

Building Regulations England Part L (BREL) Compliance Report

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

Date: Wed 17 Jul 2024 07:55:14

Project Information			
Assessed By	Nicola Griggs	Building Type	Flat, End-terrace
OCDEA Registration	EES/027209	Assessment Date	2024-07-17

Dwelling Details			
Assessment Type	As designed	Total Floor Area	69 m ²
Site Reference	C105 102	Plot Reference	C105 102
Address	C2_01, NW7 1UH		

Client Details	
Name	Scott Teuma
Company	Barratt London
Address	Here East, Press Centre, London, E15 2GW

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	Heat network	
Target carbon dioxide emission rate	14.98 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	13.9 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	70.49 kWh _{PE} /m ²	
Dwelling primary energy	70.12 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	33.0 kWh/m ²	
Dwelling fabric energy efficiency	30.1 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	0.13	Walls (2) (0.18)	OK
Party walls	0.2	0	Party Wall (1) (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	N/A	N/A	N/A
Windows, doors, and roof windows	1.6	1.23	W_5 (1.35)	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)	29.8	0.13 (!)
Exposed wall: Walls (2)	3.5	0.18
Exposed wall: Walls (3)	14.02	0.14 (!)
Exposed wall: Walls (4)	3.3	0.11 (!)
Exposed wall: Walls (5)	6.41	0.11 (!)
Exposed wall: Walls (6)	0.76	0.17
Party wall: Party Wall (1)	23.53	0 (!)

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]
W_5, W_5	3	North West	0.8	1.35
W_6, W_6	3	North West	0.8	1.35
W_7, W_7	3.12	North East	0.8	1.35
W_8, W_8	3.12	North East	0.8	1.35
W_9, W_9	3	North East	0.8	1.35
D_2, D_2	1.89	South West	N/A	0.22 (!)

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

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E2: Other lintels (including other steel lintels)	Calculated by person with suitable expertise	0.036 (!)	
External wall	E4: Jamb	Calculated by person with suitable expertise	0.077	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.056	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.056	
External wall	E23: Balcony within or between dwellings - balcony support penetrates wall insulation	Calculated by person with suitable expertise	0.108	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.058	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.058	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	-0.036 (!)	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.033 (!)	
External wall	E18: Party wall between dwellings	Calculated by person with suitable expertise	0.033 (!)	
External wall	E25: Staggered party wall between dwellings	Calculated by person with suitable expertise	0.12	
Party wall	P3: Intermediate floor between dwellings (in blocks of flats)	SAP table default	0 (!)	

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	3 m ³ /hm ² , Design value (!)	OK
Air permeability test certificate reference		

4 Space heating

Main heating system 1: Heat network - Heat network

Efficiency	
Emitter type	
Flow temperature	
System type	
Manufacturer	
Model	
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	

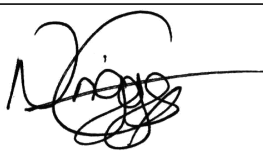
Waste water heat recovery system 1 - type: N/A

Efficiency	
Manufacturer	
Model	

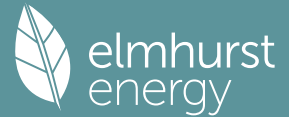
6 Controls

Main heating 1 - type: Charging system linked to use of heating, programmer, and at least two room thermostats

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	80 lm/W	OK
External lights control	N/A	
8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	0.76 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	91%	OK
Manufacturer/Model	Sentinel Kinetic B	
Commissioning		
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	0.3 kWp	
Orientation	South	
Pitch	30°	
Overshading	Modest	
Manufacturer		
MCS certificate		
10 Heat networks		
Network name: Existing CHP		
Service provision	Space and water heating	
Status	Existing heat network	
Maximum permitted carbon dioxide emission factor	0.35 kgCO ₂ /kWh	
Carbon dioxide emission factor for delivered heat	0.185 kgCO ₂ /kWh	OK
Maximum permitted primary energy factor	N/A	
Primary energy factor for delivered heat	0.899 kWh _{PE} /kWh	
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	C105 102	Issued on Date	17/07/2024
Assessment Reference	C105 102	Prop Type Ref	
Property	C2_01, NW7 1UH		
SAP Rating	84 B	DER	13.90
Environmental	89 B	TER	14.98
CO ₂ Emissions (t/year)	0.92	% DER < TER	7.21
Compliance Check	See BREL	DFEE	30.14
% DPER < TPER	0.53	TFEE	33.03
		% DFEE < TFEE	8.75
		DPER	70.12
		TPER	70.49
Assessor Details	Ms. Nicola Griggs	Assessor ID	AU86-0001
Client			

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	69.0700	2.5900	178.8913
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0700		178.8913
Dwelling volume			178.8913

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.0000 (17)
Infiltration rate		0.1500 (18)
Number of sides sheltered		2 (19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (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	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												0.5000 (23a)
If mechanical ventilation												0.5000 (23b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												81.9000 (23c)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.2531	0.2499	0.2467	0.2307	0.2276	0.2116	0.2116	0.2084	0.2180	0.2276	0.2339	0.2403 (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
W_5 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_6 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_7 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_8 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_9 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
D_2			1.8900	0.2200	0.4158		(26)
Wall 1	45.0400	15.2400	29.8000	0.1300	3.8740	14.0000	417.2000 (29a)
Wall 1A	3.5000		3.5000	0.1800	0.6300	14.0000	49.0000 (29a)
Wall 2	15.9100	1.8900	14.0200	0.1400	1.9628	14.0000	196.2800 (29a)
Wall 3	3.3000		3.3000	0.1100	0.3630	14.0000	46.2000 (29a)
Wall 4	6.4100		6.4100	0.1100	0.7051	14.0000	89.7400 (29a)
Wall 1B	0.7600		0.7600	0.1700	0.1292	14.0000	10.6400 (29a)
Total net area of external elements Aum(A, m ²)			74.9200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.5998		(33)
Party Wall			23.5300	0.0000	0.0000	20.0000	470.6000 (32)

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Party Floor 1	69.0100	40.0000	2760.4000 (32d)
Party Ceiling 1	69.0100	64.0000	4416.6400 (32b)
Internal Wall 1	164.5200	9.0000	1480.6800 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 9937.3800 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 143.8740 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.2500	0.0360	0.2610
E4 Jamb	28.2000	0.0770	2.1714
E7 Party floor between dwellings (in blocks of flats)	33.9600	0.0560	1.9018
E7 Party floor between dwellings (in blocks of flats)	19.7900	0.0560	1.1082
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	4.0000	0.1080	0.4320
E16 Corner (normal)	2.5900	0.0580	0.1502
E16 Corner (normal)	2.5900	0.0580	0.1502
E17 Corner (inverted - internal area greater than external area)	5.1800	-0.0360	-0.1865
E18 Party wall between dwellings	5.1800	0.0330	0.1709
E18 Party wall between dwellings	2.5900	0.0330	0.0855
E25 Staggered party wall between dwellings	2.5900	0.1200	0.3108
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.1700	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.5556 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 34.1554 (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	14.9393	14.7512	14.5630	13.6221	13.4340	12.4931	12.4931	12.3049	12.8694	13.4340	13.8103	14.1866 (38)
Average = Sum(39)m / 12 =	49.0947	48.9065	48.7184	47.7775	47.5893	46.6485	46.6485	46.4603	47.0248	47.5893	47.9657	48.3420 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7108	0.7081	0.7053	0.6917	0.6890	0.6754	0.6754	0.6727	0.6808	0.6890	0.6945	0.6999 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2233 (42)

Hot water usage for mixer showers	69.1849	68.1452	66.6301	63.7313	61.5920	59.2064	57.8504	59.3540	61.0022	63.5637	66.5247	68.9198 (42a)
Hot water usage for baths	26.5692	26.1746	25.6190	24.5944	23.8273	22.9766	22.5171	23.0689	23.6697	24.5799	25.6256	26.4794 (42b)
Hot water usage for other uses	37.3992	36.0392	34.6792	33.3193	31.9593	30.5993	30.5993	31.9593	33.3193	34.6792	36.0392	37.3992 (42c)
Average daily hot water use (litres/day)												122.4193 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	133.1533	130.3590	126.9283	121.6450	117.3786	112.7823	110.9668	114.3822	117.9911	122.8228	128.1895	132.7984 (44)
Energy content (annual)	210.8823	185.6295	195.0841	166.5259	158.0142	138.6790	134.2047	141.6290	145.4949	166.6694	182.6295	207.9302 (45)
Distribution loss (46)m = 0.15 x (45)m	31.6323	27.8444	29.2626	24.9789	23.7021	20.8019	20.1307	21.2443	21.8242	25.0004	27.3944	31.1895 (46)
Water storage loss:												
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	114.3398	101.6638	109.0869	98.1648	96.7612	88.9057	88.8445	91.3131	91.1720	99.6390	103.5192	113.3582 (65)

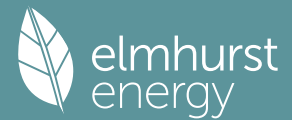
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts

(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.3619	20.7498	16.8749	12.7754	9.5497	8.0623	8.7116	11.3236	15.1986	19.2981	22.5237	24.0112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	291.2192	294.2411	286.6259	270.4140	249.9495	230.7157	217.8663	214.8444	222.4596	238.6714	259.1360	278.3698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634 (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)	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334 (71)
Water heating gains (Table 5)	153.6825	151.2854	146.6222	136.3400	130.0553	123.4802	119.4147	122.7326	126.6278	133.9234	143.7767	152.3632 (72)
Total internal gains	563.2936	561.3063	545.1530	514.5595	484.5846	457.2882	441.0226	443.9307	459.3160	486.9230	520.4665	549.7742 (73)

6. Solar gains

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[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
Northwest			3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (81)
Northwest			3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (81)
Northeast			3.1200	11.2829	0.6000	0.8000	0.7700	11.7099 (75)
Northeast			3.1200	11.2829	0.6000	0.8000	0.7700	11.7099 (75)
Northeast			3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (75)
Solar gains	57.1981	116.4284	209.7670	344.4977	463.0725	493.6843	255.6044	46.7109 (83)
Total gains	620.4917	677.7348	754.9200	859.0572	947.6571	950.9725	714.9204	596.4851 (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	56.2257	56.4420	56.6600	57.7758	58.0042	59.1741	59.1741	59.4138	58.7005	58.0042	57.5491	57.1011
alpha	4.7484	4.7628	4.7773	4.8517	4.8669	4.9449	4.9449	4.9609	4.9134	4.8669	4.8366	4.8067
util living area	0.9189	0.8822	0.7984	0.6372	0.4608	0.3132	0.2272	0.2629	0.4487	0.7175	0.8737	0.9277 (86)
MIT	20.3368	20.4963	20.7241	20.9180	20.9843	20.9982	20.9997	20.9994	20.9901	20.8838	20.6020	20.3104 (87)
Th 2	20.3313	20.3337	20.3361	20.3481	20.3506	20.3626	20.3626	20.3650	20.3578	20.3506	20.3457	20.3409 (88)
util rest of house	0.9082	0.8678	0.7770	0.6088	0.4301	0.2823	0.1944	0.2267	0.4085	0.6846	0.8563	0.9180 (89)
MIT 2	19.5695	19.7653	20.0375	20.2661	20.3366	20.3613	20.3625	20.3647	20.3502	20.2365	19.9072	19.5452 (90)
Living area fraction									FLA = Living area / (4) =			0.3156 (91)
MIT	19.8117	19.9960	20.2542	20.4718	20.5411	20.5624	20.5636	20.5651	20.5521	20.4408	20.1265	19.7867 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8117	19.9960	20.2542	20.4718	20.5411	20.5624	20.5636	20.5651	20.5521	20.4408	20.1265	19.7867 (93)

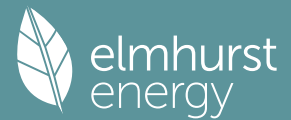
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8988	0.8599	0.7742	0.6143	0.4392	0.2920	0.2047	0.2381	0.4208	0.6894	0.8499	0.9087 (94)
Useful gains	557.6945	582.7504	584.4881	527.7408	416.2056	277.6839	184.8386	193.3904	300.8047	433.7569	503.5394	542.0420 (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	761.5433	738.2928	670.0807	552.8740	420.7404	278.1348	184.8964	193.5101	303.4109	468.3174	624.8232	753.4940 (97)
Space heating kWh	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98a)
Space heating requirement - total per year (kWh/year)												611.6962
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	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												611.6962
Space heating per m2												(98c) / (4) = 8.8562 (99)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Combined Heat and Power-Space and Water												0.6000 (303a)
Fraction of heat from community Boilers-Space and Water												0.4000 (303b)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98)
Space heat from Combined Heat and Power = (98) x 0.60 x 1.00 x 1.50	136.4972	94.0720	57.3128	16.2863	3.0365	0.0000	0.0000	0.0000	0.0000	23.1417	78.5919	141.5882
307a												
Space heat from Boilers = (98) x 0.40 x 1.00 x 1.50	90.9991	62.7147	38.2085	10.8575	2.0243	0.0000	0.0000	0.0000	0.0000	15.4278	52.3946	94.3921
307b												
Space heating requirement	227.4953	156.7867	95.5213	27.1439	5.0609	0.0000	0.0000	0.0000	0.0000	38.5694	130.9865	235.9804 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (64)
Water heat from Combined Heat and Power = (64) x 0.60 x 1.00 x 1.50	239.5432	212.0013	225.3248	198.0176	191.9619	172.9554	170.5334	177.2152	179.0897	199.7516	212.5108	236.8863
310a												
Water heat from Boilers = (64) x 0.40 x 1.00 x 1.50	159.6955	141.3342	150.2166	132.0118	127.9746	115.3036	113.6889	118.1435	119.3931	133.1677	141.6739	157.9242
310b												
Water heating fuel	399.2386	353.3354	375.5414	330.0294	319.9365	288.2590	284.2223	295.3587	298.4828	332.9193	354.1847	394.8105 (310)
Cooling System Energy Efficiency Ratio												0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	17.6093	15.9052	17.6093	17.0412	17.6093	17.0412	17.6093	17.6093	17.0412	17.6093	17.0412	17.6093 (331)
Lighting	20.4485	16.4045	14.7705	10.8215	8.3588	6.8292	7.6252	9.9115	12.8741	16.8915	19.0789	21.0168 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-5.1913	-8.2076	-13.2473	-16.7940	-19.8738	-19.2303	-18.9870	-17.0018	-13.8866	-10.1320	-6.0109	-4.3898 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)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 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)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 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	-0.8190	-1.8220	-3.8342	-6.0986	-8.4081	-8.5754	-8.4512	-6.9711	-4.8890	-2.6895	-1.1183	-0.6399 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)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 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												

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(335b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(335b)
Annual totals kWh/year														
Space heating fuel - community heating													917.5443	(307)
Space heating fuel - secondary													0.0000	(309)
Water heating fuel - community heating													4026.3188	(310)
Efficiency of water heater													0.0000	(311)
Electricity used for heat distribution													9.1754	(313)
Space cooling fuel													0.0000	(321)
Electricity for pumps and fans:														
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9500)														
mechanical ventilation fans (SFP = 0.9500)													207.3350	(330a)
Total electricity for the above, kWh/year													207.3350	(331)
Electricity for lighting (calculated in Appendix L)													165.0310	(332)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-207.2687	(333)
Wind generation													0.0000	(334)
Hydro-electric generation (Appendix N)													0.0000	(335a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(335)
Appendix Q - special features														
Energy saved or generated													-0.0000	(336)
Energy used													0.0000	(337)
Total delivered energy for all uses													5108.9605	(338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating from Combined Heat and Power	550.5266	3.1100	17.1214	(340a)
Space heating from Boilers	367.0177	4.4400	16.2956	(340b)
Space heating total			33.4170	(340)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary	0.0000	0.0000	0.0000	(341)
Water heating from Combined Heat and Power	2415.7913	3.1100	75.1311	(342a)
Water heating from Boilers	1610.5275	4.4400	71.5074	(342b)
Water heating total			146.6385	(342)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(347a)
Pumps, fans and electric keep-hot	207.3350	16.4900	34.1895	(349)
Energy for lighting	165.0310	16.4900	27.2136	(350)
Additional standing charges			92.0000	(351)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-152.9524	16.4900	-25.2218	
PV Unit electricity exported	-54.3164	5.5900	-3.0363	
Total			-28.2581	(352)
Total energy cost			305.2005	(355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):		0.3600	(356)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.9632	(357)
SAP value		84.3865	
SAP rating (Section 12)		84	(358)
SAP band		B	

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Electrical efficiency of CHP unit			35.2000	(361)
Heat efficiency of CHP unit			54.6000	(362)
Space heating from Combined Heat and Power	1008.2905	0.2100	211.7410	(363)
less credit emissions for electricity	-354.9182	0.3480	-123.5115	(364)
Water heating from Combined Heat and Power	4424.5262	0.2100	929.1505	(365)
less credit emissions for electricity	-1557.4332	0.3480	-541.9868	(366)
Efficiency of heat source Boilers			95.6000	(367)
Space and Water heating from Boilers	2068.5620	0.2100	80.6210	(368)
Electrical energy for heat distribution (space & water)	9.1754	0.0000	7.1206	(372)
Overall CO2 factor for heat network			0.1855	(386)
Total CO2 associated with community systems			916.9118	(373)
Space and water heating			916.9118	(376)
Pumps, fans and electric keep-hot	207.3350	0.1387	28.7599	(378)
Energy for lighting	165.0310	0.1443	23.8191	(379)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-152.9524	0.1322	-20.2258	
PV Unit electricity exported	-54.3164	0.1243	-6.7542	
Total			-26.9801	(380)
Total CO2, kg/year			942.5108	(383)
CO2 emissions per m2			13.6500	(384)
EI value			88.9282	(384a)
EI rating			89	(385)
EI band			B	

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

1. Overall dwelling characteristics

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Ground floor		Area (m ²)	Storey height (m)	=	Volume (m ³)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0700	69.0700 (1b)	x 2.5900 (2b)	=	178.8913 (1b) - (3b)	(4)
Dwelling volume				=	(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	(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	0 * 10 =	0.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		0.0000 / (5) =	0.0000 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	3.0000 (17)		
Infiltration rate	0.1500 (18)		
Number of sides sheltered	2 (19)		
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)		
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1275 (21)		

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.0000	4.8000	4.8000	4.3000	4.3000	3.9000	4.0000	3.9000	4.1000	4.4000	4.2000	4.6000
Wind factor	1.2500	1.2000	1.2000	1.0750	1.0750	0.9750	1.0000	0.9750	1.0250	1.1000	1.0500	1.1500
Adj infilt rate												
	0.1594	0.1530	0.1530	0.1371	0.1371	0.1243	0.1275	0.1243	0.1307	0.1403	0.1339	0.1466
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation	0.5000 (23a)											
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)											
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	81.9000 (23c)											
Effective ac	0.2499	0.2435	0.2435	0.2276	0.2276	0.2148	0.2180	0.2148	0.2212	0.2307	0.2244	0.2371

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
W_5 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_6 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_7 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_8 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_9 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
D_2			1.8900	0.2200	0.4158		(26)
Wall 1	45.0400	15.2400	29.8000	0.1300	3.8740	14.0000	417.2000 (29a)
Wall 1A	3.5000		3.5000	0.1800	0.6300	14.0000	49.0000 (29a)
Wall 2	15.9100	1.8900	14.0200	0.1400	1.9628	14.0000	196.2800 (29a)
Wall 3	3.3000		3.3000	0.1100	0.3630	14.0000	46.2000 (29a)
Wall 4	6.4100		6.4100	0.1100	0.7051	14.0000	89.7400 (29a)
Wall 1B	0.7600		0.7600	0.1700	0.1292	14.0000	10.6400 (29a)
Total net area of external elements Aum(A, m ²)			74.9200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.5998		(33)
Party Wall			23.5300	0.0000	0.0000	20.0000	470.6000 (32)
Party Floor 1			69.0100			40.0000	2760.4000 (32d)
Party Ceiling 1			69.0100			64.0000	4416.6400 (32b)
Internal Wall 1			164.5200			9.0000	1480.6800 (32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			9937.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							143.8740 (35)

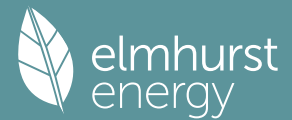
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.2500	0.0360	0.2610
E4 Jamb	28.2000	0.0770	2.1714
E7 Party floor between dwellings (in blocks of flats)	33.9600	0.0560	1.9018
E7 Party floor between dwellings (in blocks of flats)	19.7900	0.0560	1.1082
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	4.0000	0.1080	0.4320
E16 Corner (normal)	2.5900	0.0580	0.1502
E16 Corner (normal)	2.5900	0.0580	0.1502
E17 Corner (inverted - internal area greater than external area)	5.1800	-0.0360	-0.1865
E18 Party wall between dwellings	5.1800	0.0330	0.1709
E18 Party wall between dwellings	2.5900	0.0330	0.0855
E25 Staggered party wall between dwellings	2.5900	0.1200	0.3108
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.1700	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.5556 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 34.1554 (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	14.7512	14.3748	14.3748	13.4340	13.4340	12.6813	12.8694	12.6813	13.0576	13.6221	13.2458	13.9985
Heat transfer coeff	48.9065	48.5302	48.5302	47.5893	47.5893	46.8367	47.0248	46.8367	47.2130	47.7775	47.4012	48.1539
Average = Sum(39)m / 12 =	47.6991											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7081	0.7026	0.7026	0.6890	0.6890	0.6781	0.6808	0.6781	0.6836	0.6917	0.6863	0.6972
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

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Assumed occupancy												2.2233 (42)
Hot water usage for mixer showers	69.1849	68.1452	66.6301	63.7313	61.5920	59.2064	57.8504	59.3540	61.0022	63.5637	66.5247	68.9198 (42a)
Hot water usage for baths	26.5692	26.1746	25.6190	24.5944	23.8273	22.9766	22.5171	23.0689	23.6697	24.5799	25.6256	26.4794 (42b)
Hot water usage for other uses	37.3992	36.0392	34.6792	33.3193	31.9593	30.5993	30.5993	31.9593	33.3193	34.6792	36.0392	37.3992 (42c)
Average daily hot water use (litres/day)												122.4193 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	133.1533	130.3590	126.9283	121.6450	117.3786	112.7823	110.9668	114.3822	117.9911	122.8228	128.1895	132.7984 (44)
Energy content (annual)	210.8823	185.6295	195.0841	166.5259	158.0142	138.6790	134.2047	141.6290	145.4949	166.6694	182.6295	207.9302 (45)
Distribution loss (46)m = 0.15 x (45)m												2033.3728
Water storage loss:	31.6323	27.8444	29.2626	24.9789	23.7021	20.8019	20.1307	21.2443	21.8242	25.0004	27.3944	31.1895 (46)
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0294 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	114.3398	101.6638	109.0869	98.1648	96.7612	88.9057	88.8445	91.3131	91.1720	99.6390	103.5192	113.3582 (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	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.3619	20.7498	16.8749	12.7754	9.5497	8.0623	8.7116	11.3236	15.1986	19.2981	22.5237	24.0112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	291.2192	294.2411	286.6259	270.4140	249.9495	230.7157	217.8663	214.8444	222.4596	238.6714	259.1360	278.3698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634 (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)	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334 (71)
Water heating gains (Table 5)	153.6825	151.2854	146.6222	136.3400	130.0553	123.4802	119.4147	122.7326	126.6278	133.9234	143.7767	152.3632 (72)
Total internal gains	563.2936	561.3063	545.1530	514.5595	484.5846	457.2882	441.0226	443.9307	459.3160	486.9230	520.4665	549.7742 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
Northwest	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (81)						
Northwest	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (81)						
Northeast	3.1200	12.4928	0.6000	0.8000	0.7700	12.9655 (75)						
Northeast	3.1200	12.4928	0.6000	0.8000	0.7700	12.9655 (75)						
Northeast	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (75)						
Solar gains	63.3313	118.4801	213.2792	359.5724	467.8968	533.4730	496.1527	407.5843	282.3788	155.5486	82.4277	52.8907 (83)
Total gains	626.6249	679.7865	758.4323	874.1318	952.4813	990.7612	937.1753	851.5150	741.6948	642.4716	602.8942	602.6650 (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	56.4420	56.8797	56.8797	58.0042	58.0042	58.9364	58.7005	58.9364	58.4666	57.7758	58.2345	57.3242
alpha	4.7628	4.7920	4.7920	4.8669	4.8669	4.9291	4.9134	4.9291	4.8978	4.8517	4.8823	4.8216
util living area	0.9077	0.8709	0.7722	0.5916	0.4113	0.2503	0.1606	0.1815	0.3798	0.6677	0.8480	0.9157 (86)
MIT	20.4060	20.5477	20.7762	20.9448	20.9914	20.9995	21.0000	20.9999	20.9958	20.9206	20.6810	20.3913 (87)
Th 2	20.3337	20.3385	20.3385	20.3506	20.3506	20.3602	20.3578	20.3602	20.3554	20.3481	20.3530	20.3433 (88)
util rest of house	0.8956	0.8554	0.7487	0.5619	0.3801	0.2202	0.1283	0.1463	0.3397	0.6314	0.8278	0.9044 (89)
MIT 2	19.6567	19.8316	20.1002	20.2969	20.3434	20.3599	20.3578	20.3602	20.3524	20.2733	20.0073	19.6471 (90)
Living area fraction	19.8932	20.0577	20.3136	20.5014	20.5479	20.5617	20.5605	20.5621	20.5555	20.4776	20.2199	19.8820 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8932	20.0577	20.3136	20.5014	20.5479	20.5617	20.5605	20.5621	20.5555	20.4776	20.2199	19.8820 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8866	0.8482	0.7478	0.5689	0.3896	0.2297	0.1385	0.1574	0.3522	0.6388	0.8234	0.8955	(94)
Useful gains	555.5951	576.5916	567.1564	497.3082	371.0838	227.5829	129.8038	134.0388	261.2463	410.4285	496.4150	539.6830	(95)
Ext temp.	4.8000	5.3000	7.2000	9.7000	12.7000	15.7000	17.8000	17.7000	15.0000	11.4000	7.7000	4.8000	(96)
Heat loss rate W	738.1546	716.1918	636.4039	514.0302	373.4772	227.7077	129.8105	134.0513	262.2913	433.7050	593.4593	726.2572	(97)
Space heating kWh	135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112	(98a)
Space heating requirement - total per year (kWh/year)	520.9772												
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	135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	520.9772												
Space heating per m2	(98c) / (4) =											7.5427 (99)	

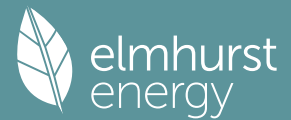
9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (301)
Fraction of space heat from community system													1.0000 (302)
Fraction of heat from community Combined Heat and Power-Space and Water													0.6000 (303a)
Fraction of heat from community Boilers-Space and Water													0.4000 (303b)
Factor for control and charging method (Table 4c(3)) for space heating													1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating													1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system													1.5000 (306)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating:													
Space heating requirement	135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112	(98)
Space heat from Combined Heat and Power = (98) x 0.60 x 1.00 x 1.50													
307a	122.2418	84.4302	46.3681	10.8359	1.6026	0.0000	0.0000	0.0000	0.0000	15.5859	62.8848	124.9301	
Space heat from Boilers = (98) x 0.40 x 1.00 x 1.50													
307b	81.4946	56.2868	30.9121	7.2239	1.0684	0.0000	0.0000	0.0000	0.0000	10.3906	41.9232	83.2867	
Space heating requirement	203.7364	140.7170	77.2802	18.0598	2.6710	0.0000	0.0000	0.0000	0.0000	25.9766	104.8079	208.2168	(307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)													0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(309)
Water heating													
Annual water heating requirement	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070	(64)
Water heat from Combined Heat and Power = (64) x 0.60 x 1.00 x 1.50													
310a	239.5432	212.0013	225.3248	198.0176	191.9619	172.9554	170.5334	177.2152	179.0897	199.7516	212.5108	236.8863	
Water heat from Boilers = (64) x 0.40 x 1.00 x 1.50													
310b	159.6955	141.3342	150.2166	132.0118	127.9746	115.3036	113.6889	118.1435	119.3931	133.1677	141.6739	157.9242	
Water heating fuel	399.2386	353.3354	375.5414	330.0294	319.9365	288.2590	284.2223	295.3587	298.4828	332.9193	354.1847	394.8105	(310)
Cooling System Energy Efficiency Ratio													0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(315)
Pumps and Fa	17.6093	15.9052	17.6093	17.0412	17.6093	17.0412	17.6093	17.6093	17.0412	17.6093	17.0412	17.6093	(331)
Lighting	20.4485	16.4045	14.7705	10.8215	8.3588	6.8292	7.6252	9.9115	12.8741	16.8915	19.0789	21.0168	(332)
Electricity generated by PVs (Appendix M) (negative quantity)													
(333a)m	-5.5911	-8.1460	-13.1115	-17.0291	-19.6851	-20.1548	-19.7884	-18.1117	-14.7490	-10.6966	-6.6603	-4.8359	(333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(334a)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	(334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(335a)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	(335a)
Electricity generated by PVs (Appendix M) (negative quantity)													
(333b)m	-0.9219	-1.7998	-3.7690	-6.2451	-8.2698	-9.3131	-9.0877	-7.7809	-5.4177	-2.9419	-1.3194	-0.7463	(333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(334b)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	(334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(335b)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	(335b)
Annual totals kWh/year													
Space heating fuel - community heating													781.4658 (307)
Space heating fuel - secondary													0.0000 (309)
Water heating fuel - community heating													4026.3188 (310)
Efficiency of water heater													0.0000 (311)
Electricity used for heat distribution													7.8147 (313)
Space cooling fuel													0.0000 (321)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9500)													
mechanical ventilation fans (SFP = 0.9500)													207.3350 (330a)
Total electricity for the above, kWh/year													207.3350 (331)
Electricity for lighting (calculated in Appendix L)													165.0310 (332)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-216.1722 (333)
Wind generation													0.0000 (334)
Hydro-electric generation (Appendix N)													0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)													0.0000 (335)
Appendix Q - special features													
Energy saved or generated													-0.0000 (336)
Energy used													0.0000 (337)
Total delivered energy for all uses													4963.9785 (338)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating from Combined Heat and Power	468.8795	5.6000	26.2573 (340a)	
Space heating from Boilers	312.5863	5.6000	17.5048 (340b)	
Space heating total			43.7621 (340)	
Total CO2 associated with community systems			0.0000 (473)	
Space heating - secondary	0.0000	0.0000	0.0000 (341)	
Water heating from Combined Heat and Power	2415.7913	5.6000	135.2843 (342a)	
Water heating from Boilers	1610.5275	5.6000	90.1895 (342b)	
Water heating total			225.4739 (342)	
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (347a)	

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Pumps, fans and electric keep-hot	207.3350	26.0600	54.0315 (349)
Energy for lighting	165.0310	26.0600	43.0071 (350)
Additional standing charges			99.0000 (351)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	26.0600	-41.3206
PV Unit electricity exported	-57.6127	5.8100	-3.3473
Total			-44.6679 (352)
Total energy cost			420.6066 (355)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Electrical efficiency of CHP unit			35.2000 (361)
Heat efficiency of CHP unit			54.6000 (362)
Space heating from Combined Heat and Power	858.7536	0.2100	180.3383 (363)
less credit emissions for electricity	-302.2813	0.3480	-105.1939 (364)
Water heating from Combined Heat and Power	4424.5262	0.2100	929.1505 (365)
less credit emissions for electricity	-1557.4332	0.3480	-541.9868 (366)
Efficiency of heat source Boilers			95.6000 (367)
Space and Water heating from Boilers	2011.6254	0.2100	68.6644 (368)
Electrical energy for heat distribution (space & water)	7.8147	0.0000	6.9102 (372)
Overall CO2 factor for heat network			0.1855 (386)
Total CO2 associated with community systems			891.6597 (373)
Space and water heating			891.6597 (376)
Pumps, fans and electric keep-hot		0.1387	28.7599 (378)
Energy for lighting		0.1443	23.8191 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	0.1321	-20.9460
PV Unit electricity exported	-57.6127	0.1236	-7.1234
Total			-28.0694 (380)
Total CO2, kg/year			916.1693 (383)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Electrical efficiency of CHP unit			35.2000 (461)
Heat efficiency of CHP unit			54.6000 (462)
Space heating from Combined Heat and Power	858.7536	1.1300	970.3916 (463)
less credit emissions for electricity	-302.2813	2.1490	-649.6025 (464)
Water heating from Combined Heat and Power	4424.5262	1.1300	4999.7146 (465)
less credit emissions for electricity	-1557.4332	2.1490	-3346.9240 (466)
Efficiency of heat source Boilers			95.6000 (467b)
Space and Water heating from Boilers	2011.6254	1.1300	369.4796 (468)
Electrical energy for heat distribution (space & water)	7.8147	0.0000	73.6343 (472)
Overall CO2 factor for heat network			0.8986 (486)
Total CO2 associated with community systems			4320.3508 (473)
Space and water heating			4320.3508 (476)
Pumps, fans and electric keep-hot		1.5128	313.6564 (478)
Energy for lighting		1.5338	253.1301 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	1.4881	-235.9476
PV Unit electricity exported	-57.6127	0.4536	-26.1359
Total			-262.0836 (480)
Total Primary energy kWh/year			4625.0537 (483)

SAP 10 EPC IMPROVEMENTS

C105 102

Current energy efficiency rating: B 84
 Current environmental impact rating: B 89

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

Recommended measures: (none)	SAP change	Cost change	CO2 change
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Recommended measures (none)	Typical annual savings	Energy efficiency impact	Environmental impact
	Total Savings	£0	0.00 kg/m²

Potential energy efficiency rating: B 84
 Potential environmental impact rating: B 89

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

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

	Current	Potential	Saving
Electricity	£97	£97	£0
Community scheme	£368	£368	£0
Space heating	£197	£197	£0
Water heating	£225	£225	£0
Lighting	£43	£43	£0
Generated (PV)	-£45	-£45	£0
Total cost of fuels	£420	£420	£0

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Total cost of uses	£420	£420	£0
Delivered energy	72 kWh/m ²	72 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.9 tonnes	0.9 tonnes	0.0 tonnes
CO2 emissions per m ²	13 kg/m ²	13 kg/m ²	0 kg/m ²
Primary energy	67 kWh/m ²	67 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	69.0700 (1b)	2.5900 (2b)	178.8913 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0700		178.8913 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 178.8913 (5)

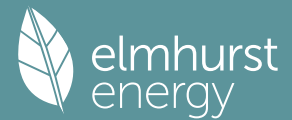
2. Ventilation rate

	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	0 * 10 =											0.0000 (7a)	
Number of passive vents	0 * 10 =											0.0000 (7b)	
Number of flueless gas fires	0 * 40 =											0.0000 (7c)	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =											0.0000 (8)	
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												3.0000 (17)	
Infiltration rate												0.1500 (18)	
Number of sides sheltered												2 (19)	
Shelter factor	(20) = 1 - [0.075 x (19)] =											0.8500 (20)	
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =											0.1275 (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)
Balanced mechanical ventilation with heat recovery	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498	(22b)
If mechanical ventilation												0.5000 (23a)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)	
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.9000 (23c)	
Effective ac	0.2531	0.2499	0.2467	0.2307	0.2276	0.2116	0.2116	0.2084	0.2180	0.2276	0.2339	0.2403	(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
W_5 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_6 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_7 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_8 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_9 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
D_2			1.8900	0.2200	0.4158		(26)
Wall 1	45.0400	15.2400	29.8000	0.1300	3.8740	14.0000	417.2000 (29a)
Wall 1A	3.5000		3.5000	0.1800	0.6300	14.0000	49.0000 (29a)
Wall 2	15.9100	1.8900	14.0200	0.1400	1.9628	14.0000	196.2800 (29a)
Wall 3	3.3000		3.3000	0.1100	0.3630	14.0000	46.2000 (29a)
Wall 4	6.4100		6.4100	0.1100	0.7051	14.0000	89.7400 (29a)
Wall 1B	0.7600		0.7600	0.1700	0.1292	14.0000	10.6400 (29a)
Total net area of external elements Aum(A, m ²)			74.9200			(31)	
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	27.5998			(33)
Party Wall			23.5300	0.0000	0.0000	20.0000	470.6000 (32)
Party Floor 1			69.0100			40.0000	2760.4000 (32d)
Party Ceiling 1			69.0100			64.0000	4416.6400 (32b)
Internal Wall 1			164.5200			9.0000	1480.6800 (32c)
Heat capacity Cm = Sum(A x k)			(28) ... (30) + (32) + (32a) ... (32e) =			9937.3800 (34)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							143.8740 (35)
List of Thermal Bridges							
K1 Element			Length	Psi-value			Total
E2 Other lintels (including other steel lintels)			7.2500	0.0360			0.2610
E4 Jamb			28.2000	0.0770			2.1714
E7 Party floor between dwellings (in blocks of flats)			33.9600	0.0560			1.9018
E7 Party floor between dwellings (in blocks of flats)			19.7900	0.0560			1.1082
E23 Balcony within or between dwellings, balcony support penetrates wall insulation			4.0000	0.1080			0.4320
E16 Corner (normal)			2.5900	0.0580			0.1502
E16 Corner (normal)			2.5900	0.0580			0.1502
E17 Corner (inverted - internal area greater than external area)			5.1800	-0.0360			-0.1865
E18 Party wall between dwellings			5.1800	0.0330			0.1709

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E18 Party wall between dwellings	2.5900	0.0330	0.0855	
E25 Staggered party wall between dwellings	2.5900	0.1200	0.3108	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.1700	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				6.5556 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		34.1554 (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	14.9393	14.7512	14.5630	13.6221	13.4340	12.4931	12.4931	12.3049	12.8694	13.4340	13.8103	14.1866 (38)
Average = Sum(39)m / 12 =	49.0947	48.9065	48.7184	47.7775	47.5893	46.6485	46.6485	46.4603	47.0248	47.5893	47.9657	48.3420 (39)
												47.7305

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7108	0.7081	0.7053	0.6917	0.6890	0.6754	0.6754	0.6727	0.6808	0.6890	0.6945	0.6999 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2233 (42)
Hot water usage for mixer showers	69.1849	68.1452	66.6301	63.7313	61.5920	59.2064	57.8504	59.3540	61.0022	63.5637	66.5247	68.9198 (42a)
Hot water usage for baths	26.5692	26.1746	25.6190	24.5944	23.8273	22.9766	22.5171	23.0689	23.6697	24.5799	25.6256	26.4794 (42b)
Hot water usage for other uses	37.3992	36.0392	34.6792	33.3193	31.9593	30.5993	30.5993	31.9593	33.3193	34.6792	36.0392	37.3992 (42c)
Average daily hot water use (litres/day)												122.4193 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	133.1533	130.3590	126.9283	121.6450	117.3786	112.7823	110.9668	114.3822	117.9911	122.8228	128.1895	132.7984 (44)
Energy content (annual)	210.8823	185.6295	195.0841	166.5259	158.0142	138.6790	134.2047	141.6290	145.4949	166.6694	182.6295	207.9302 (45)
Distribution loss (46)m = 0.15 x (45)m												2033.3728
Water storage loss:	31.6323	27.8444	29.2626	24.9789	23.7021	20.8019	20.1307	21.2443	21.8242	25.0004	27.3944	31.1895 (46)
Store volume												110.0000 (47)
b) If manufacturer declared loss factor is not known :												0.0152 (51)
Hot water storage loss factor from Table 2 (kWh/litre/day)												1.0294 (52)
Volume factor from Table 2a												0.6000 (53)
Temperature factor from Table 2b												1.0327 (55)
Enter (49) or (54) in (55)												
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (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	114.3398	101.6638	109.0869	98.1648	96.7612	88.9057	88.8445	91.3131	91.1720	99.6390	103.5192	113.3582 (65)

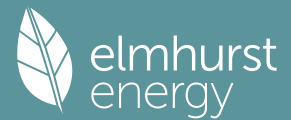
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.3619	20.7498	16.8749	12.7754	9.5497	8.0623	8.7116	11.3236	15.1986	19.2981	22.5237	24.0112 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	291.2192	294.2411	286.6259	270.4140	249.9495	230.7157	217.8663	214.8444	222.4596	238.6714	259.1360	278.3698 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634 (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)	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334 (71)
Water heating gains (Table 5)	153.6825	151.2854	146.6222	136.3400	130.0553	123.4802	119.4147	122.7326	126.6278	133.9234	143.7767	152.3632 (72)
Total internal gains	563.2936	561.3063	545.1530	514.5595	484.5846	457.2882	441.0226	443.9307	459.3160	486.9230	520.4665	549.7742 (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
Northwest	3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (81)
Northwest	3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (81)
Northeast	3.1200	11.2829	0.6000	0.8000	0.7700	11.7099 (75)
Northeast	3.1200	11.2829	0.6000	0.8000	0.7700	11.7099 (75)
Northeast	3.0000	11.2829	0.6000	0.8000	0.7700	11.2595 (75)
Solar gains	57.1981	116.4284	209.7670	344.4977	463.0725	493.6843
Total gains	620.4917	677.7348	754.9200	859.0572	947.6571	950.9725
						461.8315
						368.1774
						255.6044
						142.2848
						71.9700
						596.4851 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	56.2257	56.4420	56.6600	57.7758	58.0042	59.1741	59.1741	59.4138	58.7005	58.0042	57.5491	57.1011
alpha	4.7484	4.7628	4.7773	4.8517	4.8669	4.9449	4.9449	4.9609	4.9134	4.8669	4.8366	4.8067
util living area	0.9189	0.8822	0.7984	0.6372	0.4608	0.3132	0.2272	0.2629	0.4487	0.7175	0.8737	0.9277 (86)
MIT	20.3368	20.4963	20.7241	20.9180	20.9843	20.9982	20.9997	20.9994	20.9901	20.8838	20.6020	20.3104 (87)
Th 2	20.3313	20.3337	20.3361	20.3481	20.3506	20.3626	20.3626	20.3650	20.3578	20.3506	20.3457	20.3409 (88)
util rest of house	0.9082	0.8678	0.7770	0.6088	0.4301	0.2823	0.1944	0.2267	0.4085	0.6846	0.8563	0.9180 (89)
MIT 2	19.5695	19.7653	20.0375	20.2661	20.3366	20.3613	20.3625	20.3647	20.3502	20.2365	19.9072	19.5452 (90)
Living area fraction										FLA = Living area / (4) =		0.3156 (91)
MIT	19.8117	19.9960	20.2542	20.4718	20.5411	20.5624	20.5636	20.5651	20.5521	20.4408	20.1265	19.7867 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8117	19.9960	20.2542	20.4718	20.5411	20.5624	20.5636	20.5651	20.5521	20.4408	20.1265	19.7867 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8988	0.8599	0.7742	0.6143	0.4392	0.2920	0.2047	0.2381	0.4208	0.6894	0.8499	0.9087 (94)
Useful gains	557.6945	582.7504	584.4881	527.7408	416.2056	277.6839	184.8386	193.3904	300.8047	433.7569	503.5394	542.0420 (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	761.5433	738.2928	670.0807	552.8740	420.7404	278.1348	184.8964	193.5101	303.4109	468.3174	624.8232	753.4940 (97)
Space heating kWh	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98a)
Space heating requirement - total per year (kWh/year)												611.6962
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	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												611.6962
Space heating per m2										(98c) / (4) =		8.8562 (99)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Combined Heat and Power-Space and Water												0.6000 (303a)
Fraction of heat from community Boilers-Space and Water												0.4000 (303b)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	151.6635	104.5244	63.6809	18.0959	3.3739	0.0000	0.0000	0.0000	0.0000	25.7129	87.3244	157.3202 (98)
Space heat from Combined Heat and Power = (98) x 0.60 x 1.00 x 1.50	136.4972	94.0720	57.3128	16.2863	3.0365	0.0000	0.0000	0.0000	0.0000	23.1417	78.5919	141.5882
307a	136.4972	94.0720	57.3128	16.2863	3.0365	0.0000	0.0000	0.0000	0.0000	23.1417	78.5919	141.5882
Space heat from Boilers = (98) x 0.40 x 1.00 x 1.50	90.9981	62.7147	38.2085	10.8575	2.0243	0.0000	0.0000	0.0000	0.0000	15.4278	52.3946	94.3921
307b	90.9981	62.7147	38.2085	10.8575	2.0243	0.0000	0.0000	0.0000	0.0000	15.4278	52.3946	94.3921
Space heating requirement	227.4953	156.7867	95.5213	27.1439	5.0609	0.0000	0.0000	0.0000	0.0000	38.5694	130.9865	235.9804 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (64)
Water heat from Combined Heat and Power = (64) x 0.60 x 1.00 x 1.50	239.5432	212.0013	225.3248	198.0176	191.9619	172.9554	170.5334	177.2152	179.0897	199.7516	212.5108	236.8863
310a	239.5432	212.0013	225.3248	198.0176	191.9619	172.9554	170.5334	177.2152	179.0897	199.7516	212.5108	236.8863
Water heat from Boilers = (64) x 0.40 x 1.00 x 1.50	159.6955	141.3342	150.2166	132.0118	127.9746	115.3036	113.6889	118.1435	119.3931	133.1677	141.6739	157.9242
310b	159.6955	141.3342	150.2166	132.0118	127.9746	115.3036	113.6889	118.1435	119.3931	133.1677	141.6739	157.9242
Water heating fuel	399.2386	353.3354	375.5414	330.0294	319.9365	288.2590	284.2223	295.3587	298.4828	332.9193	354.1847	394.8105 (310)
0.0000 (314)												0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	17.6093	15.9052	17.6093	17.0412	17.6093	17.0412	17.6093	17.0412	17.6093	17.0412	17.6093	17.6093 (331)
Lighting	20.4485	16.4045	14.7705	10.8215	8.3588	6.8292	7.6252	9.9115	12.8741	16.8915	19.0789	21.0168 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-5.1913	-8.2076	-13.2473	-16.7940	-19.8738	-19.2303	-18.9870	-17.0018	-13.8866	-10.1320	-6.0109	-4.3898 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)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 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)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 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	-0.8190	-1.8220	-3.8342	-6.0986	-8.4081	-8.5754	-8.4512	-6.9711	-4.8890	-2.6895	-1.1183	-0.6399 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)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 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335b)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 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												917.5443 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												4026.3188 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												9.1754 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9500)												
mechanical ventilation fans (SFP = 0.9500)												207.3350 (330a)
Total electricity for the above, kWh/year												207.3350 (331)
Electricity for lighting (calculated in Appendix L)												165.0310 (332)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-207.2687 (333)

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Wind generation	0.0000	(334)
Hydro-electric generation (Appendix N)	0.0000	(335a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(335)
Appendix Q - special features		
Energy saved or generated	-0.0000	(336)
Energy used	0.0000	(337)
Total delivered energy for all uses	5108.9605	(338)

10b. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating from Combined Heat and Power	550.5266	3.1100	17.1214	(340a)
Space heating from Boilers	367.0177	4.4400	16.2956	(340b)
Space heating total			33.4170	(340)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary	0.0000	0.0000	0.0000	(341)
Water heating from Combined Heat and Power	2415.7913	3.1100	75.1311	(342a)
Water heating from Boilers	1610.5275	4.4400	71.5074	(342b)
Water heating total			146.6385	(342)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(347a)
Pumps, fans and electric keep-hot	207.3350	16.4900	34.1895	(349)
Energy for lighting	165.0310	16.4900	27.2136	(350)
Additional standing charges			92.0000	(351)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-152.9524	16.4900	-25.2218	
PV Unit electricity exported	-54.3164	5.5900	-3.0363	
Total			-28.2581	(352)
Total energy cost			305.2005	(355)

11b. SAP rating - Community heating scheme

Energy cost deflator (Table 12):		0.3600	(356)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.9632	(357)
SAP value		84.3865	
SAP rating (Section 12)		84	(358)
SAP band		B	

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Electrical efficiency of CHP unit			35.2000	(361)
Heat efficiency of CHP unit			54.6000	(362)
Space heating from Combined Heat and Power	1008.2905	0.2100	211.7410	(363)
less credit emissions for electricity	-354.9182	0.3480	-123.5115	(364)
Water heating from Combined Heat and Power	4424.5262	0.2100	929.1505	(365)
less credit emissions for electricity	-1557.4332	0.3480	-541.9868	(366)
Efficiency of heat source Boilers			95.6000	(367)
Space and Water heating from Boilers	2068.5620	0.2100	80.6210	(368)
Electrical energy for heat distribution (space & water)	9.1754	0.0000	7.1206	(372)
Overall CO2 factor for heat network			0.1855	(386)
Total CO2 associated with community systems			916.9118	(373)
Space and water heating			916.9118	(376)
Pumps, fans and electric keep-hot	207.3350	0.1387	28.7599	(378)
Energy for lighting	165.0310	0.1443	23.8191	(379)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-152.9524	0.1322	-20.2258	
PV Unit electricity exported	-54.3164	0.1243	-6.7542	
Total			-26.9801	(380)
Total CO2, kg/year			942.5108	(383)
CO2 emissions per m2			13.6500	(384)
EI value			88.9282	(384a)
EI rating			89	(385)
EI band			B	

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	69.0700	(1b) x 2.5900	(2b)	= 178.8913 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.0700			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	178.8913	(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 0 * 20 = 0.0000 (6d)
 Number of flues attached to other heater 0 * 35 = 0.0000 (6e)
 Number of blocked chimneys 0 * 20 = 0.0000 (6f)
 Number of intermittent extract fans 0 * 10 = 0.0000 (7a)
 Number of passive vents 0 * 10 = 0.0000 (7b)
 Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 3.0000 (17)
 Infiltration rate 0.1500 (18)
 Number of sides sheltered 2 (19)
 Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.0000	4.8000	4.8000	4.3000	4.3000	3.9000	4.0000	3.9000	4.1000	4.4000	4.2000	4.6000
Wind factor	1.2500	1.2000	1.2000	1.0750	1.0750	0.9750	1.0000	0.9750	1.0250	1.1000	1.0500	1.1500
Adj infilt rate	0.1594	0.1530	0.1530	0.1371	0.1371	0.1243	0.1275	0.1243	0.1307	0.1403	0.1339	0.1466
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.9000
Effective ac	0.2499	0.2435	0.2435	0.2276	0.2276	0.2148	0.2180	0.2148	0.2212	0.2307	0.2244	0.2371

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
W_5 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_6 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
W_7 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_8 (Uw = 1.35)			3.1200	1.2808	3.9962		(27)
W_9 (Uw = 1.35)			3.0000	1.2808	3.8425		(27)
D_2			1.8900	0.2200	0.4158		(26)
Wall 1	45.0400	15.2400	29.8000	0.1300	3.8740	14.0000	417.2000 (29a)
Wall 1A	3.5000		3.5000	0.1800	0.6300	14.0000	49.0000 (29a)
Wall 2	15.9100	1.8900	14.0200	0.1400	1.9628	14.0000	196.2800 (29a)
Wall 3	3.3000		3.3000	0.1100	0.3630	14.0000	46.2000 (29a)
Wall 4	6.4100		6.4100	0.1100	0.7051	14.0000	89.7400 (29a)
Wall 1B	0.7600		0.7600	0.1700	0.1292	14.0000	10.6400 (29a)
Total net area of external elements Aum(A, m2)			74.9200				(31)
Fabric heat loss, W/K = Sum (A x U)					27.5998		(33)
Party Wall			23.5300	0.0000	0.0000	20.0000	470.6000 (32)
Party Floor 1			69.0100			2760.4000	(32d)
Party Ceiling 1			69.0100			64.0000	4416.6400 (32b)
Internal Wall 1			164.5200			9.0000	1480.6800 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 9937.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							143.8740 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.2500	0.0360	0.2610
E4 Jamb	28.2000	0.0770	2.1714
E7 Party floor between dwellings (in blocks of flats)	33.9600	0.0560	1.9018
E7 Party floor between dwellings (in blocks of flats)	19.7900	0.0560	1.1082
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	4.0000	0.1080	0.4320
E16 Corner (normal)	2.5900	0.0580	0.1502
E16 Corner (normal)	2.5900	0.0580	0.1502
E17 Corner (inverted - internal area greater than external area)	5.1800	-0.0360	-0.1865
E18 Party wall between dwellings	5.1800	0.0330	0.1709
E18 Party wall between dwellings	2.5900	0.0330	0.0855
E25 Staggered party wall between dwellings	2.5900	0.1200	0.3108
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	18.1700	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.5556 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 34.1554 (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
(38)m	14.7512	14.3748	14.3748	13.4340	13.4340	12.6813	12.8694	12.6813	13.0576	13.6221	13.2458	13.9985
Heat transfer coeff	48.9065	48.5302	48.5302	47.5893	47.5893	46.8367	47.0248	46.8367	47.2130	47.7775	47.4012	48.1539
Average = Sum(39)m / 12 =												47.6991
HLP	0.7081	0.7026	0.7026	0.6890	0.6890	0.6781	0.6808	0.6781	0.6836	0.6917	0.6863	0.6972
HLP (average)												0.6906
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2233 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Hot water usage for mixer showers	69.1849	68.1452	66.6301	63.7313	61.5920	59.2064	57.8504	59.3540	61.0022	63.5637	66.5247	68.9198
Hot water usage for baths	26.5692	26.1746	25.6190	24.5944	23.8273	22.9766	22.5171	23.0689	23.6697	24.5799	25.6256	26.4794
Hot water usage for other uses	37.3992	36.0392	34.6792	33.3193	31.9593	30.5993	30.5993	31.9593	33.3193	34.6792	36.0392	37.3992
Average daily hot water use (litres/day)												122.4193
Daily hot water use	133.1533	130.3590	126.9283	121.6450	117.3786	112.7823	110.9668	114.3822	117.9911	122.8228	128.1895	132.7984
Energy conte	210.8823	185.6295	195.0841	166.5259	158.0142	138.6790	134.2047	141.6290	145.4949	166.6694	182.6295	207.9302
Energy content (annual)												Total = Sum(45)m = 2033.3728
Distribution loss (46)m = 0.15 x (45)m	31.6323	27.8444	29.2626	24.9789	23.7021	20.8019	20.1307	21.2443	21.8242	25.0004	27.3944	31.1895

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Water storage loss:																	
Store volume											110.0000 (47)						
b) If manufacturer declared loss factor is not known :																	
Hot water storage loss factor from Table 2 (kWh/litre/day)											0.0152 (51)						
Volume factor from Table 2a											1.0294 (52)						
Temperature factor from Table 2b											0.6000 (53)						
Enter (49) or (54) in (55)											1.0327 (55)						
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817	32.0144	30.9817
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	22.5120	23.2624	22.5120	23.2624	22.5120
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070	263.2070	236.1232	236.1232	263.2070	263.2070
WWHRs	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
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	-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	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	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070	263.2070	236.1232	236.1232	263.2070	263.2070
Total per year (kWh/year) = Sum(64)m =												2684.2126	(64)				
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)				
Heat gains from water heating, kWh/month	114.3398	101.6638	109.0869	98.1648	96.7612	88.9057	88.8445	91.3131	91.1720	99.6390	103.5192	113.3582	113.3582	103.5192	103.5192	113.3582	113.3582

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
(66)m	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002	133.4002
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	23.3619	20.7498	16.8749	12.7754	9.5497	8.0623	8.7116	11.3236	15.1986	19.2981	22.5237	24.0112	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	291.2192	294.2411	286.6259	270.4140	249.9495	230.7157	217.8663	214.8444	222.4596	238.6714	259.1360	278.3698	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	50.5634	(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)	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	-88.9334	(71)
Water heating gains (Table 5)	153.6825	151.2854	146.6222	136.3400	130.0553	123.4802	119.4147	122.7326	126.6278	133.9234	143.7767	152.3632	(72)
Total internal gains	563.2936	561.3063	545.1530	514.5595	484.5846	457.2882	441.0226	443.9307	459.3160	486.9230	520.4665	549.7742	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northwest	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (81)							
Northwest	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (81)							
Northeast	3.1200	12.4928	0.6000	0.8000	0.7700	12.9655 (75)							
Northeast	3.1200	12.4928	0.6000	0.8000	0.7700	12.9655 (75)							
Northeast	3.0000	12.4928	0.6000	0.8000	0.7700	12.4668 (75)							
Solar gains	63.3313	118.4801	213.2792	359.5724	467.8968	533.4730	496.1527	407.5843	282.3788	155.5486	82.4277	52.8907	(83)
Total gains	626.6249	679.7865	758.4323	874.1318	952.4813	990.7612	937.1753	851.5150	741.6948	642.4716	602.8942	602.6650	(84)

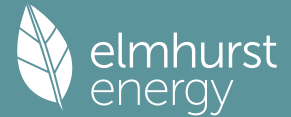
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th _l (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(85)
Utilisation factor for gains for living area, n _{l,m} (see Table 9a)	0.9077	0.8709	0.7722	0.5916	0.4113	0.2503	0.1606	0.1815	0.3798	0.6677	0.8480	0.9157	(86)
tau	56.4420	56.8797	56.8797	58.0042	58.0042	58.9364	58.7005	58.9364	58.4666	57.7758	58.2345	57.3242	
alpha	4.7628	4.7920	4.7920	4.8669	4.8669	4.9291	4.9134	4.9291	4.8978	4.8517	4.8823	4.8216	
util living area	0.9077	0.8709	0.7722	0.5916	0.4113	0.2503	0.1606	0.1815	0.3798	0.6677	0.8480	0.9157	(86)
MIT	20.4060	20.5477	20.7762	20.9448	20.9914	20.9995	21.0000	20.9999	20.9958	20.9206	20.6810	20.3913	(87)
Th 2	20.3337	20.3385	20.3385	20.3506	20.3506	20.3602	20.3578	20.3602	20.3554	20.3481	20.3530	20.3433	(88)
util rest of house	0.8956	0.8554	0.7487	0.5619	0.3801	0.2202	0.1283	0.1463	0.3397	0.6314	0.8278	0.9044	(89)
MIT 2	19.6567	19.8316	20.1002	20.2969	20.3434	20.3599	20.3578	20.3602	20.3524	20.2733	20.0073	19.6471	(90)
Living area fraction	19.8932	20.0577	20.3136	20.5014	20.5479	20.5617	20.5605	20.5621	20.5555	20.4776	20.2199	19.8820	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8932	20.0577	20.3136	20.5014	20.5479	20.5617	20.5605	20.5621	20.5555	20.4776	20.2199	19.8820	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(94)
Utilisation	0.8866	0.8482	0.7478	0.5689	0.3896	0.2297	0.1385	0.1574	0.3522	0.6388	0.8234	0.8955	(94)
Useful gains	555.5951	576.5916	567.1564	497.3082	371.0838	227.5829	129.8038	134.0388	261.2463	410.4285	496.4150	539.6830	(95)
Ext temp.	4.8000	5.3000	7.2000	9.7000	12.7000	15.7000	17.8000	17.7000	15.0000	11.4000	7.7000	4.8000	(96)
Heat loss rate W	738.1546	716.1918	636.4039	514.0302	373.4772	227.7077	129.8105	134.0513	262.2913	433.7050	593.4593	726.2572	(97)
Space heating kWh	135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112	(98a)
Space heating requirement - total per year (kWh/year)												520.9772	
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													

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135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											520.9772
Space heating per m2											(98c) / (4) = 7.5427 (99)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)											0.0000 (301)		
Fraction of space heat from community system											1.0000 (302)		
Fraction of heat from community Combined Heat and Power-Space and Water											0.6000 (303a)		
Fraction of heat from community Boilers-Space and Water											0.4000 (303b)		
Factor for control and charging method (Table 4c(3)) for space heating											1.0000 (305)		
Factor for charging method (Table 4c(3)) for water heating											1.0000 (305a)		
Distribution loss factor (Table 12c) for community heating system											1.5000 (306)		
Efficiency of secondary/supplementary heating system, %											0.0000 (208)		
Space heating:													
Space heating requirement	135.8243	93.8114	51.5202	12.0399	1.7807	0.0000	0.0000	0.0000	0.0000	17.3177	69.8720	138.8112 (98)	
Space heat from Combined Heat and Power = (98) x 0.60 x 1.00 x 1.50													
307a	122.2418	84.4302	46.3681	10.8359	1.6026	0.0000	0.0000	0.0000	0.0000	15.5859	62.8848	124.9301	
Space heat from Boilers = (98) x 0.40 x 1.00 x 1.50													
307b	81.4946	56.2868	30.9121	7.2239	1.0684	0.0000	0.0000	0.0000	0.0000	10.3906	41.9232	83.2867	
Space heating requirement	203.7364	140.7170	77.2802	18.0598	2.6710	0.0000	0.0000	0.0000	0.0000	25.9766	104.8079	208.2168 (307)	
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)	
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)	
Water heating													
Annual water heating requirement	266.1591	235.5570	250.3609	220.0196	213.2910	192.1727	189.4815	196.9058	198.9886	221.9462	236.1232	263.2070 (64)	
Water heat from Combined Heat and Power = (64) x 0.60 x 1.00 x 1.50													
310a	239.5432	212.0013	225.3248	198.0176	191.9619	172.9554	170.5334	177.2152	179.0897	199.7516	212.5108	236.8863	
Water heat from Boilers = (64) x 0.40 x 1.00 x 1.50													
310b	159.6955	141.3342	150.2166	132.0118	127.9746	115.3036	113.6889	118.1435	119.3931	133.1677	141.6739	157.9242	
Water heating fuel	399.2386	353.3354	375.5414	330.0294	319.9365	288.2590	284.2223	295.3587	298.4828	332.9193	354.1847	394.8105 (310)	
Cooling System Energy Efficiency Ratio												0.0000 (314)	
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)	
Pumps and Fa	17.6093	15.9052	17.6093	17.0412	17.6093	17.0412	17.6093	17.0412	17.6093	17.0412	17.6093	17.6093 (331)	
Lighting	20.4485	16.4045	14.7705	10.8215	8.3588	6.8292	7.6252	9.9115	12.8741	16.8915	19.0789	21.0168 (332)	
Electricity generated by PVs (Appendix M) (negative quantity)	(333a)m	-5.5911	-8.1460	-13.1115	-17.0291	-19.6851	-20.1548	-19.7884	-18.1117	-14.7490	-10.6966	-6.6603	-4.8359 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	(334a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	(335a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)	
Electricity generated by PVs (Appendix M) (negative quantity)	(333b)m	-0.9219	-1.7998	-3.7690	-6.2451	-8.2698	-9.3131	-9.0877	-7.7809	-5.4177	-2.9419	-1.3194	-0.7463 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	(334b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	(335b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)	
Annual totals kWh/year													
Space heating fuel - community heating												781.4658 (307)	
Space heating fuel - secondary												0.0000 (309)	
Water heating fuel - community heating												4026.3188 (310)	
Efficiency of water heater												0.0000 (311)	
Electricity used for heat distribution												7.8147 (313)	
Space cooling fuel												0.0000 (321)	
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9500)													
mechanical ventilation fans (SFP = 0.9500)												207.3350 (330a)	
Total electricity for the above, kWh/year												207.3350 (331)	
Electricity for lighting (calculated in Appendix L)												165.0310 (332)	
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-216.1722 (333)	
Wind generation												0.0000 (334)	
Hydro-electric generation (Appendix N)												0.0000 (335a)	
Electricity generated - Micro CHP (Appendix N)												0.0000 (335)	
Appendix Q - special features													
Energy saved or generated												-0.0000 (336)	
Energy used												0.0000 (337)	
Total delivered energy for all uses												4963.9785 (338)	

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating from Combined Heat and Power	468.8795	5.6000	26.2573 (340a)
Space heating from Boilers	312.5863	5.6000	17.5048 (340b)
Space heating total			43.7621 (340)
Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	0.0000	0.0000	0.0000 (341)
Water heating from Combined Heat and Power	2415.7913	5.6000	135.2843 (342a)
Water heating from Boilers	1610.5275	5.6000	90.1895 (342b)
Water heating total			225.4739 (342)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (347a)
Pumps, fans and electric keep-hot	207.3350	26.0600	54.0315 (349)
Energy for lighting	165.0310	26.0600	43.0071 (350)
Additional standing charges			99.0000 (351)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	26.0600	-41.3206
PV Unit electricity exported	-57.6127	5.8100	-3.3473
Total			-44.6679 (352)
Total energy cost			420.6066 (355)

12b. Carbon dioxide emissions - Community heating scheme

Energy	Emission factor	Emissions
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Full SAP Calculation Printout

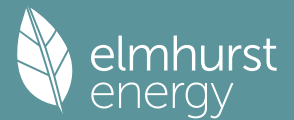


	kWh/year	kg CO2/kWh	kg CO2/year
Electrical efficiency of CHP unit			35.2000 (361)
Heat efficiency of CHP unit			54.6000 (362)
Space heating from Combined Heat and Power	858.7536	0.2100	180.3383 (363)
less credit emissions for electricity	-302.2813	0.3480	-105.1939 (364)
Water heating from Combined Heat and Power	4424.5262	0.2100	929.1505 (365)
less credit emissions for electricity	-1557.4332	0.3480	-541.9868 (366)
Efficiency of heat source Boilers			95.6000 (367)
Space and Water heating from Boilers	2011.6254	0.2100	68.6644 (368)
Electrical energy for heat distribution (space & water)	7.8147	0.0000	6.9102 (372)
Overall CO2 factor for heat network			0.1855 (386)
Total CO2 associated with community systems			891.6597 (373)
Space and water heating			891.6597 (376)
Pumps, fans and electric keep-hot	207.3350	0.1387	28.7599 (378)
Energy for lighting	165.0310	0.1443	23.8191 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	0.1321	-20.9460
PV Unit electricity exported	-57.6127	0.1236	-7.1234
Total			-28.0694 (380)
Total CO2, kg/year			916.1693 (383)

 13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Electrical efficiency of CHP unit			35.2000 (461)
Heat efficiency of CHP unit			54.6000 (462)
Space heating from Combined Heat and Power	858.7536	1.1300	970.3916 (463)
less credit emissions for electricity	-302.2813	2.1490	-649.6025 (464)
Water heating from Combined Heat and Power	4424.5262	1.1300	4999.7146 (465)
less credit emissions for electricity	-1557.4332	2.1490	-3346.9240 (466)
Efficiency of heat source Boilers			95.6000 (467b)
Space and Water heating from Boilers	2011.6254	1.1300	369.4796 (468)
Electrical energy for heat distribution (space & water)	7.8147	0.0000	73.6343 (472)
Overall CO2 factor for heat network			0.8986 (486)
Total CO2 associated with community systems			4320.3508 (473)
Space and water heating			4320.3508 (476)
Pumps, fans and electric keep-hot	207.3350	1.5128	313.6564 (478)
Energy for lighting	165.0310	1.5338	253.1301 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.5595	1.4881	-235.9476
PV Unit electricity exported	-57.6127	0.4536	-26.1359
Total			-262.0836 (480)
Total Primary energy kWh/year			4625.0537 (483)

Predicted Energy Assessment

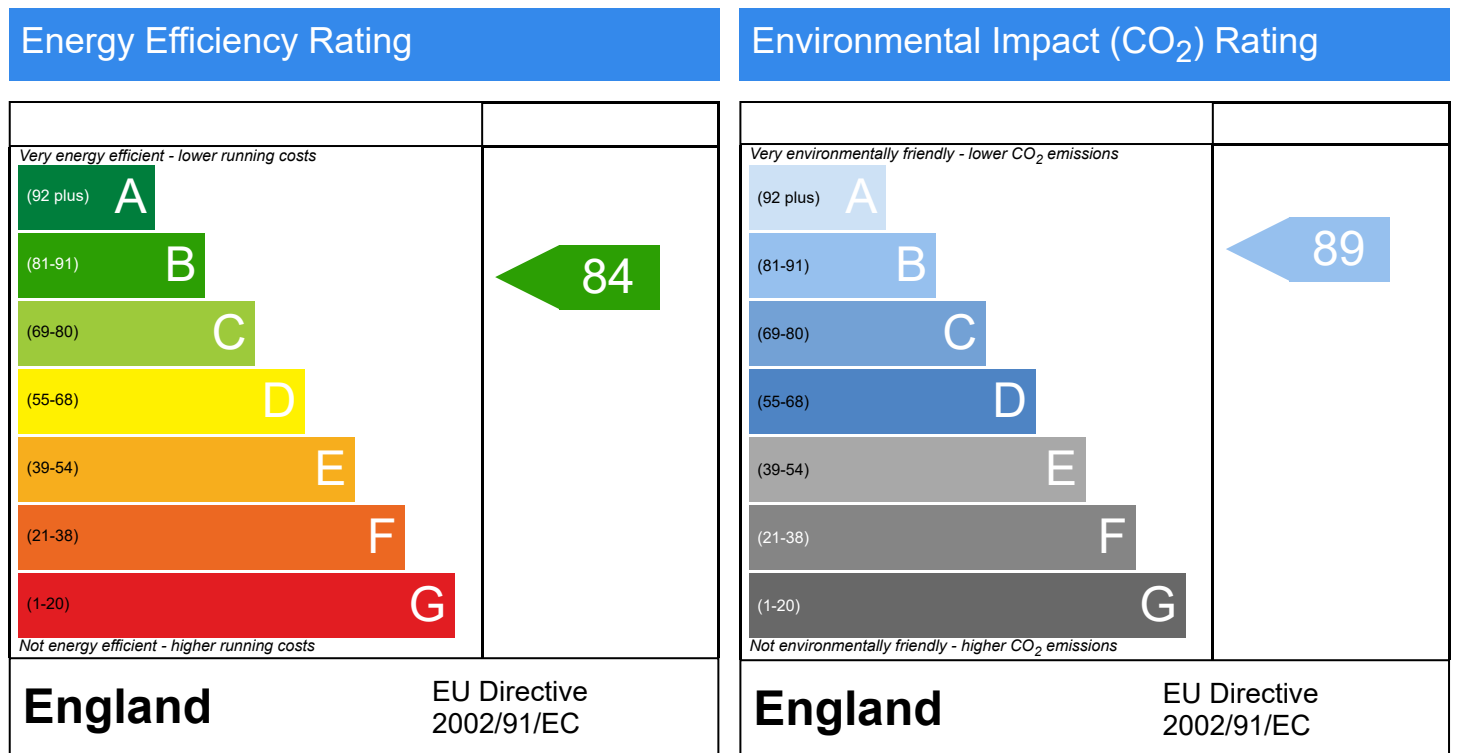


C2_01, NW7 1UH

Dwelling type: Flat, End-Terrace
 Date of assessment: 17/07/2024
 Produced by: Nicola Griggs
 Total floor area: 69.07 m²
 DRRN: 7026-3346-9042

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

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



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

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