20.0928	20.0828	19.9023	19.3120	18.5963	17.9984 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9691	0.9559	0.9336	0.8789	0.7794	0.6106	0.4405	0.4859	0.7191	0.8945	0.9532	0.9723 (94)
Useful gains	401.0538	436.2576	451.0125	458.9158	422.9649	327.2089	225.3735	234.4629	325.8288	370.7224	380.8499	388.5063 (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	931.9748	906.6091	823.6806	694.0964	537.1016	360.4185	232.8251	245.2139	387.6867	584.2963	773.0750	930.4444 (97)
Space heating kWh	395.0052	316.0762	277.2651	169.3300	84.9177	0.0000	0.0000	0.0000	0.0000	158.8990	282.4021	403.2019 (98a)
Space heating requirement - total per year (kWh/year)												2087.0972
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	395.0052	316.0762	277.2651	169.3300	84.9177	0.0000	0.0000	0.0000	0.0000	158.8990	282.4021	403.2019 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2087.0972
Space heating per m2										(98c) / (4) =		38.3235 (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	395.0052	316.0762	277.2651	169.3300	84.9177	0.0000	0.0000	0.0000	0.0000	158.8990	282.4021	403.2019 (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)	395.0052	316.0762	277.2651	169.3300	84.9177	0.0000	0.0000	0.0000	0.0000	158.8990	282.4021	403.2019 (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	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												
Water heating requirement	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962 (64)
Efficiency of water heater (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 (216)
Fuel for water heating, kWh/month	69.3479	61.2682	64.9029	56.5815	54.5295	48.7859	47.8766	49.9609	50.7158	56.9754	61.1069	68.5238 (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	22.2400	17.8417	16.0645	11.7695	9.0911	7.4275	8.2932	10.7799	14.0020	18.3713	20.7504	22.8581 (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												2087.0972 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												302.9550

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Water heating fuel used	690.5753 (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)	179.4891 (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	2957.1617 (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	2087.0972	0.1547	322.7778 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (263)
Water heating (other fuel)	690.5753	0.1411	97.4225 (264)
Space and water heating			420.2004 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	179.4891	0.1443	25.9058 (268)
Total CO2, kg/year			446.1062 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			8.1900 (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	2087.0972	1.5726	3282.1094 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	690.5753	1.5217	1050.8145 (278)
Space and water heating			4332.9239 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	179.4891	1.5338	275.3064 (282)
Total Primary energy kWh/year			4608.2303 (286)
Dwelling Primary energy Rate (DPER)			84.6200 (287)

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

1. Overall dwelling characteristics

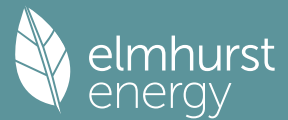
	Area (m2)		Storey height (m)		Volume (m3)
Main dwelling					
Ground floor	4.2800 (1b)	x	2.6000 (2b)	=	11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x	2.4000 (2c)	=	120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600				(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	131.5600 (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) = 0.1520 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4020 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3116 (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	0.3972	0.3895	0.3817	0.3427	0.3349	0.2960	0.2960	0.2882	0.3116	0.3349	0.3505	0.3661 (22b)
Effective ac	0.5789	0.5758	0.5728	0.5587	0.5561	0.5438	0.5438	0.5415	0.5485	0.5561	0.5614	0.5670 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			1.8900	1.0000	1.8900			(26)
TER Opening Type			6.1000	1.1450	6.9847			(27)
GF			4.2800	0.1300	0.5564			(28b)
Exposed FF			3.4900	0.1300	0.4537			(28b)
Main	91.3080	7.9900	83.3180	0.1800	14.9972			(29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198			(30)
Total net area of external elements Aum(A, m2)			149.2580					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
Main dwelling								(33)
Party Wall 1			9.3400	0.0000	0.0000			(32)

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

174.0839 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2800	0.0500	0.3140
E3 Sill	5.3800	0.0500	0.2690
E4 Jamb	17.7000	0.0500	0.8850
E5 Ground floor (normal)	6.0600	0.1600	0.9696
E7 Party floor between dwellings (in blocks of flats)	16.5200	0.0700	1.1564
E16 Corner (normal)	14.8000	0.0900	1.3320
E18 Party wall between dwellings	4.8000	0.0600	0.2880
P1 Party wall - Ground floor	3.8900	0.0800	0.3112
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	3.8900	0.0000	0.0000
E6 Intermediate floor within a dwelling	4.5300	0.0000	0.0000
E20 Exposed floor (normal)	11.8100	0.3200	3.7792
E21 Exposed floor (inverted)	11.2100	0.3200	3.5872
E10 Eaves (insulation at ceiling level)	31.4800	0.0600	1.8888

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

14.7804 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 45.1823 (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	25.1330	24.9999	24.8696	24.2571	24.1426	23.6092	23.6092	23.5104	23.8146	24.1426	24.3744	24.6167
Heat transfer coeff	70.3152	70.1822	70.0518	69.4394	69.3248	68.7914	68.7914	68.6927	68.9969	69.3248	69.5566	69.7990
Average = Sum(39)m / 12 =												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2911	1.2887	1.2863	1.2751	1.2729	1.2632	1.2632	1.2613	1.2669	1.2729	1.2772	1.2817
HLP (average)												1.2750
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8215 (42)
Hot water usage for mixer showers													
70.2903	69.2340	67.6947	64.7496	62.5761	60.1524	58.7747	60.3023	61.9769	64.5793	67.5877	70.0210	70.0210	(42a)
Hot water usage for baths													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)
Hot water usage for other uses													
33.2842	32.0739	30.8635	29.6532	28.4428	27.2325	27.2325	28.4428	29.6532	30.8635	32.0739	33.2842	33.2842	(42c)
Average daily hot water use (litres/day)													95.0637 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	103.5745	101.3078	98.5582	94.4028	91.0190	87.3849	86.0072	88.7452	91.6301	95.4428	99.6615	103.3052	(44)
Energy conte	164.0367	144.2610	151.4803	129.2327	122.5291	107.4499	104.0183	109.8850	112.9890	129.5150	141.9861	161.7509	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													1579.1339
24.6055	21.6391	22.7220	19.3849	18.3794	16.1175	15.6027	16.4828	16.9484	19.4272	21.2979	24.2626	24.2626	(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													
210.6316	186.3467	198.0752	174.3245	169.1240	152.5417	150.6132	156.4799	158.0809	176.1099	187.0779	208.3458	208.3458	(62)
WWHRS	-32.1338	-28.4194	-29.7591	-24.6417	-22.9652	-19.6515	-18.4202	-19.5880	-20.3322	-23.9694	-27.1545	-31.5387	(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													
178.4978	157.9273	168.3161	149.6828	146.1587	132.8902	132.1930	136.8920	137.7487	152.1404	159.9235	176.8071	176.8071	(64)
12Total per year (kWh/year)													1829.1776 (64)
Electric shower(s)													1829 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month													
91.8181	81.6354	87.6431	79.0433	78.0168	71.8006	71.8620	73.8127	73.6423	80.3397	83.2839	91.0581	91.0581	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
90.2594	99.9300	90.2594	93.2680	90.2594	93.2680	90.2594	90.2594	90.2594	93.2680	90.2594	93.2680	90.2594	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
158.7929	160.4407	156.2883	147.4485	136.2898	125.8022	118.7958	117.1481	121.3004	130.1402	141.2989	151.7865	151.7865	(68)

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Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076 (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 (70)
Losses e.g. evaporation (negative values) (Table 5)	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608 (71)
Water heating gains (Table 5)	123.4114	121.4812	117.7999	109.7824	104.8613	99.7230	96.5887	99.2106	102.2810	107.9834	115.6720 (72)
Total internal gains	425.7865	435.1747	417.6704	403.8217	384.7333	369.1160	355.9667	356.9409	367.1722	381.7058	403.5618 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W
North					1.1800	10.6334	0.6300	0.7000			0.7700	3.8346 (74)
West					4.9200	19.6403	0.6300	0.7000			0.7700	29.5314 (80)
Solar gains	33.3661	65.0979	107.5909	158.7556	196.9922	202.9190	192.6560	163.7217	125.6218	77.2719	41.5527	27.4820 (83)
Total gains	459.1526	500.2726	525.2613	562.5773	581.7255	572.0350	548.6227	520.6626	492.7941	458.9777	445.1145	445.2406 (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)												
tau	37.4528	37.5238	37.5936	37.9252	37.9879	38.2824	38.2824	38.3375	38.1684	37.9879	37.8613	37.7298
alpha	3.4969	3.5016	3.5062	3.5283	3.5325	3.5522	3.5522	3.5558	3.5446	3.5325	3.5241	3.5153
util living area	0.9768	0.9670	0.9496	0.9042	0.8176	0.6692	0.5197	0.5619	0.7663	0.9154	0.9639	0.9791 (86)
MIT	19.1817	19.3802	19.7033	20.1662	20.5745	20.8551	20.9557	20.9409	20.7520	20.2431	19.6482	19.1503 (87)
Th 2	19.8478	19.8497	19.8516	19.8604	19.8621	19.8698	19.8698	19.8712	19.8668	19.8621	19.8587	19.8552 (88)
util rest of house	0.9715	0.9594	0.9374	0.8796	0.7685	0.5812	0.3996	0.4421	0.6903	0.8886	0.9542	0.9743 (89)
MIT 2	17.7672	18.0187	18.4260	19.0012	19.4785	19.7726	19.8514	19.8444	19.6801	19.1058	18.3663	17.7322 (90)
Living area fraction	18.0459	18.2869	18.6776	19.2307	19.6945	19.9859	20.0690	20.0605	19.8913	19.3298	18.6188	18.0116 (92)
MIT	18.0459	18.2869	18.6776	19.2307	19.6945	19.9859	20.0690	20.0605	19.8913	19.3298	18.6188	18.0116 (93)
Temperature adjustment												0.0000
adjusted MIT	18.0459	18.2869	18.6776	19.2307	19.6945	19.9859	20.0690	20.0605	19.8913	19.3298	18.6188	18.0116 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9597	0.9453	0.9209	0.8628	0.7601	0.5911	0.4219	0.4635	0.6921	0.8727	0.9398	0.9633 (94)
Useful gains	440.6503	472.9293	483.7302	485.4177	442.1817	338.1147	231.4658	241.3074	341.0742	400.5482	418.3105	428.8879 (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	966.5440	939.5241	853.0666	717.3606	554.2147	370.5031	238.6353	251.4468	399.5833	605.1946	801.2112	964.0364 (97)
Space heating kWh	391.2649	313.5517	274.7863	166.9989	83.3525	0.0000	0.0000	0.0000	0.0000	152.2569	275.6885	398.1505 (98a)
Space heating requirement - total per year (kWh/year)												2056.0502
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	391.2649	313.5517	274.7863	166.9989	83.3525	0.0000	0.0000	0.0000	0.0000	152.2569	275.6885	398.1505 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2056.0502
Space heating per m2										(98c) / (4) =		37.7534 (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	391.2649	313.5517	274.7863	166.9989	83.3525	0.0000	0.0000	0.0000	0.0000	152.2569	275.6885	398.1505 (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)	423.9056	339.7093	297.7099	180.9306	90.3061	0.0000	0.0000	0.0000	0.0000	164.9588	298.6874	431.3657 (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	178.4978	157.9273	168.3161	149.6828	146.1587	132.8902	132.1930	136.8920	137.7487	152.1404	159.9235	176.8071 (64)
Efficiency of water heater (217)m	85.7695	85.5675	85.1520	84.3059	82.8495	79.8000	79.8000	79.8000	79.8000	84.0615	85.2694	85.8235 (217)
Fuel for water heating, kWh/month	208.1133	184.5647	197.6655	177.5473	176.4147	166.5291	165.6554	171.5438	172.6174	180.9871	187.5508	206.0125 (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	18.7541	15.0452	13.5466	9.9248	7.6662	6.2634	6.9934	9.0902	11.8073	15.4919	17.4980	19.2754 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-25.9176	-36.7595	-53.1610	-60.1697	-65.2527	-61.0864	-60.3908	-56.8725	-50.6548	-42.2846	-28.5953	-22.3863 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(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	-13.9525	-29.4378	-58.6560	-88.2891	-116.8981	-117.4698	-116.0294	-98.1147	-71.7872	-42.0924	-18.6312	-11.0217	(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												2227.5733	(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												2195.2015	(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)												151.3565	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1345.9110	(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												3314.2203	(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	2227.5733	0.2100	467.7904 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2195.2015	0.2100	460.9923 (264)
Space and water heating			928.7827 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	151.3565	0.1443	21.8454 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-563.5311	0.1344	-75.7582
PV Unit electricity exported	-782.3799	0.1258	-98.4572
Total			-174.2155 (269)
Total CO2, kg/year			788.3419 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.4800 (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	2227.5733	1.1300	2517.1579 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2195.2015	1.1300	2480.5776 (278)
Space and water heating			4997.7355 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	151.3565	1.5338	232.1556 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-563.5311	1.4968	-843.5159
PV Unit electricity exported	-782.3799	0.4619	-361.4045
Total			-1204.9205 (283)
Total Primary energy kWh/year			4155.0715 (286)
Target Primary Energy Rate (TPER)			76.3000 (287)

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

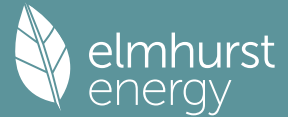
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.5600 (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)

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

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
2 * 10 = 20.0000 (7a)
0 * 10 = 0.0000 (7b)
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) = 0.1520 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 4.0000 (17)
Infiltration rate 0.3520 (18)
Number of sides sheltered 3 (19)
Shelter factor (20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2728 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	0.3478	0.3410	0.3342	0.3001	0.2933	0.2592	0.2592	0.2524	0.2728	0.2933	0.3069	0.3206	(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	0.5605	0.5581	0.5558	0.5450	0.5430	0.5336	0.5336	0.5318	0.5372	0.5430	0.5471	0.5514	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			1.8900	1.2000	2.2680		(26)
Windows			6.1000	1.3258	8.0871		(27)
GF			4.2800	0.1200	0.5136	110.0000	470.8000 (28b)
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000 (28b)
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800 (29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200 (30)
Total net area of external elements Aum(A, m2)			149.2580				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 31.4251		(33)
Main dwelling							
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000 (32)
Party Floor 1			38.1100			40.0000	1524.4000 (32d)
Internal Wall 1			108.1900			9.0000	973.7100 (32c)
Internal Floor 1			4.2800			30.0000	128.4000 (32d)
Internal Ceiling 1			4.2800			30.0000	128.4000 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 9480.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 174.0839 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	6.2800	0.0230	0.1444
E2 Other lintels (including other steel lintels)	5.3800	0.0210	0.1130
E3 Sill	17.7000	0.0160	0.2832
E4 Jamb	6.0600	0.0580	0.3515
E5 Ground floor (normal)	16.5200	0.0430	0.7104
E7 Party floor between dwellings (in blocks of flats)	14.8000	0.0370	0.5476
E16 Corner (normal)	4.8000	0.0430	0.2064
E18 Party wall between dwellings	3.8900	0.0430	0.1673
P1 Party wall - Ground floor	3.8900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5300	0.0430	0.1948
E6 Intermediate floor within a dwelling	11.8100	0.3200	3.7792
E20 Exposed floor (normal)	11.2100	0.3200	3.5872
E21 Exposed floor (inverted)	31.4800	0.0630	1.9832
E10 Eaves (insulation at ceiling level)			12.0682 (36)

Thermal bridges (Sum(L x Psi) calculated using Appendix K) (36a) = 0.0000
Point Thermal bridges (33) + (36) + (36a) = 43.4932 (37)
Total fabric heat loss

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan 24.3339 Feb 24.2319 Mar 24.1319 Apr 23.6624 May 23.5745 Jun 23.1655 Jul 23.1655 Aug 23.0898 Sep 23.3231 Oct 23.5745 Nov 23.7522 Dec 23.9380 (38)
Heat transfer coeff 67.8271 67.7251 67.6251 67.1556 67.0677 66.6588 66.6588 66.5830 66.8163 67.0677 67.2455 67.4313 (39)
Average = Sum(39)m / 12 = 67.1552

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.2454	1.2436	1.2417	1.2331	1.2315	1.2240	1.2240	1.2226	1.2269	1.2315	1.2348	1.2382	(40)
HLP (average)												1.2331	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8215 (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 23.6720 23.3204 22.8254 21.9125 21.2290 20.4711 20.0617 20.5533 21.0886 21.8996 22.8312 23.5920 (42b)
Hot water usage for other uses 33.2842 32.0739 30.8635 29.6532 28.4428 27.2325 27.2325 28.4428 29.6532 30.8635 32.0739 33.2842 (42c)
Average daily hot water use (litres/day) 52.2060 (43)
Daily hot water use Jan 56.9562 Feb 55.3943 Mar 53.6889 Apr 51.5657 May 49.6719 Jun 47.7036 Jul 47.2942 Aug 48.9962 Sep 50.7418 Oct 52.7631 Nov 54.9051 Dec 56.8762 (44)
Energy conte 90.2047 78.8807 82.5178 70.5909 66.8679 58.6572 57.1983 60.6675 62.5697 71.5991 78.2224 89.0543 (45)
Energy content (annual) Total = Sum(45)m = 867.0305
Distribution loss (46)m = 0.15 x (45)m 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (46)
Water storage loss: 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)
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 (57)
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 (59)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)

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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	76.6740	67.0486	70.1401	60.0023	56.8377	49.8586	48.6186	51.5674	53.1843	60.8592	66.4890	75.6962 (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	76.6740	67.0486	70.1401	60.0023	56.8377	49.8586	48.6186	51.5674	53.1843	60.8592	66.4890	75.6962 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											736.9759 (64)
Electric shower(s)	43.8540	39.0743	42.6676	40.7172	41.4812	39.5690	40.8880	41.4812	40.7172	42.6676	41.8653	43.8540 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											498.8364 (64a)
Heat gains from water heating, kWh/month	30.1320	26.5307	28.2019	25.1799	24.5797	22.3569	22.3766	23.2621	23.4754	25.8817	27.0886	29.8875 (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	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	90.2594	99.9300	90.2594	93.2680	90.2594	93.2680	90.2594	90.2594	93.2680	90.2594	93.2680	90.2594	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	158.7929	160.4407	156.2883	147.4485	136.2898	125.8022	118.7958	117.1481	121.3004	130.1402	141.2989	151.7865	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	(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)	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	(71)
Water heating gains (Table 5)	40.5000	39.4802	37.9058	34.9720	33.0373	31.0513	30.0761	31.2663	32.6047	34.7872	37.6230	40.1714	(72)
Total internal gains	339.8751	350.1737	334.7763	326.0113	309.9092	300.4443	289.4541	288.9966	297.4959	305.5096	322.5128	332.5401	(73)

6. Solar gains

[Jan]						Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d		Gains W
North						1.1800	10.6334	0.6600	0.7000	0.7700		4.0173 (74)
West						4.9200	19.6403	0.6600	0.7000	0.7700		30.9377 (80)
Solar gains	34.9549	68.1978	112.7143	166.3154	206.3728	212.5818	201.8301	171.5180	131.6038	80.9515	43.5314	28.7906 (83)
Total gains	374.8300	418.3715	447.4906	492.3267	516.2821	513.0261	491.2843	460.5146	429.0997	386.4612	366.0442	361.3307 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)											
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.8267	38.8852	38.9427	39.2149	39.2663	39.5072	39.5072	39.5522	39.4141	39.2663	39.1625	39.0546
alpha	3.5884	3.5923	3.5962	3.6143	3.6178	3.6338	3.6338	3.6368	3.6276	3.6178	3.6108	3.6036
util living area	0.9873	0.9800	0.9667	0.9285	0.8507	0.7069	0.5564	0.6056	0.8111	0.9436	0.9791	0.9889 (86)
MIT	19.0688	19.2764	19.6112	20.0973	20.5312	20.8372	20.9492	20.9302	20.7127	20.1545	19.5370	19.0328 (87)
Th 2	19.8838	19.8853	19.8868	19.8936	19.8949	19.9009	19.9009	19.9020	19.8986	19.8949	19.8923	19.8896 (88)
util rest of house	0.9842	0.9752	0.9582	0.9089	0.8073	0.6215	0.4342	0.4844	0.7422	0.9243	0.9732	0.9862 (89)
MIT 2	18.1414	18.3479	18.6791	19.1551	19.5574	19.8130	19.8837	19.8762	19.7232	19.2186	18.6129	18.1099 (90)
Living area fraction	18.3241	18.5308	18.8628	19.3408	19.7493	20.0148	20.0937	20.0839	19.9181	19.4030	18.7950	18.2917 (91)
MIT	18.3241	18.5308	18.8628	19.3408	19.7493	20.0148	20.0937	20.0839	19.9181	19.4030	18.7950	18.2917 (92)
Temperature adjustment	18.3241	18.5308	18.8628	19.3408	19.7493	20.0148	20.0937	20.0839	19.9181	19.4030	18.7950	18.2917 (93)
adjusted MIT	18.3241	18.5308	18.8628	19.3408	19.7493	20.0148	20.0937	20.0839	19.9181	19.4030	18.7950	18.2917 (93)

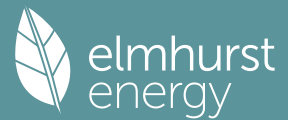
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9783	0.9673	0.9480	0.8968	0.8006	0.6313	0.4569	0.5060	0.7436	0.9132	0.9652	0.9808	(94)
Useful gains	366.6823	404.6853	424.2027	441.5399	413.3234	323.8532	224.4903	233.0244	319.0972	352.9021	353.3024	354.3810	(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													
Space heating kWh	951.2168	923.1487	836.0356	701.1549	539.8460	360.9458	232.8833	245.2831	388.7463	590.3978	786.4328	950.2218	(97)
Space heating requirement - total per year (kWh/year)	434.8937	348.4074	306.4037	186.9227	94.1328	0.0000	0.0000	0.0000	0.0000	176.6968	311.8539	443.3056	(98a)
Solar heating kWh												2302.6166	
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	(98b)
Space heating kWh												0.0000	
Space heating requirement after solar contribution - total per year (kWh/year)	434.8937	348.4074	306.4037	186.9227	94.1328	0.0000	0.0000	0.0000	0.0000	176.6968	311.8539	443.3056	(98c)
Space heating per m2												2302.6166	
										(98c) / (4) =		42.2809	(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	626.5925	493.2749	506.0311	0.0000	0.0000	0.0000	0.0000 (100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7377	0.8155	0.7811	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	462.2160	402.2739	395.2503	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	559.3663	536.0031	501.8628	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	69.9482	99.4945	79.3197	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fc = cooled area / (4) =			1.0000 (105)
Space cooling kWh	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 requirement	0.0000	0.0000	0.0000	0.0000	0.0000	17.4871	24.8736	19.8299	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												62.1906 (107)
Energy for space cooling												42.2809 (99)
Total												1.1420 (108)
Fabric Energy Efficiency (DFEE)												43.4228 (109)
												43.4 (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 (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)	
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	131.5600 (5)	

2. Ventilation rate

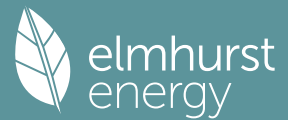
	m ³ per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
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) =	0.1520 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4020	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3116 (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 infiltr rate	0.3972	0.3895	0.3817	0.3427	0.3349	0.2960	0.2960	0.2882	0.3116	0.3349	0.3505	0.3661 (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	0.5789	0.5758	0.5728	0.5587	0.5561	0.5438	0.5438	0.5415	0.5485	0.5561	0.5614	0.5670 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type			6.1000	1.1450	6.9847		(27)
GF			4.2800	0.1300	0.5564		(28b)
Exposed FF			3.4900	0.1300	0.4537		(28b)
Main	91.3080	7.9900	83.3180	0.1800	14.9972		(29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198		(30)
Total net area of external elements Aum(A, m ²)			149.2580				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.4019		(33)
Main dwelling							
Party Wall 1			9.3400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							174.0839 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				6.2800	0.0500	0.3140	
E3 Sill				5.3800	0.0500	0.2690	
E4 Jamb				17.7000	0.0500	0.8850	
E5 Ground floor (normal)				6.0600	0.1600	0.9696	
E7 Party floor between dwellings (in blocks of flats)				16.5200	0.0700	1.1564	
E16 Corner (normal)				14.8000	0.0900	1.3320	
E18 Party wall between dwellings				4.8000	0.0600	0.2880	
P1 Party wall - Ground floor				3.8900	0.0800	0.3112	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				3.8900	0.0000	0.0000	
E6 Intermediate floor within a dwelling				4.5300	0.0000	0.0000	
E20 Exposed floor (normal)				11.8100	0.3200	3.7792	

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E21 Exposed floor (inverted)												
E10 Eaves (insulation at ceiling level)												
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												
Point Thermal bridges												
Total fabric heat loss												
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	25.1330	24.9999	24.8696	24.2571	24.1426	23.6092	23.6092	23.5104	23.8146	24.1426	24.3744	24.6167
Average = Sum(39)m / 12 =	70.3152	70.1822	70.0518	69.4394	69.3248	68.7914	68.7914	68.6927	68.9969	69.3248	69.5566	69.7990
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2911	1.2887	1.2863	1.2751	1.2729	1.2632	1.2632	1.2613	1.2669	1.2729	1.2772	1.2817
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.8215 (42)
Hot water usage for mixer showers												
Hot water usage for baths												
Hot water usage for other uses												
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	56.9562	55.3943	53.6889	51.5657	49.6719	47.7036	47.2942	48.9962	50.7418	52.7631	54.9051	56.8762
Energy conte	90.2047	78.8807	82.5178	70.5909	66.8679	58.6572	57.1983	60.6675	62.5697	71.5991	78.2224	89.0543
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												
Water storage loss:												
Total storage loss												
If cylinder contains dedicated solar storage												
Primary loss												
Combi loss												
Total heat required for water heating calculated for each month												
WWHRS	76.6740	67.0486	70.1401	60.0023	56.8377	49.8586	48.6186	51.5674	53.1843	60.8592	66.4890	75.6962
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
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
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
Output from w/h	76.6740	67.0486	70.1401	60.0023	56.8377	49.8586	48.6186	51.5674	53.1843	60.8592	66.4890	75.6962
12Total per year (kWh/year)												
Electric shower(s)	43.8540	39.0743	42.6676	40.7172	41.4812	39.5690	40.8880	41.4812	40.7172	42.6676	41.8653	43.8540
Heat gains from water heating, kWh/month	30.1320	26.5307	28.2019	25.1799	24.5797	22.3569	22.3766	23.2621	23.4754	25.8817	27.0886	29.8875

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	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760	91.0760
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	90.2594	99.9300	90.2594	93.2680	90.2594	93.2680	90.2594	90.2594	93.2680	90.2594	93.2680	90.2594
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	158.7929	160.4407	156.2883	147.4485	136.2898	125.8022	118.7958	117.1481	121.3004	130.1402	141.2989	151.7865
Pumps, fans	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076	32.1076
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
Water heating gains (Table 5)	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608
Total internal gains	40.5000	39.4802	37.9058	34.9720	33.0373	31.0513	30.0761	31.2663	32.6047	34.7872	37.6230	40.1714

6. Solar gains												
[Jan]												
	Area	Solar flux										
	m2	Table 6a										
		W/m2										
North	1.1800	10.6334										
West	4.9200	19.6403										
Solar gains	33.3661	65.0979	107.5909	158.7556	196.9922	202.9190	192.6560	163.7217	125.6218	77.2719	41.5527	27.4820
Total gains	373.2411	415.2716	442.3672	484.7669	506.9015	503.3633	482.1102	452.7183	423.1177	382.7815	364.0655	360.0221

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)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	37.4528	37.5238	37.5936	37.9252	37.9879	38.2824	38.2824	38.3375	38.1684	37.9879	37.8613	37.7298

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util living area	0.9875	0.9808	0.9686	0.9338	0.8623	0.7254	0.5770	0.6251	0.8235	0.9469	0.9798	0.9890 (86)
MIT	18.9815	19.1885	19.5270	20.0254	20.4776	20.8105	20.9382	20.9168	20.6784	20.0979	19.4664	18.9497 (87)
Th 2	19.8478	19.8497	19.8516	19.8604	19.8621	19.8698	19.8698	19.8712	19.8668	19.8621	19.8587	19.8552 (88)
util rest of house	0.9845	0.9761	0.9605	0.9151	0.8201	0.6392	0.4494	0.4997	0.7554	0.9281	0.9740	0.9864 (89)
MIT 2	18.0294	18.2357	18.5713	19.0620	19.4844	19.7670	19.8490	19.8405	19.6696	19.1405	18.5194	18.0032 (90)
Living area fraction	18.2170	18.4234	18.7596	19.2518	19.6801	19.9726	20.0636	20.0525	19.8684	19.3291	18.7060	18.1897 (91)
Temperature adjustment	18.2170	18.4234	18.7596	19.2518	19.6801	19.9726	20.0636	20.0525	19.8684	19.3291	18.7060	18.1897 (92)
adjusted MIT	18.2170	18.4234	18.7596	19.2518	19.6801	19.9726	20.0636	20.0525	19.8684	19.3291	18.7060	18.1897 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9785	0.9681	0.9501	0.9025	0.8121	0.6480	0.4729	0.5217	0.7555	0.9167	0.9659	0.9809	(94)
Useful gains	365.1999	402.0262	420.3043	437.5134	411.6624	326.1661	227.9928	236.1866	319.6647	350.8868	351.6492	353.1339	(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	978.5756	949.1015	858.8101	718.8235	553.2169	369.5908	238.2655	250.9011	397.9994	605.1437	807.2739	976.4641	(97)
Space heating kWh	456.3515	367.6346	326.2483	202.5432	105.3166	0.0000	0.0000	0.0000	0.0000	189.1672	328.0497	463.7577	(98a)
Space heating requirement - total per year (kWh/year)												2439.0687	
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	456.3515	367.6346	326.2483	202.5432	105.3166	0.0000	0.0000	0.0000	0.0000	189.1672	328.0497	463.7577	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2439.0687	
Space heating per m2										(98c) / (4) =		44.7864	(99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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	646.6396	509.0567	522.0643	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7118	0.7924	0.7574	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	460.3033	403.3753	395.4205	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	548.0721	525.2801	492.7502	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	63.1936	90.6972	72.4133	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	15.7984	22.6743	18.1033	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												56.5760	(107)
Energy for space heating												44.7864	(99)
Energy for space cooling												1.0389	(108)
Total												45.8253	(109)
Fabric Energy Efficiency (TFEE)												45.8	(109)

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

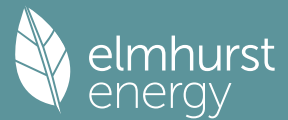
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280	(1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	131.5600	(5)

2. Ventilation rate

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) =	0.1520 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.3520	(18)
Number of sides sheltered		3	(19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.7750 \quad (20)$$
$$(21) = (18) \times (20) = 0.2728 \quad (21)$$

	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													
Effective ac	0.3478	0.3410	0.3342	0.3001	0.2933	0.2592	0.2592	0.2524	0.2728	0.2933	0.3069	0.3206	(22b)
	0.5605	0.5581	0.5558	0.5450	0.5430	0.5336	0.5336	0.5318	0.5372	0.5430	0.5471	0.5514	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Door			1.8900	1.2000	2.2680			(26)
Windows			6.1000	1.3258	8.0871			(27)
GF			4.2800	0.1200	0.5136	110.0000	470.8000	(28b)
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000	(28b)
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800	(29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200	(30)
Total net area of external elements Aum(A, m2)			149.2580					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.4251		(33)
Main dwelling								
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000	(32)
Party Floor 1			38.1100			40.0000	1524.4000	(32d)
Internal Wall 1			108.1900			9.0000	973.7100	(32c)
Internal Floor 1			4.2800			30.0000	128.4000	(32d)
Internal Ceiling 1			4.2800			30.0000	128.4000	(32e)

$$\text{Heat capacity } C_m = \text{Sum}(A \times k) \quad (28) \dots (30) + (32) + (32a) \dots (32e) = 9480.6100 \quad (34)$$
$$\text{Thermal mass parameter (TMP} = C_m / \text{TFA) in kJ/m}^2\text{K} \quad 174.0839 \quad (35)$$

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2800	0.0230	0.1444
E3 Sill	5.3800	0.0210	0.1130
E4 Jamb	17.7000	0.0160	0.2832
E5 Ground floor (normal)	6.0600	0.0580	0.3515
E7 Party floor between dwellings (in blocks of flats)	16.5200	0.0430	0.7104
E16 Corner (normal)	14.8000	0.0370	0.5476
E18 Party wall between dwellings	4.8000	0.0430	0.2064
P1 Party wall - Ground floor	3.8900	0.0430	0.1673
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	3.8900	0.0000	0.0000
E6 Intermediate floor within a dwelling	4.5300	0.0430	0.1948
E20 Exposed floor (normal)	11.8100	0.3200	3.7792
E21 Exposed floor (inverted)	11.2100	0.3200	3.5872
E10 Eaves (insulation at ceiling level)	31.4800	0.0630	1.9832

$$\text{Thermal bridges (Sum}(L \times \text{Psi) calculated using Appendix K)} \quad 12.0682 \quad (36)$$
$$\text{Point Thermal bridges} \quad 0.0000 \quad (36a)$$
$$\text{Total fabric heat loss} \quad (33) + (36) + (36a) = 43.4932 \quad (37)$$

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

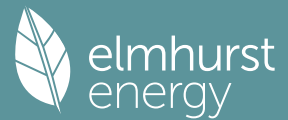
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	24.3339	24.2319	24.1319	23.6624	23.5745	23.1655	23.1655	23.0898	23.3231	23.5745	23.7522	23.9380	(38)
Heat transfer coeff	67.8271	67.7251	67.6251	67.1556	67.0677	66.6588	66.6588	66.5830	66.8163	67.0677	67.2455	67.4313	(39)
Average = Sum(39)m / 12 =												67.1552	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2454	1.2436	1.2417	1.2331	1.2315	1.2240	1.2240	1.2226	1.2269	1.2315	1.2348	1.2382	(40)
HLP (average)												1.2331	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.8215	(42)
Hot water usage for mixer showers	79.0766	77.8882	76.1565	72.8433	70.3982	67.6714	66.1215	67.8401	69.7240	72.6517	76.0361	78.7736	(42a)	
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)	
Hot water usage for other uses	33.2842	32.0739	30.8635	29.6532	28.4428	27.2325	27.2325	28.4428	29.6532	30.8635	32.0739	33.2842	(42c)	
Average daily hot water use (litres/day)													103.1643	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	112.3608	109.9621	107.0201	102.4965	98.8410	94.9039	93.3540	96.2829	99.3772	103.5152	108.1100	112.0578	(44)	
Energy conte	177.9520	156.5845	164.4858	140.3125	133.0590	116.6954	112.9036	119.2184	122.5420	140.4692	154.0225	175.4554	(45)	
Energy content (annual)										Total = Sum(45)m =		1713.7004		
Distribution loss (46)m = 0.15 x (45)m	26.6928	23.4877	24.6729	21.0469	19.9589	17.5043	16.9355	17.8828	18.3813	21.0704	23.1034	26.3183	(46)	
Water storage loss:														
Store volume													173.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):													1.9200	(48)
Temperature factor from Table 2b													0.5400	(49)
Enter (49) or (54) in (55)													1.0368	(55)
Total storage loss	32.1408	29.0304	32.1408	31.1040	32.1408	31.1040	32.1408	32.1408	31.1040	32.1408	31.1040	32.1408	(56)	
If cylinder contains dedicated solar storage	32.1408	29.0304	32.1408	31.1040	32.1408	31.1040	32.1408	32.1408	31.1040	32.1408	31.1040	32.1408	(57)	
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month														
WWHRS	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962	(62)	
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	(63a)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962	(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)	

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Heat gains from water heating, kWh/month
59.1690 52.0644 54.6915 46.6539 44.2421 38.8012 37.5405 39.6401 40.7452 46.7060 51.2125 58.3389 (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	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	25.4085	22.5676	18.3532	13.8946	10.3864	8.7686	9.4748	12.3157	16.5301	20.9888	24.4970	26.1147 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	237.0043	239.4637	233.2661	220.0724	203.4176	187.7645	177.3072	174.8478	181.0454	194.2391	210.8939	226.5470 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506 (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)	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608 (71)
Water heating gains (Table 5)	79.5283	77.4767	73.5101	64.7971	59.4652	53.8906	50.4576	53.2797	56.5906	62.7769	71.1284	78.4125 (72)
Total internal gains	426.1222	423.6891	409.3106	382.9451	357.4502	334.6047	321.4206	324.6243	338.3470	362.1858	390.7003	415.2554 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	1.1800		10.6334		0.6600		0.7000		0.7700		4.0173 (74)	
West	4.9200		19.6403		0.6600		0.7000		0.7700		30.9377 (80)	
Solar gains	34.9549	68.1978	112.7143	166.3154	206.3728	212.5818	201.8301	171.5180	131.6038	80.9515	43.5314	28.7906 (83)
Total gains	461.0771	491.8869	522.0248	549.2605	563.8230	547.1865	523.2508	496.1423	469.9509	443.1373	434.2318	444.0460 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	38.8267	38.8852	38.9427	39.2149	39.2663	39.5072	39.5072	39.5522	39.4141	39.2663	39.1625	39.0546
alpha	3.5884	3.5923	3.5962	3.6143	3.6178	3.6338	3.6338	3.6368	3.6276	3.6178	3.6108	3.6036
util living area	0.9760	0.9677	0.9487	0.9059	0.8211	0.6781	0.5283	0.5716	0.7763	0.9194	0.9654	0.9789 (86)
MIT	19.2713	19.4436	19.7700	20.2000	20.5916	20.8585	20.9570	20.9422	20.7554	20.2631	19.6913	19.2291 (87)
Th 2	19.8838	19.8853	19.8868	19.8936	19.8949	19.9009	19.9009	19.9020	19.8986	19.8949	19.8923	19.8896 (88)
util rest of house	0.9706	0.9604	0.9365	0.8819	0.7733	0.5920	0.4099	0.4535	0.7028	0.8939	0.9562	0.9741 (89)
MIT 2	17.9035	18.1218	18.5325	19.0663	19.5246	19.8048	19.8826	19.8752	19.7120	19.1541	18.4426	17.8539 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.1730	18.3822	18.7763	19.2897	19.7348	20.0124	20.0943	20.0855	19.9176	19.3726	18.6887	18.1249 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.1730	18.3822	18.7763	19.2897	19.7348	20.0124	20.0943	20.0855	19.9176	19.3726	18.6887	18.1249 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9590	0.9469	0.9206	0.8659	0.7654	0.6015	0.4318	0.4745	0.7042	0.8787	0.9425	0.9634 (94)
Useful gains	442.1790	465.7716	480.5748	475.6233	431.5385	329.1342	225.9374	235.4244	330.9604	389.3955	409.2757	427.7767 (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	940.9623	913.0864	830.1886	697.7233	538.8771	360.7825	232.9274	245.3891	388.7090	588.3564	779.2851	938.9724 (97)
Space heating kWh	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296 (98a)
Space heating requirement - total per year (kWh/year)												1966.3382
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	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1966.3382
Space heating per m ²												(98c) / (4) = 36.1061 (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	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296 (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)	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296 (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)												

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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 used, main 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	(215)
												0.0000	(213)
Water heating													
Water heating requirement	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962	(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													(217)
Fuel for water heating, kWh/month	69.3479	61.2682	64.9029	56.5815	54.5295	48.7859	47.8766	49.9609	50.7158	56.9754	61.1069	68.5238	(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	22.2400	17.8417	16.0645	11.7695	9.0911	7.4275	8.2932	10.7799	14.0020	18.3713	20.7504	22.8581	(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												1966.3382	(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												690.5753	(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)												179.4891	(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												2836.4027	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1966.3382	16.4900	324.2492	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	690.5753	16.4900	113.8759	(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	179.4891	16.4900	29.5978	(250)
Additional standing charges			0.0000	(251)
Total energy cost			467.7228	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600	(256)
Energy cost factor (ECF)	1.6929	(257)
SAP value	72.5574	
SAP rating (Section 12)	73	(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	1966.3382	0.1547	304.1427	(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)	690.5753	0.1411	97.4225	(264)
Space and water heating			401.5653	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	179.4891	0.1443	25.9058	(268)
Total CO2, kg/year			427.4711	(272)
CO2 emissions per m2			7.8500	(273)
EI value			94.2408	
EI rating			94	(274)
EI band			A	

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1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.5600 (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) = 0.1520 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	4.0000	(17)
Infiltration rate	0.3520	(18)
Number of sides sheltered	3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2728 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.1000	4.1000	3.8000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.0750	1.0250	1.0250	0.9500	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.2933	0.2796	0.2796	0.2592	0.2660	0.2319	0.2319	0.2251	0.2319	0.2592	0.2524	0.2728 (22b)
Effective ac	0.5430	0.5391	0.5391	0.5336	0.5354	0.5269	0.5269	0.5253	0.5269	0.5336	0.5318	0.5372 (25)

3. Heat losses and heat loss parameter

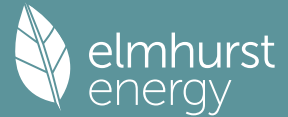
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			1.8900	1.2000	2.2680		(26)
Windows			6.1000	1.3258	8.0871		(27)
GF			4.2800	0.1200	0.5136		(28b)
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000 (28b)
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800 (29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200 (30)
Total net area of external elements Aum(A, m ²)			149.2580				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.4251		(33)
Main dwelling							
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000 (32)
Party Floor 1			38.1100			40.0000	1524.4000 (32d)
Internal Wall 1			108.1900			9.0000	973.7100 (32c)
Internal Floor 1			4.2800			30.0000	128.4000 (32d)
Internal Ceiling 1			4.2800			30.0000	128.4000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9480.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		174.0839 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.2800	0.0230	0.1444
E2 Other lintels (including other steel lintels)	5.3800	0.0210	0.1130
E3 Sill	17.7000	0.0160	0.2832
E4 Jamb	6.0600	0.0580	0.3515
E5 Ground floor (normal)	16.5200	0.0430	0.7104
E7 Party floor between dwellings (in blocks of flats)	14.8000	0.0370	0.5476
E16 Corner (normal)	4.8000	0.0430	0.2064
E18 Party wall between dwellings	3.8900	0.0430	0.1673
P1 Party wall - Ground floor	3.8900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5300	0.0430	0.1948
E6 Intermediate floor within a dwelling	11.8100	0.3200	3.7792
E20 Exposed floor (normal)	11.2100	0.3200	3.5872
E21 Exposed floor (inverted)	31.4800	0.0630	1.9832
E10 Eaves (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.0682 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 43.4932 (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	23.5745	23.4049	23.4049	23.1655	23.2433	22.8747	22.8747	22.8071	22.8747	23.1655	23.0898	23.3231 (38)
Average = Sum(39)m / 12 =	67.0677	66.8981	66.8981	66.6588	66.7365	66.3680	66.3680	66.3003	66.3680	66.6588	66.5830	66.8163 (39)
												66.6435
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2315	1.2284	1.2284	1.2240	1.2254	1.2187	1.2187	1.2174	1.2187	1.2240	1.2226	1.2269 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8215 (42)
Hot water usage for mixer showers												78.7736 (42a)
Hot water usage for baths												0.0000 (42b)
Hot water usage for other uses												33.2842 (42c)
Average daily hot water use (litres/day)												103.1643 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	112.3608	109.9621	107.0201	102.4965	98.8410	94.9039	93.3540	96.2829	99.3772	103.5152	108.1100	112.0578 (44)
Distribution loss (46)m = 0.15 x (45)m	177.9520	156.5845	164.4858	140.3125	133.0590	116.6954	112.9036	119.2184	122.5420	140.4692	154.0225	175.4554 (45)
Water storage loss:												173.0000 (47)
Store volume												1.9200 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												1.0368 (55)
Enter (49) or (54) in (55)												32.1408 (56)
Total storage loss												32.1408 (57)
If cylinder contains dedicated solar storage												0.0000 (59)
Primary loss												0.0000 (61)
Combi loss												0.0000 (62)
Total heat required for water heating calculated for each month												207.5962 (63a)
WWHRS												0.0000 (63b)
PV diverter												0.0000 (63c)
Solar input												0.0000 (63d)
FGHRS												0.0000 (64)
Output from w/h												207.5962 (64)
Electric shower(s)												0.0000 (64a)
Heat gains from water heating, kWh/month												58.3389 (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	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912	109.2912 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	25.4085	22.5676	18.3532	13.8946	10.3864	8.7686	9.4748	12.3157	16.5301	20.9888	24.4970	26.1147 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	237.0043	239.4637	233.2661	220.0724	203.4176	187.7645	177.3072	174.8478	181.0454	194.2391	210.8939	226.5470 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506	47.7506 (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)	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608	-72.8608 (71)
Water heating gains (Table 5)	79.5283	77.4767	73.5101	64.7971	59.4652	53.8906	50.4576	53.2797	56.5906	62.7769	71.1284	78.4125 (72)
Total internal gains	426.1222	423.6891	409.3106	382.9451	357.4502	334.6047	321.4206	324.6243	338.3470	362.1858	390.7003	415.2554 (73)

6. Solar gains

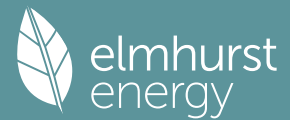
[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W			
North				1.1800	12.7650	0.6600	0.7000	0.7700	4.8226 (74)			
West				4.9200	23.8018	0.6600	0.7000	0.7700	37.4929 (80)			
Solar gains	42.3155	72.1912	118.4105	177.1141	213.7984	232.7955	218.9079	190.9756	147.3048	91.9770	51.9275	35.0431 (83)
Total gains	468.4377	495.8803	527.7211	560.0592	571.2486	567.4002	540.3286	515.5999	485.6518	454.1628	442.6279	450.2985 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	39.2663	39.3659	39.3659	39.5072	39.4612	39.6803	39.6803	39.7208	39.6803	39.5072	39.5522	39.4141
alpha	3.6178	3.6244	3.6244	3.6338	3.6307	3.6454	3.6454	3.6481	3.6454	3.6338	3.6368	3.6276
util living area	0.9708	0.9614	0.9366	0.8781	0.7619	0.5650	0.3962	0.4249	0.7011	0.8924	0.9554	0.9739 (86)
MIT	19.4461	19.6098	19.9435	20.3685	20.7320	20.9376	20.9875	20.9838	20.8529	20.4199	19.8729	19.4134 (87)
Th 2	19.8949	19.8974	19.8974	19.9009	19.8997	19.9051	19.9051	19.9061	19.9051	19.9009	19.9020	19.8986 (88)
util rest of house	0.9639	0.9523	0.9210	0.8467	0.6993	0.4624	0.2692	0.2941	0.6094	0.8579	0.9431	0.9678 (89)
MIT 2	18.1322	18.3394	18.7555	19.2725	19.6788	19.8721	19.9021	19.9019	19.8084	19.3445	18.6768	18.0938 (90)
Living area fraction	18.3911	18.5897	18.9895	19.4884	19.8864	20.0820	20.1160	20.1151	20.0142	19.5563	18.9125	18.3538 (91)
MIT	18.3911	18.5897	18.9895	19.4884	19.8864	20.0820	20.1160	20.1151	20.0142	19.5563	18.9125	18.3538 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3911	18.5897	18.9895	19.4884	19.8864	20.0820	20.1160	20.1151	20.0142	19.5563	18.9125	18.3538 (93)

8. Space heating requirement

Full SAP Calculation Printout



	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9512	0.9380	0.9047	0.8327	0.6985	0.4799	0.2943	0.3198	0.6195	0.8446	0.9284	0.9558	(94)
Useful gains	445.5894	465.1320	477.4384	466.3861	398.9966	272.3017	158.9920	164.9043	300.8598	383.5829	410.9204	430.3942	(95)
Ext temp.	5.1000	5.7000	7.4000	9.9000	12.9000	15.8000	17.7000	17.6000	15.0000	11.5000	8.0000	5.1000	(96)
Heat loss rate W	891.4007	862.2981	775.3183	639.1524	466.2448	284.1879	160.3421	166.7504	332.7799	537.0260	726.5862	885.5708	(97)
Space heating kWh	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514	(98a)
Space heating requirement - total per year (kWh/year)												1674.7187	
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	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1674.7187	
Space heating per m2										(98c) / (4) =		30.7514	(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	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514	(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)	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514	(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	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962	(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)	
Fuel for water heating, kWh/month	69.3479	61.2682	64.9029	56.5815	54.5295	48.7859	47.8766	49.9609	50.7158	56.9754	61.1069	68.5238	(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	22.2400	17.8417	16.0645	11.7695	9.0911	7.4275	8.2932	10.7799	14.0020	18.3713	20.7504	22.8581	(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													1674.7187	(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													690.5753	(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)													179.4891	(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													2544.7831	(238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1674.7187	28.4300	476.1225	(240)
Space heating - main system 2	0.0000	28.4300	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	690.5753	28.4300	196.3306	(247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	179.4891	28.4300	51.0288	(250)
Additional standing charges			0.0000	(251)
Total energy cost			723.4818	(255)

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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	1674.7187	0.1553	260.1137 (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)	690.5753	0.1411	97.4225 (264)
Space and water heating			357.5362 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	179.4891	0.1443	25.9058 (268)
Total CO2, kg/year			383.4420 (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	1674.7187	1.5750	2637.7413 (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)	690.5753	1.5217	1050.8145 (278)
Space and water heating			3688.5559 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	179.4891	1.5338	275.3064 (282)
Total Primary energy kWh/year			3963.8623 (286)

SAP 10 EPC IMPROVEMENTS

1a FF

Current energy efficiency rating: C 73
Current environmental impact rating: A 94

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)

Recommended measures Typical annual savings Energy Environmental
(none) efficiency impact
Total Savings £0 0.00 kg/m²

Potential energy efficiency rating: C 73
Potential environmental impact rating: A 94

Fuel prices for cost data on this page from database revision number 577 TEST (01 Aug 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £723	Potential £723	Saving £0
Electricity			
Space heating	£476	£476	£0
Water heating	£196	£196	£0
Lighting	£51	£51	£0
Total cost of fuels	£723	£723	£0
Total cost of uses	£723	£723	£0
Delivered energy	47 kWh/m²	47 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.4 tonnes	0.4 tonnes	0.0 tonnes
CO2 emissions per m²	7 kg/m²	7 kg/m²	0 kg/m²
Primary energy	73 kWh/m²	73 kWh/m²	0 kWh/m²

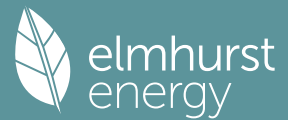
SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022) CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 131.5600 (5)

2. Ventilation rate

Full SAP Calculation Printout



											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)
													Air changes per hour
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											20.0000 / (5) =	0.1520 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												4.0000	(17)
Infiltration rate												0.3520	(18)
Number of sides sheltered												3	(19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.2728 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)	
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)	
	0.3478	0.3410	0.3342	0.3001	0.2933	0.2592	0.2592	0.2524	0.2728	0.2933	0.3069	0.3206 (22b)	
Effective ac	0.5605	0.5581	0.5558	0.5450	0.5430	0.5336	0.5336	0.5318	0.5372	0.5430	0.5471	0.5514 (25)	

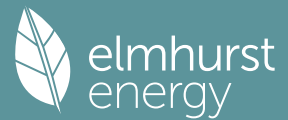
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Main dwelling												
Door			1.8900	1.2000	2.2680		(26)					
Windows			6.1000	1.3258	8.0871		(27)					
GF			4.2800	0.1200	0.5136	110.0000	470.8000 (28b)					
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000 (28b)					
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800 (29a)					
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200 (30)					
Total net area of external elements Aum(A, m2)			149.2580				(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.4251	(33)					
Main dwelling												
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000 (32)					
Party Floor 1			38.1100			40.0000	1524.4000 (32d)					
Internal Wall 1			108.1900			9.0000	973.7100 (32c)					
Internal Floor 1			4.2800			30.0000	128.4000 (32d)					
Internal Ceiling 1			4.2800			30.0000	128.4000 (32e)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							9480.6100 (34)					
List of Thermal Bridges							174.0839 (35)					
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				6.2800	0.0230	0.1444						
E3 Sill				5.3800	0.0210	0.1130						
E4 Jamb				17.7000	0.0160	0.2832						
E5 Ground floor (normal)				6.0600	0.0580	0.3515						
E7 Party floor between dwellings (in blocks of flats)				16.5200	0.0430	0.7104						
E16 Corner (normal)				14.8000	0.0370	0.5476						
E18 Party wall between dwellings				4.8000	0.0430	0.2064						
P1 Party wall - Ground floor				3.8900	0.0430	0.1673						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				3.8900	0.0000	0.0000						
E6 Intermediate floor within a dwelling				4.5300	0.0430	0.1948						
E20 Exposed floor (normal)				11.8100	0.3200	3.7792						
E21 Exposed floor (inverted)				11.2100	0.3200	3.5872						
E10 Eaves (insulation at ceiling level)				31.4800	0.0630	1.9832						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							12.0682 (36)					
Point Thermal Bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	43.4932 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 24.3339	Feb 24.2319	Mar 24.1319	Apr 23.6624	May 23.5745	Jun 23.1655	Jul 23.1655	Aug 23.0898	Sep 23.3231	Oct 23.5745	Nov 23.7522	Dec 23.9380 (38)
Heat transfer coeff	67.8271	67.7251	67.6251	67.1556	67.0677	66.6588	66.6588	66.5830	66.8163	67.0677	67.2455	67.4313 (39)
Average = Sum(39)m / 12 =												67.1552
HLP	Jan 1.2454	Feb 1.2436	Mar 1.2417	Apr 1.2331	May 1.2315	Jun 1.2240	Jul 1.2240	Aug 1.2226	Sep 1.2269	Oct 1.2315	Nov 1.2348	Dec 1.2382 (40)
HLP (average)												1.2331
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.8215 (42)											
Hot water usage for mixer showers	79.0766 77.8882 76.1565 72.8433 70.3982 67.6714 66.1215 67.8401 69.7240 72.6517 76.0361 78.7736 (42a)											
Hot water usage for baths	0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42b)											
Hot water usage for other uses	33.2842 32.0739 30.8635 29.6532 28.4428 27.2325 27.2325 28.4428 29.6532 30.8635 32.0739 33.2842 (42c)											
Average daily hot water use (litres/day)	103.1643 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	112.3608	109.9621	107.0201	102.4965	98.8410	94.9039	93.3540	96.2829	99.3772	103.5152	108.1100	112.0578
Energy content (annual)	177.9520	156.5845	164.4858	140.3125	133.0590	116.6954	112.9036	119.2184	122.5420	140.4692	154.0225	175.4554
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m = 1713.7004											
Water storage loss:	26.6928	23.4877	24.6729	21.0469	19.9589	17.5043	16.9355	17.8828	18.3813	21.0704	23.1034	26.3183
Store volume	173.0000 (47)											

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a) If manufacturer declared loss factor is known (kWh/day):	1.9200	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	1.0368	(55)
Total storage loss		
32.1408 29.0304 32.1408 31.1040 32.1408 31.1040 32.1408 32.1408 31.1040 32.1408 31.1040 32.1408 (56)		
If cylinder contains dedicated solar storage		
32.1408 29.0304 32.1408 31.1040 32.1408 31.1040 32.1408 32.1408 31.1040 32.1408 31.1040 32.1408 (57)		
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)		
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)		
Total heat required for water heating calculated for each month		
210.0928 185.6149 196.6266 171.4165 165.1998 147.7994 145.0444 151.3592 153.6460 172.6100 185.1265 207.5962 (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		
210.0928 185.6149 196.6266 171.4165 165.1998 147.7994 145.0444 151.3592 153.6460 172.6100 185.1265 207.5962 (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)		
Heat gains from water heating, kWh/month		
59.1690 52.0644 54.6915 46.6539 44.2421 38.8012 37.5405 39.6401 40.7452 46.7060 51.2125 58.3389 (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
109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 (66)												
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
25.4085 22.5676 18.3532 13.8946 10.3864 8.7686 9.4748 12.3157 16.5301 20.9888 24.4970 26.1147 (67)												
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
237.0043 239.4637 233.2661 220.0724 203.4176 187.7645 177.3072 174.8478 181.0454 194.2391 210.8939 226.5470 (68)												
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 (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)												
-72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 (71)												
Water heating gains (Table 5)												
79.5283 77.4767 73.5101 64.7971 59.4652 53.8906 50.4576 53.2797 56.5906 62.7769 71.1284 78.4125 (72)												
Total internal gains												
426.1222 423.6891 409.3106 382.9451 357.4502 334.6047 321.4206 324.6243 338.3470 362.1858 390.7003 415.2554 (73)												

6. Solar gains

[Jan]												Gains
	Area					Solar flux	g	FF	Access			W
	m2					Table 6a	Specific data	Specific data	factor			
						W/m2	or Table 6b	or Table 6c	Table 6d			
North	1.1800					10.6334	0.6600	0.7000	0.7700			4.0173 (74)
West	4.9200					19.6403	0.6600	0.7000	0.7700			30.9377 (80)
Solar gains	34.9549	68.1978	112.7143	166.3154	206.3728	212.5818	201.8301	171.5180	131.6038	80.9515	43.5314	28.7906 (83)
Total gains	461.0771	491.8869	522.0248	549.2605	563.8230	547.1865	523.2508	496.1423	469.9509	443.1373	434.2318	444.0460 (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)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
38.8267 38.8852 38.9427 39.2149 39.2663 39.5072 39.5072 39.5522 39.4141 39.2663 39.1625 39.0546												
alpha	3.5884	3.5923	3.5962	3.6143	3.6178	3.6338	3.6338	3.6368	3.6276	3.6178	3.6108	3.6036
util living area												
0.9760 0.9677 0.9487 0.9059 0.8211 0.6781 0.5283 0.5716 0.7763 0.9194 0.9654 0.9789 (86)												
MIT	19.2713	19.4436	19.7700	20.2000	20.5916	20.8585	20.9570	20.9422	20.7554	20.2631	19.6913	19.2291 (87)
Th 2	19.8838	19.8853	19.8868	19.8936	19.8949	19.9009	19.9009	19.9020	19.8986	19.8949	19.8923	19.8896 (88)
util rest of house												
0.9706 0.9604 0.9365 0.8819 0.7733 0.5920 0.4099 0.4535 0.7028 0.8939 0.9562 0.9741 (89)												
MIT 2	17.9035	18.1218	18.5325	19.0663	19.5246	19.8048	19.8826	19.8752	19.7120	19.1541	18.4426	17.8539 (90)
Living area fraction												
MIT	18.1730	18.3822	18.7763	19.2897	19.7348	20.0124	20.0943	20.0855	19.9176	19.3726	18.6887	18.1249 (92)
Temperature adjustment												0.0000
adjusted MIT	18.1730	18.3822	18.7763	19.2897	19.7348	20.0124	20.0943	20.0855	19.9176	19.3726	18.6887	18.1249 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
0.9590 0.9469 0.9206 0.8659 0.7654 0.6015 0.4318 0.4745 0.7042 0.8787 0.9425 0.9634 (94)												
Useful gains	442.1790	465.7716	480.5748	475.6233	431.5385	329.1342	225.9374	235.4244	330.9604	389.3955	409.2757	427.7767 (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												
940.9623 913.0864 830.1886 697.7233 538.8771 360.7825 232.9274 245.3891 388.7090 588.3564 779.2851 938.9724 (97)												
Space heating kWh												
371.0947 300.5956 260.1127 159.9120 79.8599 0.0000 0.0000 0.0000 0.0000 148.0269 266.4068 380.3296 (98a)												
Space heating requirement - total per year (kWh/year)												1966.3382
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												
371.0947 300.5956 260.1127 159.9120 79.8599 0.0000 0.0000 0.0000 0.0000 148.0269 266.4068 380.3296 (98c)												
Space heating requirement after solar contribution - total per year (kWh/year)												1966.3382
Space heating per m2												36.1061 (99)

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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	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296	(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)	371.0947	300.5956	260.1127	159.9120	79.8599	0.0000	0.0000	0.0000	0.0000	148.0269	266.4068	380.3296	(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	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962	(64)
Efficiency of water heater												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	69.3479	61.2682	64.9029	56.5815	54.5295	48.7859	47.8766	49.9609	50.7158	56.9754	61.1069	68.5238	(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	22.2400	17.8417	16.0645	11.7695	9.0911	7.4275	8.2932	10.7799	14.0020	18.3713	20.7504	22.8581	(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												1966.3382	(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												690.5753	(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)												179.4891	(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												2836.4027	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1966.3382	16.4900	324.2492 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	690.5753	16.4900	113.8759 (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	179.4891	16.4900	29.5978 (250)
Additional standing charges			0.0000 (251)
Total energy cost			467.7228 (255)

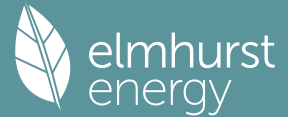
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.6929 (257)
SAP value	72.5574
SAP rating (Section 12)	73 (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	1966.3382	0.1547	304.1427 (261)

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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)	690.5753	0.1411	97.4225 (264)
Space and water heating			401.5653 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	179.4891	0.1443	25.9058 (268)
Total CO2, kg/year			427.4711 (272)
CO2 emissions per m2			7.8500 (273)
EI value			94.2408
EI rating			94 (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)
Main dwelling			
Ground floor	4.2800 (1b)	x 2.6000 (2b)	= 11.1280 (1b) - (3b)
First floor	50.1800 (1c)	x 2.4000 (2c)	= 120.4320 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	54.4600		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	131.5600 (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) = 0.1520 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	4.0000 (17)
Infiltration rate	0.3520 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2728 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.3000	4.1000	4.1000	3.8000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.0750	1.0250	1.0250	0.9500	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.2933	0.2796	0.2796	0.2592	0.2660	0.2319	0.2319	0.2251	0.2319	0.2592	0.2524	0.2728 (22b)
Effective ac	0.5430	0.5391	0.5391	0.5336	0.5354	0.5269	0.5269	0.5253	0.5269	0.5336	0.5318	0.5372 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
Door			1.8900	1.2000	2.2680		(26)
Windows			6.1000	1.3258	8.0871		(27)
GF			4.2800	0.1200	0.5136	110.0000	470.8000 (28b)
Exposed FF			3.4900	0.2500	0.8725	110.0000	383.9000 (28b)
Main	91.3080	7.9900	83.3180	0.1700	14.1641	60.0000	4999.0800 (29a)
External Roof 1	50.1800		50.1800	0.1100	5.5198	9.0000	451.6200 (30)
Total net area of external elements Aum(A, m2)			149.2580				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.4251		(33)
Main dwelling							
Party Wall 1			9.3400	0.0000	0.0000	45.0000	420.3000 (32)
Party Floor 1			38.1100			40.0000	1524.4000 (32d)
Internal Wall 1			108.1900			9.0000	973.7100 (32c)
Internal Floor 1			4.2800			30.0000	128.4000 (32d)
Internal Ceiling 1			4.2800			30.0000	128.4000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9480.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		174.0839 (35)

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	6.2800	0.0230	0.1444
E2 Other lintels (including other steel lintels)	5.3800	0.0210	0.1130
E3 Sill	17.7000	0.0160	0.2832
E4 Jamb	6.0600	0.0580	0.3515
E5 Ground floor (normal)	16.5200	0.0430	0.7104
E7 Party floor between dwellings (in blocks of flats)	14.8000	0.0370	0.5476
E16 Corner (normal)	4.8000	0.0430	0.2064
E18 Party wall between dwellings	3.8900	0.0430	0.1673
P1 Party wall - Ground floor	3.8900	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	4.5300	0.0430	0.1948
E6 Intermediate floor within a dwelling	11.8100	0.3200	3.7792
E20 Exposed floor (normal)	11.2100	0.3200	3.5872
E21 Exposed floor (inverted)			

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E10 Eaves (insulation at ceiling level) 31.4800 0.0630 1.9832
 Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.0682 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 43.4932 (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 23.5745 23.4049 23.4049 23.1655 23.2433 22.8747 22.8747 22.8071 22.8747 23.1655 23.0898 23.3231 (38)
 Average = Sum(39)m / 12 = 67.0677 66.8981 66.8981 66.6588 66.7365 66.3680 66.3680 66.3003 66.3680 66.6588 66.5830 66.8163 (39)
 66.6435

HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 HLP (average) 1.2315 1.2284 1.2284 1.2240 1.2254 1.2187 1.2187 1.2174 1.2187 1.2240 1.2226 1.2269 (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 1.8215 (42)
 Hot water usage for mixer showers 79.0766 77.8882 76.1565 72.8433 70.3982 67.6714 66.1215 67.8401 69.7240 72.6517 76.0361 78.7736 (42a)
 Hot water usage for baths 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42b)
 Hot water usage for other uses 33.2842 32.0739 30.8635 29.6532 28.4428 27.2325 27.2325 28.4428 29.6532 30.8635 32.0739 33.2842 (42c)
 Average daily hot water use (litres/day) 103.1643 (43)
 Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
 Energy conte 112.3608 109.9621 107.0201 102.4965 98.8410 94.9039 93.3540 96.2829 99.3772 103.5152 108.1100 112.0578 (44)
 Energy content (annual) 177.9520 156.5845 164.4858 140.3125 133.0590 116.6954 112.9036 119.2184 122.5420 140.4692 154.0225 175.4554 (45)
 Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1713.7004
 26.6928 23.4877 24.6729 21.0469 19.9589 17.5043 16.9355 17.8828 18.3813 21.0704 23.1034 26.3183 (46)
 Water storage loss:
 Store volume 173.0000 (47)
 a) If manufacturer declared loss factor is known (kWh/day): 1.9200 (48)
 Temperature factor from Table 2b 0.5400 (49)
 Enter (49) or (54) in (55) 1.0368 (55)
 Total storage loss
 If cylinder contains dedicated solar storage 32.1408 29.0304 32.1408 31.1040 32.1408 31.1040 32.1408 32.1408 31.1040 32.1408 31.1040 32.1408 (56)
 Primary loss 32.1408 29.0304 32.1408 31.1040 32.1408 31.1040 32.1408 32.1408 31.1040 32.1408 31.1040 32.1408 (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 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
 WWHRs 210.0928 185.6149 196.6266 171.4165 165.1998 147.7994 145.0444 151.3592 153.6460 172.6100 185.1265 207.5962 (62)
 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 (63a)
 Solar input 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63b)
 FGHRs 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (63d)
 Output from w/h 210.0928 185.6149 196.6266 171.4165 165.1998 147.7994 145.0444 151.3592 153.6460 172.6100 185.1265 207.5962 (64)
 Total per year (kWh/year) = Sum(64)m = 2092.1324 (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 59.1690 52.0644 54.6915 46.6539 44.2421 38.8012 37.5405 39.6401 40.7452 46.7060 51.2125 58.3389 (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 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 109.2912 (66)
 Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 25.4085 22.5676 18.3532 13.8946 10.3864 8.7686 9.4748 12.3157 16.5301 20.9888 24.4970 26.1147 (67)
 Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 237.0043 239.4637 233.2661 220.0724 203.4176 187.7645 177.3072 174.8478 181.0454 194.2391 210.8939 226.5470 (68)
 Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 47.7506 (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) -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 -72.8608 (71)
 Water heating gains (Table 5) 79.5283 77.4767 73.5101 64.7971 59.4652 53.8906 50.4576 53.2797 56.5906 62.7769 71.1284 78.4125 (72)
 Total internal gains 426.1222 423.6891 409.3106 382.9451 357.4502 334.6047 321.4206 324.6243 338.3470 362.1858 390.7003 415.2554 (73)

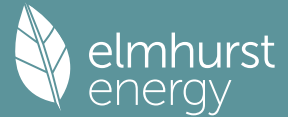
6. Solar gains

[Jan] Area Solar flux g Specific data FF Access Gains
 m2 Table 6a W/m2 or Table 6b or Table 6c factor Table 6d W
 North 1.1800 12.7650 0.6600 0.7000 0.7700 4.8226 (74)
 West 4.9200 23.8018 0.6600 0.7000 0.7700 37.4929 (80)
 Solar gains 42.3155 72.1912 118.4105 177.1141 213.7984 232.7955 218.9079 190.9756 147.3048 91.9770 51.9275 35.0431 (83)
 Total gains 468.4377 495.8803 527.7211 560.0592 571.2486 567.4002 540.3286 515.5999 485.6518 454.1628 442.6279 450.2985 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
 Utilisation factor for gains for living area, nil,m (see Table 9a)
 Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec

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tau	39.2663	39.3659	39.3659	39.5072	39.4612	39.6803	39.6803	39.7208	39.6803	39.5072	39.5522	39.4141
alpha	3.6178	3.6244	3.6244	3.6338	3.6307	3.6454	3.6454	3.6481	3.6454	3.6338	3.6368	3.6276
util living area	0.9708	0.9614	0.9366	0.8781	0.7619	0.5650	0.3962	0.4249	0.7011	0.8924	0.9554	0.9739 (86)
MIT	19.4461	19.6098	19.9435	20.3685	20.7320	20.9376	20.9875	20.9838	20.8529	20.4199	19.8729	19.4134 (87)
Th 2	19.8949	19.8974	19.8974	19.9009	19.8997	19.9051	19.9051	19.9061	19.9051	19.9009	19.9020	19.8986 (88)
util rest of house	0.9639	0.9523	0.9210	0.8467	0.6993	0.4624	0.2692	0.2941	0.6094	0.8579	0.9431	0.9678 (89)
MIT 2	18.1322	18.3394	18.7555	19.2725	19.6788	19.8721	19.9021	19.9019	19.8084	19.3445	18.6768	18.0938 (90)
Living area fraction	FLA = Living area / (4) = 0.1970 (91)											
MIT	18.3911	18.5897	18.9895	19.4884	19.8864	20.0820	20.1160	20.1151	20.0142	19.5563	18.9125	18.3538 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.3911	18.5897	18.9895	19.4884	19.8864	20.0820	20.1160	20.1151	20.0142	19.5563	18.9125	18.3538 (93)

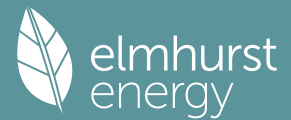
8. Space heating requirement

Utilisation	Jan 0.9512	Feb 0.9380	Mar 0.9047	Apr 0.8327	May 0.6985	Jun 0.4799	Jul 0.2943	Aug 0.3198	Sep 0.6195	Oct 0.8446	Nov 0.9284	Dec 0.9558 (94)
Useful gains	445.5894	465.1320	477.4384	466.3861	398.9966	272.3017	158.9920	164.9043	300.8598	383.5829	410.9204	430.3942 (95)
Ext temp.	5.1000	5.7000	7.4000	9.9000	12.9000	15.8000	17.7000	17.6000	15.0000	11.5000	8.0000	5.1000 (96)
Heat loss rate W	891.4007	862.2981	775.3183	639.1524	466.2448	284.1879	160.3421	166.7504	332.7799	537.0260	726.5862	885.5708 (97)
Space heating kWh	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514 (98a)
Space heating requirement - total per year (kWh/year)	1674.7187											
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	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1674.7187											
Space heating per m2	(98c) / (4) = 30.7514 (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)											
Space heating requirement	Jan 331.6836	Feb 266.8956	Mar 221.6227	Apr 124.3917	May 50.0327	Jun 0.0000	Jul 0.0000	Aug 0.0000	Sep 0.0000	Oct 114.1616	Nov 227.2794	Dec 338.6514 (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)	331.6836	266.8956	221.6227	124.3917	50.0327	0.0000	0.0000	0.0000	0.0000	114.1616	227.2794	338.6514 (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	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												
Water heating requirement	210.0928	185.6149	196.6266	171.4165	165.1998	147.7994	145.0444	151.3592	153.6460	172.6100	185.1265	207.5962 (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)
Fuel for water heating, kWh/month	69.3479	61.2682	64.9029	56.5815	54.5295	48.7859	47.8766	49.9609	50.7158	56.9754	61.1069	68.5238 (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	22.2400	17.8417	16.0645	11.7695	9.0911	7.4275	8.2932	10.7799	14.0020	18.3713	20.7504	22.8581 (232)
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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	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)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1674.7187 (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												690.5753 (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)												179.4891 (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												

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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2544.7831 (238)

10a. Fuel costs - using BEDF prices (577)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1674.7187	28.4300	476.1225 (240)
Space heating - main system 2	0.0000	28.4300	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	690.5753	28.4300	196.3306 (247)
Energy for instantaneous electric shower(s)	0.0000	28.4300	0.0000 (247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (249)
Energy for lighting	179.4891	28.4300	51.0288 (250)
Additional standing charges			0.0000 (251)
Total energy cost			723.4818 (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	1674.7187	0.1553	260.1137 (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)	690.5753	0.1411	97.4225 (264)
Space and water heating			357.5362 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	179.4891	0.1443	25.9058 (268)
Total CO2, kg/year			383.4420 (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	1674.7187	1.5750	2637.7413 (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)	690.5753	1.5217	1050.8145 (278)
Space and water heating			3688.5559 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	179.4891	1.5338	275.3064 (282)
Total Primary energy kWh/year			3963.8623 (286)

Summary for Input Data



Property Reference	1a Eaton Place FF		Issued on Date	04/09/2025
Assessment Reference	1a FF	Prop Type Ref		
Property	1a Eaton Place, RG1 7LP			

SAP Rating	73 C	DER	8.19	TER	14.48
Environmental	94 A	% DER < TER			43.44
CO ₂ Emissions (t/year)	0.38	DFEE	43.42	TFEE	45.83
Compliance Check	See BREL	% DFEE < TFEE			5.24
% DPER < TPER	-10.90	DPER	84.62	TPER	76.30

Assessor Details	Mr. William Linley	Assessor ID	P977-0001
Client			

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

Orientation	West
Property Tenure	ND
Transaction Type	6
Terrain Type	Urban
1.0 Property Type	Flat, Semi-Detached
Position of Flat	Top-floor flat
Which Floor	1
2.0 Number of Storeys	2
3.0 Date Built	2025
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	174.08 kJ/m ² K
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
	Ground floor:	6.06 m	4.28 m ²	2.60 m
	1st Storey:	31.48 m	50.18 m ²	2.40 m

8.0 Living Area	10.73 m ²
-----------------	----------------------

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
Main	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.17	60.00	91.31	83.32	0.00	None	7.99	Calculate Wall Area

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	Other	0.00	45.00	9.34		None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	108.19

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.11	9.00	50.18	50.18	None	0.00	Calculate Wall Area	0.00

Description	Storey	Construction	Area (m ²)
Internal Ceiling 1	Lowest occupied	Other	4.28

Summary for Input Data

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
GF	Exposed Floor - Solid	Lowest occupied	Other	0.12	None	0.00	110.00	4.28
Exposed FF	Exposed Floor - Solid	+1	Other	0.25	None	0.00	110.00	3.49

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	+1	Precast concrete plank floor (screed laid on insulation), carpeted	40.00	38.11

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Other	30.00	4.28

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Solid Door				0.00			1.20
Windows	Manufacturer	Window	Double Low-E Soft 0.05			0.66		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Door	Main	West	1.89	
Front	Windows	Main	West	4.92	
Side	Windows	Main	North	1.18	

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	6.28	0.02	0.02	No
E3 Sill	Independently assessed	5.38	0.02	0.02	No
E4 Jamb	Independently assessed	17.70	0.02	0.02	No
E5 Ground floor (normal)	Independently assessed	6.06	0.06	0.06	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	16.52	0.04	0.04	No
E16 Corner (normal)	Independently assessed	14.80	0.04	0.04	No
E18 Party wall between dwellings	Independently assessed	4.80	0.04	0.04	Yes
P1 Party wall - Ground floor	Independently assessed	3.89	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	3.89	0.00	0.00	No
E6 Intermediate floor within a dwelling	Independently assessed	4.53	0.04	0.04	No
E20 Exposed floor (normal)	Table K1 - Default	11.81	0.32	0.32	No
E21 Exposed floor (inverted)	Table K1 - Default	11.21	0.32	0.32	No
E10 Eaves (insulation at ceiling level)	Independently assessed	31.48	0.06	0.06	No

Y-value W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys

Number of open flues

Number of chimneys/flues attached to closed fire

Number of flues attached to solid fuel boiler

Number of flues attached to other heater

Number of blocked chimneys

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Summary for Input Data

Test Method

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	75.00	5.00	375.00	10

24.0 Main Heating 1

SAP table

Percentage of Heat %

Fuel Type

SAP Code

In Winter

In Summer

Controls SAP Code

PCDF Controls

25.0 Main Heating 2

Database

Percentage of Heat %

Database Ref. No.

Fuel Type

In Winter

In Summer

Model Name

Manufacturer

Controls

PCDF Controls

26.0 Heat Networks

27.0 Secondary Heating

28.0 Water Heating

Water Heating

SAP Code

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

Cold Water Source

Bath Count

Immersion Only Heating Hot Water

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
1	Combi boiler or unvented hot water system	9.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Internal Store

Insulation Type

Cylinder Volume L

Loss kWh/day

In Airing Cupboard

Recommendations

Summary for Input Data



Lower cost measures

None

Further measures to achieve even higher standards

Typical Cost	Typical savings per year	Ratings after improvement	
		SAP rating	Environmental Impact
		0	0
		0	0
		0	0

Energy Report



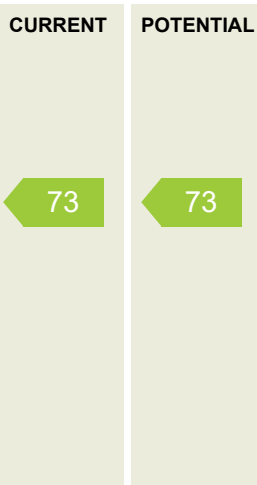
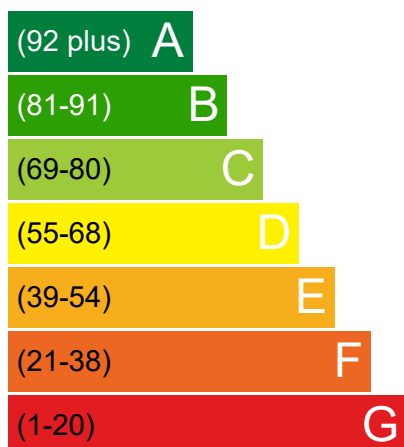
Dwelling Address	1a Eaton Place, RG1 7LP
Reference	1a Eaton Place FF-1a FF
Assessment Date	02/04/2025
Submission Date	
Property Type	Flat, Semi-Detached
Total Floor Area	54

This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

This document is not an Energy Performance Certificate (EPC) as required by the Energy Performance of Buildings Regulations

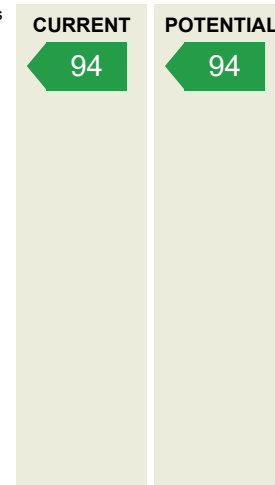
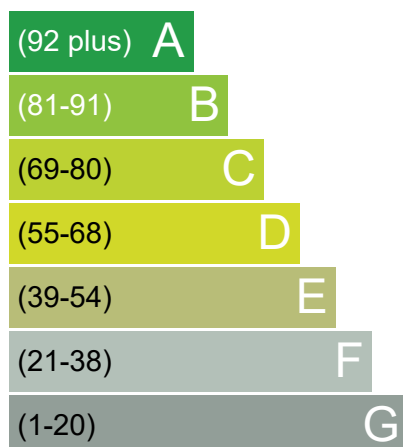
Energy Efficiency Rating

Most energy efficient - lower running costs

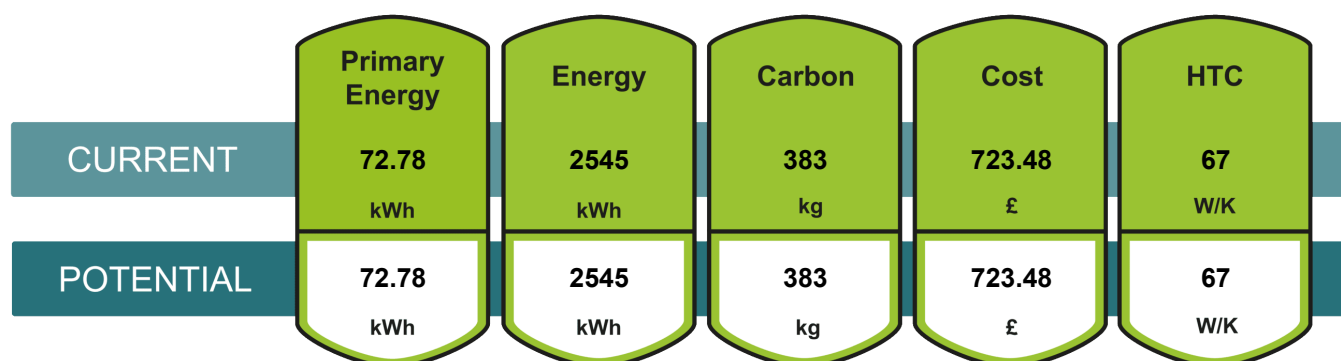


Carbon Dioxide (CO2) Emissions Rating

Very environmentally friendly - lower CO2 emissions



Additional ratings for your home



Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good
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Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.17 W/m ² K	Very Good
Roof	Average thermal transmittance 0.11 W/m ² K	Very Good
Floor	Average thermal transmittance 0.18 W/m ² K	Very Good
Windows	High performance glazing	Good
Main heating	Room heaters, electric	Very Poor
Main heating controls	Programmer and appliance thermostats	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.0 m ³ /h.m ² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
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The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

The table below shows the estimated running costs of the space and water heating and lighting within the dwelling. It does not include the energy used from household appliances. The estimated annual costs after potential improvements indicates the total energy cost if all recommended measures named above were installed.

		Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting		£51	£51	
Heating		£476	£476	
Hot Water		£196	£196	
New Technologies e.g. Impact of PV		£0	£0	
TOTAL		£723	£723	

Estimated energy use and potential savings



Space Heating

1675

kWh per year



Water Heating

691

kWh per year

About this document

Created by:

Company/Trading name:

Phone number:

Email address:

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g. heating system) is working correctly.

This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.

This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.

The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

Primary Energy	The measure of the energy required for lighting, heating and hot water in a property. This includes the efficiency of the property's heating system, power station efficiency for electricity and the energy used to produce the fuel and deliver it to the property.
Energy Used	The estimated amount of fuel energy for lighting, heating and hot water for the property. The estimate is based on typical usage which is likely to be different to actual consumption.
Carbon (CO2)	The current emissions based on the energy estimates.
Cost	The estimated cost of energy. The cost of each unit of fuel is based on an industry standard which is likely to be different to those the occupier actually pays.
Heat Transfer Coefficient	Heat flow through the property envelope where internal and external temperatures are different.