

Building Regulations England Part L (BREL) Compliance Report

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

Date: Sat 30 Mar 2024 13:54:01

Project Information			
Assessed By	Mark Scotson	Building Type	Flat, Detached
OCDEA Registration	EES/027465	Assessment Date	2024-03-30

Dwelling Details			
Assessment Type	As designed	Total Floor Area	58 m ²
Site Reference	First Floor, 3 Avenue Road	Plot Reference	ASHP & Solar
Address	First Floor, 3 Avenue Road, TR114A2		

Client Details	
Name	Client
Company	-
Address	-, -, -

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

1a Target emission rate and dwelling emission rate		
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	13.22 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	2.43 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	69.29 kWh _{PE} /m ²	
Dwelling primary energy	49.21 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	37.8 kWh/m ²	
Dwelling fabric energy efficiency	34.9 kWh/m ²	OK

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m ² K]	Dwelling average U-Value [W/m ² K]	Element with highest individual U-Value	
External walls	0.26	0.18	Walls (1) (0.18)	OK
Party walls	0.2	N/A	N/A	N/A
Curtain walls	1.6	N/A	N/A	N/A
Floors	0.18	0.15	Ground Floor (0.15)	OK
Roofs	0.16	0.15	Roof (1) (0.15)	OK
Windows, doors, and roof windows	1.6	1.2	W (1.2)	OK
Rooflights	2.2	1.2	RL, West (1.2)	OK

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Walls (1)	58.22	0.18
Ground floor: Ground Floor , Ground Floor	4.41	0.15
Exposed roof: Roof (1)	75.54	0.15

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, Window	3.17	South	0.7	1.2
W, Window	6	North	0.7	1.2
RL, Roof Window	1.86	West	0.7	1.2
RL , Roof Window	0.62	East	0.7	1.2

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	0.088	
External wall	E3: Sill	Calculated by person with suitable expertise	0.047	

Main element	Junction detail	Source	Psi value [W/mK]	Drawing / reference
External wall	E4: Jamb	Calculated by person with suitable expertise	0.04	
External wall	E5: Ground floor (normal)	Calculated by person with suitable expertise	0.033 (!)	
External wall	E14: Flat roof	Calculated by person with suitable expertise	0.049	
External wall	E16: Corner (normal)	Calculated by person with suitable expertise	0.035 (!)	
External wall	E17: Corner (inverted - internal area greater than external area)	Calculated by person with suitable expertise	0.035 (!)	
External wall	E7: Party floor between dwellings (in blocks of flats)	Calculated by person with suitable expertise	0.031 (!)	
External wall	E11: Eaves (insulation at rafter level)	Calculated by person with suitable expertise	0.042	
External wall	E13: Gable (insulation at rafter level)	Calculated by person with suitable expertise	0.032 (!)	

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	5151151	

4 Space heating

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

Efficiency	201.0%
Emitter type	Underfloor
Flow temperature	35°C
System type	Heat Pump
Manufacturer	Mitsubishi Electric Europe B.V.
Model	ECODAN
Commissioning	

Secondary heating system: N/A

Fuel	N/A
Efficiency	N/A
Commissioning	

5 Hot water

Cylinder/store - type: Cylinder

Capacity	150 litres
Declared heat loss	1.45 kWh/day
Primary pipework insulated	Yes
Manufacturer	
Model	
Commissioning	

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

Efficiency	
Manufacturer	
Model	

6 Controls

Main heating 1 - type: Time and temperature zone control by arrangement of plumbing and electrical services

Function	
Ecodesign class	
Manufacturer	
Model	

Water heating - type: Cylinder thermostat and HW separately timed

Manufacturer	
Model	

7 Lighting

Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	100 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: Balanced whole-house mechanical ventilation with heat recovery		
Maximum permitted specific fan power	1.5 W/(l/s)	
Specific fan power	0.65 W/(l/s)	OK
Minimum permitted heat recovery efficiency	73%	
Heat recovery efficiency	89%	OK
Manufacturer/Model	MRXBOXAB-ECO2, MRXBOXAB-ECO2C	
Commissioning		
9 Local generation		
Technology type: Photovoltaic system (1)		
Peak power	4 kWp	
Orientation	East	
Pitch	30°	
Overshading	None or very little	
Manufacturer		
MCS certificate		
10 Heat networks		
N/A		
11 Supporting documentary evidence		
N/A		
12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Full SAP Calculation Printout



Property Reference	First Floor, 3 Avenue Road		Issued on Date	30/03/2024	
Assessment Reference	ASHP & Solar	Prop Type Ref	1		
Property	First Floor, 3 Avenue Road , , TR114A2				
SAP Rating	84 B	DER	2.43	TER	13.22
Environmental	98 A	% DER < TER			81.62
CO ₂ Emissions (t/year)	0.02	DFEE	34.95	TFEE	37.85
Compliance Check	See BREL	% DFEE < TFEE			7.67
% DPER < TPER	28.98	DPER	49.21	TPER	69.29
Assessor Details	Mr. Mark Scotson			Assessor ID	AX66-0001
Client	Client , Client				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.4100 (1b)	2.3000 (2b)	10.1430 (1b) - (3b)
First floor	53.2400 (1c)	2.4500 (2c)	130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	140.5810 (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 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.1626	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													
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) =												44.5000 (23c)	
Effective ac	0.4401	0.4369	0.4337	0.4177	0.4146	0.3986	0.3986	0.3954	0.4050	0.4146	0.4209	0.4273	(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
Window (Uw = 1.20)			9.1700	1.1450	10.5000		(27)
RL			1.8600	1.1450	2.1298		(27a)
RL			0.6200	1.1450	0.7099		(27a)
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000 (28a)
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796	60.0000	3493.2000 (29a)
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600 (30)
Total net area of external elements Aum(A, m ²)			149.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.8118		(33)
Party Floor 1			50.1300			0.0000	0.0000 (32d)
Party Ceiling 1			50.1300			0.0000	0.0000 (32b)
Internal Wall 1			44.0000			9.0000	396.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		5054.1600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							87.6697 (35)

Full SAP Calculation Printout



List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.5500	0.0880	0.4884
E3 Sill	2.5500	0.0470	0.1198
E4 Jamb	8.9600	0.0400	0.3584
E5 Ground floor (normal)	4.6200	0.0330	0.1525
E14 Flat roof	0.0000	0.0490	0.0000
E16 Corner (normal)	10.0000	0.0350	0.3500
E17 Corner (inverted - internal area greater than external area)	2.0000	0.0350	0.0700
E7 Party floor between dwellings (in blocks of flats)	25.3500	0.0310	0.7859
E11 Eaves (insulation at rafter level)	20.3000	0.0420	0.8526
E13 Gable (insulation at rafter level)	11.5200	0.0320	0.3686

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.5462 (36)
 Point Thermal bridges 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 39.3580 (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	20.4153	20.2674	20.1195	19.3801	19.2323	18.4929	18.4929	18.3450	18.7887	19.2323	19.5280	19.8238 (38)
Average = Sum(39)m / 12 =	59.7733	59.6254	59.4775	58.7381	58.5903	57.8509	57.8509	57.7030	58.1466	58.5903	58.8860	59.1818 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0368	1.0343	1.0317	1.0189	1.0163	1.0035	1.0035	1.0009	1.0086	1.0163	1.0214	1.0266 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	1.0182 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.9145 (42)
Hot water usage for mixer showers													63.3588 (42a)
Hot water usage for baths													24.3422 (42b)
Hot water usage for other uses													34.2361 (42c)
Average daily hot water use (litres/day)													112.1075 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy cont	121.9371	119.3785	116.2370	111.3987	107.4918	103.2827	101.6199	104.7473	108.0521	112.4768	117.3915	121.6121 (44)	
Energy content (annual)	193.1186	169.9934	178.6519	152.4992	144.7046	126.9981	122.9004	129.6991	133.2391	152.6300	167.2457	190.4152 (45)	
Distribution loss (46)m = 0.15 x (45)m													Total = Sum(45)m = 1862.0953
Water storage loss:													28.9678 (46)
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.4500 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7830 (55)
Total storage loss													24.2730 (56)
If cylinder contains dedicated solar storage													24.2730 (57)
Primary loss													23.2624 (59)
Combi loss													0.0000 (61)
Total heat required for water heating calculated for each month													240.6540 (62)
WWHR													0.0000 (63a)
PV diverter													-0.0000 (63b)
Solar input													0.0000 (63c)
FGHR													0.0000 (63d)
Output from w/h													240.6540 (64)
Total per year (kWh/year) = Sum(64)m =													2421.7863 (64)
Electric shower(s)													0.0000 (64a)
Heat gains from water heating, kWh/month													102.2403 (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	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236 (66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													84.4306 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													166.9837 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													32.5724 (69)
Pumps, fans													0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)													-76.5789 (71)
Water heating gains (Table 5)													137.4197 (72)
Total internal gains													440.5511 (73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W
North	6.0000	10.6334	0.7600	0.7000	0.7700	23.5217 (74)
South	3.1700	46.7521	0.7600	0.7000	0.7700	54.6393 (78)
East	0.6200	26.0000	0.7600	0.7000	1.0000	7.7183 (82)

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Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	100.0000
Water heating fuel used	2421.7863 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.7150)	
mechanical ventilation fans (SFP = 0.7150)	122.6288 (230a)
Total electricity for the above, kWh/year	122.6288 (231)
Electricity for lighting (calculated in Appendix L)	144.7721 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2905.1336 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	608.2841 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	824.2304	0.1559	128.5304 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2421.7863	0.1409	341.2681 (264)
Space and water heating			469.7985 (265)
Pumps, fans and electric keep-hot	122.6288	0.1387	17.0101 (267)
Energy for lighting	144.7721	0.1443	20.8951 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1201.9394	0.1336	-160.5582
PV Unit electricity exported	-1703.1942	0.1215	-206.9313
Total			-367.4895 (269)
Total CO2, kg/year			140.2142 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			2.4300 (273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	824.2304	1.5773	1300.0546 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2421.7863	1.5211	3683.6742 (278)
Space and water heating			4983.7288 (279)
Pumps, fans and electric keep-hot	122.6288	1.5128	185.5129 (281)
Energy for lighting	144.7721	1.5338	222.0563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1201.9394	1.4937	-1795.2896
PV Unit electricity exported	-1703.1942	0.4458	-759.2109
Total			-2554.5005 (283)
Total Primary energy kWh/year			2836.7974 (286)
Dwelling Primary energy Rate (DPER)			49.2100 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.5810 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1423 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3923 (18)
Number of sides sheltered	2 (19)

Full SAP Calculation Printout



Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306	84.4306 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.9837	168.7165	164.3500	155.0542	143.3199	132.2913	124.9235	123.1908	127.5573	136.8531	148.5874	159.6160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5)	131.4256	129.3278	125.2861	116.4273	111.0012	105.3295	101.8457	104.7236	108.0979	114.3912	122.8834	130.2929 (72)
Total internal gains	437.5570	446.2381	428.7838	413.4435	393.4688	376.5828	362.9169	364.0621	374.6172	390.3920	413.4328	429.0566 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF Table 6d	Access factor Table 6d	Gains W					
North	6.0000	10.6334	0.6300	0.7000	0.7700	19.4982 (74)						
South	3.1700	46.7521	0.6300	0.7000	0.7700	45.2931 (78)						
East	0.6200	26.0000	0.6300	0.7000	1.0000	6.3980 (82)						
West	1.8600	26.0000	0.6300	0.7000	1.0000	19.1941 (82)						
Solar gains	90.3834	164.5933	252.3015	356.1451	437.2788	450.6278	427.6090	364.7968	288.0300	189.3286	110.2236	76.0626 (83)
Total gains	527.9405	610.8314	681.0853	769.5886	830.7476	827.2106	790.5258	728.8589	662.6472	579.7206	523.6564	505.1192 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation factor for gains for living area, nil,m (see Table 9a)	0.9063	0.8715	0.8195	0.7238	0.5986	0.4569	0.3469	0.3862	0.5692	0.7670	0.8720	0.9139 (86)
MIT	18.5128	18.8782	19.3938	20.0347	20.5257	20.8248	20.9346	20.9136	20.6891	20.0452	19.1882	18.4532 (87)
Th 2	19.9352	19.9375	19.9397	19.9502	19.9521	19.9613	19.9613	19.9630	19.9578	19.9521	19.9482	19.9440 (88)
util rest of house	0.8948	0.8563	0.7982	0.6919	0.5530	0.3955	0.2719	0.3085	0.5071	0.7321	0.8543	0.9033 (89)
MIT 2	17.0656	17.5200	18.1571	18.9350	19.5007	19.8246	19.9240	19.9108	19.6965	18.9705	17.9225	16.9965 (90)
Living area fraction	17.5727	17.9959	18.5904	19.3203	19.8598	20.1751	20.2781	20.2622	20.0443	19.3470	18.3660	17.5069 (92)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
adjusted MIT	17.5727	17.9959	18.5904	19.3203	19.8598	20.1751	20.2781	20.2622	20.0443	19.3470	18.3660	17.5069 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8614	0.8217	0.7661	0.6706	0.5487	0.4086	0.2954	0.3317	0.5126	0.7090	0.8211	0.8708 (94)
Useful gains	454.7548	501.9492	521.7979	516.0783	455.8573	338.0308	233.5515	241.7606	339.6799	411.0251	429.9677	439.8349 (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	903.6752	889.5055	819.2839	698.2993	545.6736	369.1845	243.5645	255.2894	395.1314	584.9425	756.5894	897.5973 (97)
Space heating kWh	333.9968	260.4379	221.3295	131.1991	66.8233	0.0000	0.0000	0.0000	0.0000	129.3945	235.1676	340.5753 (98a)
Space heating requirement - total per year (kWh/year)												1718.9240
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	333.9968	260.4379	221.3295	131.1991	66.8233	0.0000	0.0000	0.0000	0.0000	129.3945	235.1676	340.5753 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1718.9240
Space heating per m2										(98c) / (4) =		29.8165 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Fraction of space heat from main system(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 (201)
Efficiency of main space heating system 1 (in %)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	1.0000 (202)
Efficiency of main space heating system 2 (in %)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	92.3000 (206)
Efficiency of secondary/supplementary heating 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 (207)
Space heating requirement	333.9968	260.4379	221.3295	131.1991	66.8233	0.0000	0.0000	0.0000	0.0000	129.3945	235.1676	340.5753 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	361.8600	282.1645	239.7937	142.1442	72.3979	0.0000	0.0000	0.0000	0.0000	140.1891	254.7861	368.9873 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating requirement	202.8174	179.4345	190.9823	168.9697	164.4620	148.9367	147.6172	153.1212	154.3859	171.2429	180.9365	200.7597 (64)
Efficiency of water heater	85.1708	84.8943	84.3914	83.4989	82.2072	79.8000	79.8000	79.8000	79.8000	83.4398	84.6487	79.8000 (216)
(217)m												85.2349 (217)

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Fuel for water heating, kWh/month	238.1303	211.3623	226.3056	202.3615	200.0578	186.6374	184.9840	191.8812	193.4661	205.2293	213.7499	235.5369	(219)	
Space cooling fuel requirement														
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)	
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)	
Lighting	17.5430	14.0737	12.6718	9.2839	7.1711	5.8589	6.5417	8.5032	11.0448	14.4914	16.3680	18.0306	(232)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-27.3116	-38.6850	-55.8842	-63.1894	-68.4790	-64.0831	-63.3257	-59.6291	-53.1348	-44.4263	-30.1028	-23.5942	(233a)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-14.8938	-31.3899	-62.4825	-93.9654	-124.3414	-124.9320	-123.4283	-104.4365	-76.4792	-44.8930	-19.8900	-11.7706	(233b)	
Electricity generated by wind turbines (Appendix M) (negative quantity)														
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)	
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)														
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)	
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)														
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)	
Annual totals kWh/year														
Space heating fuel - main system 1													1862.3229	(211)
Space heating fuel - main system 2													0.0000	(213)
Space heating fuel - secondary													0.0000	(215)
Efficiency of water heater													79.8000	
Water heating fuel used													2489.7023	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													141.5821	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-1424.7478	(233)
Wind generation													0.0000	(234)
Hydro-electric generation (Appendix N)													0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)													0.0000	(235)
Appendix Q - special features														
Energy saved or generated													-0.0000	(236)
Energy used													0.0000	(237)
Total delivered energy for all uses													3154.8595	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1862.3229	0.2100	391.0878
Total CO2 associated with community systems			0.0000
Water heating (other fuel)	2489.7023	0.2100	522.8375
Space and water heating			913.9253
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293
Energy for lighting	141.5821	0.1443	20.4347
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-591.8451	0.1345	-79.5804
PV Unit electricity exported	-832.9027	0.1259	-104.8334
Total			-184.4138
Total CO2, kg/year			761.8754
EPC Target Carbon Dioxide Emission Rate (TER)			13.2200

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	1862.3229	1.1300	2104.4248
Total CO2 associated with community systems			0.0000
Water heating (other fuel)	2489.7023	1.1300	2813.3636
Space and water heating			4917.7885
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008
Energy for lighting	141.5821	1.5338	217.1634
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-591.8451	1.4969	-885.9564
PV Unit electricity exported	-832.9027	0.4620	-384.8102
Total			-1270.7666
Total Primary energy kWh/year			3994.2861
Target Primary Energy Rate (TPER)			69.2900

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.5810 (5)

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2. Ventilation rate

												m3 per hour	
Number of open chimneys												0 * 80 =	0.0000 (6a)
Number of open flues												0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 =	0.0000 (6d)
Number of flues attached to other heater												0 * 35 =	0.0000 (6e)
Number of blocked chimneys												0 * 20 =	0.0000 (6f)
Number of intermittent extract fans												2 * 10 =	20.0000 (7a)
Number of passive vents												0 * 10 =	0.0000 (7b)
Number of flueless gas fires												0 * 40 =	0.0000 (7c)
												Air changes per hour	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											20.0000 / (5) =	0.1423 (8)
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												3.0000 (17)	
Infiltration rate												0.2923 (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) = 0.2484 (21)	
												(28)...(30) + (32) = 35.8118 (33)	
												(26)...(30) + (32) = 5054.1600 (34)	
												(33) + (36) + (36a) = 39.3580 (37)	

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																		
Window (Uw = 1.20)			9.1700	1.1450	10.5000			(27)																	
RL			1.8600	1.1450	2.1298			(27a)																	
RL			0.6200	1.1450	0.7099			(27a)																	
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000	(28a)																	
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796	60.0000	3493.2000	(29a)																	
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600	(30)																	
Total net area of external elements Aum(A, m2)			149.8200					(31)																	
Fabric heat loss, W/K = Sum (A x U)					(26)...	(30) + (32) =	35.8118	(33)																	
Party Floor 1			50.1300			0.0000	0.0000	(32a)																	
Party Ceiling 1			50.1300			0.0000	0.0000	(32b)																	
Internal Wall 1			44.0000			9.0000	396.0000	(32c)																	
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	5054.1600 (34)																	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								87.6697 (35)																	
List of Thermal Bridges					Length	Psi-value	Total																		
K1 Element					5.5500	0.0880	0.4884																		
E2 Other lintels (including other steel lintels)					2.5500	0.0470	0.1198																		
E3 Sill					8.9600	0.0400	0.3584																		
E4 Jamb					4.6200	0.0330	0.1525																		
E5 Ground floor (normal)					0.0000	0.0490	0.0000																		
E14 Flat roof					10.0000	0.0350	0.3500																		
E16 Corner (normal)					2.0000	0.0350	0.0700																		
E17 Corner (inverted - internal area greater than external area)					25.3500	0.0310	0.7859																		
E7 Party floor between dwellings (in blocks of flats)					20.3000	0.0420	0.8526																		
E11 Eaves (insulation at rafter level)					11.5200	0.0320	0.3686																		
E13 Gable (insulation at rafter level)																									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5462	(36)																	
Point Thermal bridges							(36a) =	0.0000																	
Total fabric heat loss							(33) + (36) + (36a) =	39.3580 (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	25.5230	25.4327	25.3441	24.9280	24.8502	24.4878	24.4878	24.4207	24.6274	24.8502	25.0077	25.1723	(38)
Heat transfer coeff												64.8810	64.7907	64.7021	64.2860	64.2082	63.8458	63.8458	63.7787	63.9854	64.2082	64.3657	64.5303	(39)	
Average = Sum(39)m / 12 =												64.2857													
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	1.1254	1.1239	1.1223	1.1151	1.1138	1.1075	1.1075	1.1063	1.1099	1.1138	1.1165	1.1193	(40)
HLP (average)												1.1151													
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31													

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9145	(42)												
Hot water usage for mixer showers												0.0000		(42a)											
Hot water usage for baths	24.3422	23.9807	23.4716	22.5329	21.8301	21.0507	20.6297	21.1353	21.6857	22.5196	23.4776	24.2599	24.2599		(42b)										
Hot water usage for other uses	34.2361	32.9912	31.7462	30.5013	29.2563	28.0114	28.0114	29.2563	30.5013	31.7462	32.9912	34.2361	34.2361		(42c)										
Average daily hot water use (litres/day)												53.6928		(43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	58.5783	56.9719	55.2178	53.0342	51.0864	49.0621	48.6411	50.3916	52.1870	54.2659	56.4688	58.4960	(44)
Energy conte	92.7738	81.1272	84.8677	72.6012	68.7721	60.3275	58.8272	62.3953	64.3517	73.6382	80.4502	91.5907	91.5907		(45)										
Energy content (annual)												Total = Sum(45)m =		891.7227											
Distribution loss (46)m = 0.15 x (45)m												0.0000		(46)											
Water storage loss:												0.0000		(46)											
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(56)										

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If cylinder contains dedicated solar storage											
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	78.8577	68.9581	72.1376	61.7110	58.4563	51.2784	50.0031	53.0360	54.6990	62.5925	68.3826
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	78.8577	68.9581	72.1376	61.7110	58.4563	51.2784	50.0031	53.0360	54.6990	62.5925	68.3826
12Total per year (kWh/year)											77.8521 (64)
Electric shower(s)	45.1021	40.1863	43.8819	41.8760	42.6618	40.6952	42.0517	42.6618	41.8760	43.8819	43.0568
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											758 (64)
Heat gains from water heating, kWh/month	30.9899	27.2861	29.0049	25.8967	25.2795	22.9934	23.0137	23.9244	24.1437	26.6186	27.8599
											30.7385 (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
	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.4306	93.4767	84.4306	87.2449	84.4306	87.2449	84.4306	84.4306	87.2449	84.4306	87.2449	84.4306 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.9837	168.7165	164.3500	155.0542	143.3199	132.2913	124.9235	123.1908	127.5573	136.8531	148.5874	159.6160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724 (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)	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5)	41.6532	40.6043	38.9851	35.9677	33.9778	31.9353	30.9324	32.1565	33.5330	35.7777	38.6942	41.3152 (72)
Total internal gains	344.7845	354.5146	339.4827	329.9839	313.4454	303.1886	292.0036	291.4950	300.0523	308.7785	326.2437	337.0789 (73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	Specific data	Specific data	factor	W						
		W/m2	or Table 6b	or Table 6c	Table 6d							
North	6.0000	10.6334	0.7600	0.7000	0.7700	23.5217 (74)						
South	3.1700	46.7521	0.7600	0.7000	0.7700	54.6393 (78)						
East	0.6200	26.0000	0.7600	0.7000	1.0000	7.7183 (82)						
West	1.8600	26.0000	0.7600	0.7000	1.0000	23.1548 (82)						
Solar gains	109.0340	198.5570	304.3637	429.6354	527.5109	543.6145	515.8458	440.0723	347.4648	228.3964	132.9682	91.7581 (83)
Total gains	453.8185	553.0717	643.8464	759.6193	840.9563	846.8031	807.8494	731.5673	647.5171	537.1749	459.2118	428.8370 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	21.6386	21.6688	21.6984	21.8389	21.8653	21.9894	21.9894	22.0126	21.9415	21.8653	21.8118	21.7562
alpha	2.4426	2.4446	2.4466	2.4559	2.4577	2.4660	2.4660	2.4675	2.4628	2.4577	2.4541	2.4504
util living area	0.9270	0.8878	0.8282	0.7190	0.5822	0.4375	0.3305	0.3747	0.5668	0.7834	0.8948	0.9351 (86)
MIT	18.4441	18.8697	19.4366	20.1031	20.5834	20.8521	20.9460	20.9252	20.7111	20.0435	19.1281	18.3598 (87)
Th 2	19.9801	19.9814	19.9826	19.9885	19.9896	19.9947	19.9947	19.9957	19.9928	19.9896	19.9874	19.9851 (88)
util rest of house	0.9178	0.8744	0.8080	0.6877	0.5379	0.3793	0.2606	0.3010	0.5064	0.7505	0.8798	0.9268 (89)
MIT 2	17.6633	18.0771	18.6233	19.2513	19.6801	19.9044	19.9705	19.9601	19.8022	19.2161	18.3411	17.5843 (90)
Living area fraction	17.9368	18.3548	18.9082	19.5498	19.9966	20.2365	20.3123	20.2983	20.1207	19.5060	18.6169	17.8560 (91)
MIT	17.9368	18.3548	18.9082	19.5498	19.9966	20.2365	20.3123	20.2983	20.1207	19.5060	18.6169	17.8560 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9368	18.3548	18.9082	19.5498	19.9966	20.2365	20.3123	20.2983	20.1207	19.5060	18.6169	17.8560 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	405.7102	469.0728	504.3345	511.1214	452.6130	333.4202	228.7557	236.9036	333.1814	393.5655	392.5023	387.7200 (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	884.7725	871.7461	802.8386	684.6336	532.7101	359.8651	237.0148	248.6276	385.2353	571.8380	741.2926	881.2255 (97)
Space heating kWh	356.4224	270.5964	222.0870	124.9288	59.5922	0.0000	0.0000	0.0000	0.0000	132.6347	251.1290	367.1681 (98a)
Space heating requirement - total per year (kWh/year)												1784.5587
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	356.4224	270.5964	222.0870	124.9288	59.5922	0.0000	0.0000	0.0000	0.0000	132.6347	251.1290	367.1681 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1784.5587
Space heating per m2												30.9551 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	600.1509	472.4592	484.7184	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8427	0.8864	0.8599	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	505.7548	418.7650	416.8172	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	918.7618	877.1055	795.9856	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	297.3650	341.0053	282.1013	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	74.3413	85.2513	70.5253	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												230.1179 (107)
Energy for space heating												30.9551 (99)
Energy for space cooling												3.9916 (108)
Total												34.9467 (109)
Fabric Energy Efficiency (DFEE)												34.9 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 140.5810 (5)

2. Ventilation rate

	Value	Reference
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =	0.1423 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3923	(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) =	0.3334 (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	0.4251	0.4168	0.4084	0.3668	0.3584	0.3168	0.3168	0.3084	0.3334	0.3584	0.3751	0.3918 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000 (23c)
Effective ac	0.5904	0.5869	0.5834	0.5673	0.5642	0.5502	0.5502	0.5476	0.5556	0.5642	0.5704	0.5767 (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
TER Opening Type (Uw = 1.20)			9.1700	1.1450	10.5000		(27)
RL			1.8600	2.0221	3.7610		(27a)
RL			0.6200	2.0221	1.2537		(27a)
Ground Floor			4.4100	0.1300	0.5733		(28a)
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796		(29a)
Sloping Roof	78.0200	2.4800	75.5400	0.1100	8.3094		(30)
Total net area of external elements Aum(A, m ²)			149.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	34.8770	(33)

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

List of Thermal Bridges	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	5.5500	0.0500	0.2775
E3 Sill	2.5500	0.0500	0.1275
E4 Jamb	8.9600	0.0500	0.4480
E5 Ground floor (normal)	4.6200	0.1600	0.7392
E14 Flat roof	0.0000	0.0800	0.0000
E16 Corner (normal)	10.0000	0.0900	0.9000
E17 Corner (inverted - internal area greater than external area)	2.0000	-0.0900	-0.1800
E7 Party floor between dwellings (in blocks of flats)	25.3500	0.0700	1.7745

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E11 Eaves (insulation at rafter level)	20.3000	0.0400	0.8120	
E13 Gable (insulation at rafter level)	11.5200	0.0800	0.9216	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.8203 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 40.6973 (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	27.3880	27.2252	27.0656	26.3162	26.1759	25.5232	25.5232	25.4023	25.7746	26.1759	26.4596	26.7562 (38)
Average = Sum(39)m / 12 =	68.0853	67.9225	67.7629	67.0135	66.8733	66.2205	66.2205	66.0996	66.4719	66.8733	67.1569	67.4535 (39)
												67.0128
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1810	1.1782	1.1754	1.1624	1.1600	1.1487	1.1487	1.1466	1.1530	1.1600	1.1649	1.1701 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9145 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	24.3422	23.9807	23.4716	22.5329	21.8301	21.0507	20.6297	21.1353	21.6857	22.5196	23.4776	24.2599 (42b)
Hot water usage for other uses	34.2361	32.9912	31.7462	30.5013	29.2563	28.0114	28.0114	29.2563	30.5013	31.7462	32.9912	34.2361 (42c)
Average daily hot water use (litres/day)												53.6928 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	58.5783	56.9719	55.2178	53.0342	51.0864	49.0621	48.6411	50.3916	52.1870	54.2659	56.4688	58.4960 (44)
Energy content (annual)	92.7738	81.1272	84.8677	72.6012	68.7721	60.3275	58.8272	62.3953	64.3517	73.6382	80.4502	91.5907 (45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	78.8577	68.9581	72.1376	61.7110	58.4563	51.2784	50.0031	53.0360	54.6990	62.5925	68.3826	77.8521 (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	78.8577	68.9581	72.1376	61.7110	58.4563	51.2784	50.0031	53.0360	54.6990	62.5925	68.3826	77.8521 (64)
												Total per year (kWh/year) = Sum(64)m = 757.9643 (64)
												758 (64)
12Total per year (kWh/year)												
Electric shower(s)	45.1021	40.1863	43.8819	41.8760	42.6618	40.6952	42.0517	42.6618	41.8760	43.8819	43.0568	45.1021 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 513.0337 (64a)
Heat gains from water heating, kWh/month	30.9899	27.2861	29.0049	25.8967	25.2795	22.9934	23.0137	23.9244	24.1437	26.6186	27.8599	30.7385 (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	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236	95.7236 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	84.4306	93.4767	84.4306	87.2449	84.4306	87.2449	84.4306	84.4306	87.2449	84.4306	87.2449	84.4306 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.9837	168.7165	164.3500	155.0542	143.3199	132.2913	124.9235	123.1908	127.5573	136.8531	148.5874	159.6160 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724	32.5724 (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)	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5)	41.6532	40.6043	38.9851	35.9677	33.9778	31.9353	30.9324	32.1565	33.5330	35.7777	38.6942	41.3152 (72)
Total internal gains	344.7845	354.5146	339.4827	329.9839	313.4454	303.1886	292.0036	291.4950	300.0523	308.7785	326.2437	337.0789 (73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W					
North		6.0000	10.6334	0.6300	0.7000	0.7700	19.4982 (74)					
South		3.1700	46.7521	0.6300	0.7000	0.7700	45.2931 (78)					
East		0.6200	26.0000	0.6300	0.7000	1.0000	6.3980 (82)					
West		1.8600	26.0000	0.6300	0.7000	1.0000	19.1941 (82)					
Solar gains	90.3834	164.5933	252.3015	356.1451	437.2788	450.6278	427.6090	364.7968	288.0300	189.3286	110.2236	76.0626 (83)
Total gains	435.1680	519.1080	591.7842	686.1290	750.7242	753.8164	719.6126	656.2918	588.0823	498.1071	436.4673	413.1415 (84)

7. Mean internal temperature (heating season)

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

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tau	20.6202	20.6696	20.7183	20.9500	20.9939	21.2009	21.2009	21.2397	21.1207	20.9939	20.9053	20.8134
alpha	2.3747	2.3780	2.3812	2.3967	2.3996	2.4134	2.4134	2.4160	2.4080	2.3996	2.3937	2.3876
util living area	0.9343	0.9028	0.8550	0.7619	0.6370	0.4909	0.3764	0.4215	0.6148	0.8122	0.9066	0.9409 (86)
MIT	18.2413	18.6375	19.1962	19.9044	20.4530	20.7945	20.9216	20.8951	20.6294	19.8927	18.9568	18.1768 (87)
Th 2	19.9352	19.9375	19.9397	19.9502	19.9521	19.9613	19.9613	19.9630	19.9578	19.9521	19.9482	19.9440 (88)
util rest of house	0.9257	0.8905	0.8365	0.7320	0.5917	0.4271	0.2965	0.3389	0.5523	0.7812	0.8927	0.9331 (89)
MIT 2	17.4362	17.8236	18.3664	19.0441	19.5423	19.8350	19.9260	19.9129	19.7113	19.0527	18.1502	17.3787 (90)
Living area fraction									FLA = Living area / (4) =			0.3504 (91)
MIT	17.7183	18.1088	18.6572	19.3455	19.8614	20.1712	20.2749	20.2571	20.0330	19.3470	18.4328	17.6584 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7183	18.1088	18.6572	19.3455	19.8614	20.1712	20.2749	20.2571	20.0330	19.3470	18.4328	17.6584 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9020	0.8638	0.8097	0.7126	0.5874	0.4406	0.3214	0.3633	0.5571	0.7602	0.8672	0.9106 (94)
Useful gains	392.5164	448.4217	479.1639	488.9472	441.0070	332.1378	231.2893	238.4195	327.6485	378.6415	378.4940	376.2108 (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	913.5873	897.1750	823.8065	699.9910	545.7789	368.9270	243.3527	254.9506	394.3769	584.9406	761.0790	907.8145 (97)
Space heating kWh	387.6767	301.5622	256.4141	151.9516	77.9503	0.0000	0.0000	0.0000	0.0000	153.4865	275.4612	395.5132 (98a)
Space heating requirement - total per year (kWh/year)												2000.0157
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	387.6767	301.5622	256.4141	151.9516	77.9503	0.0000	0.0000	0.0000	0.0000	153.4865	275.4612	395.5132 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2000.0157
Space heating per m2												(98c) / (4) = 34.6924 (99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	622.4727	490.0317	502.3571	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7957	0.8479	0.8184	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	495.3194	415.5060	411.1429	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	816.9344	780.4527	713.3850	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	231.5628	271.5204	224.8681	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.8907	67.8801	56.2170	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												181.9878 (107)
Energy for space heating												34.6924 (99)
Energy for space cooling												3.1568 (108)
Total												37.8492 (109)
Fabric Energy Efficiency (TFEE)												37.8 (109)

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	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	140.5810 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	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)+(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)

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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												
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) =												44.5000 (23c)
Effective ac	0.4401	0.4369	0.4337	0.4177	0.4146	0.3986	0.3986	0.3954	0.4050	0.4146	0.4209	0.4273 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K					
Window (Uw = 1.20)			9.1700	1.1450	10.5000							
RL			1.8600	1.1450	2.1298							
RL			0.6200	1.1450	0.7099							
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000 (27a)					
External Wall	67.3900		58.2200	0.1800	10.4796	60.0000	3493.2000 (28a)					
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600 (29a)					
Total net area of external elements Aum(A, m2)			149.8200									
Fabric heat loss, W/K = Sum (A x U)					35.8118							
Party Floor 1			50.1300			0.0000	0.0000 (31)					
Party Ceiling 1			50.1300			0.0000	0.0000 (32a)					
Internal Wall 1			44.0000			9.0000	396.0000 (32b)					
Heat capacity Cm = Sum(A x k)												
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							5054.1600 (34)					
List of Thermal Bridges							87.6697 (35)					
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				5.5500	0.0880	0.4884						
E3 Sill				2.5500	0.0470	0.1198						
E4 Jamb				8.9600	0.0400	0.3584						
E5 Ground floor (normal)				4.6200	0.0330	0.1525						
E14 Flat roof				0.0000	0.0490	0.0000						
E16 Corner (normal)				10.0000	0.0350	0.3500						
E17 Corner (inverted - internal area greater than external area)				2.0000	0.0350	0.0700						
E7 Party floor between dwellings (in blocks of flats)				25.3500	0.0310	0.7859						
E11 Eaves (insulation at rafter level)				20.3000	0.0420	0.8526						
E13 Gable (insulation at rafter level)				11.5200	0.0320	0.3686						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5462 (36)					
Point Thermal bridges							0.0000 (36a)					
Total fabric heat loss							39.3580 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	20.4153	20.2674	20.1195	19.3801	19.2323	18.4929	18.4929	18.3450	18.7887	19.2323	19.5280	19.8238 (38)
Heat transfer coeff	59.7733	59.6254	59.4775	58.7381	58.5903	57.8509	57.8509	57.7030	58.1466	58.5903	58.8860	59.1818 (39)
Average = Sum(39)m / 12 =												58.7012
HLP	1.0368	1.0343	1.0317	1.0189	1.0163	1.0035	1.0035	1.0009	1.0086	1.0163	1.0214	1.0266 (40)
HLP (average)												1.0182
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.9145 (42)
Hot water usage for mixer showers	63.3588	62.4067	61.0192	58.3645	56.4054	54.2206	52.9788	54.3558	55.8652	58.2110	60.9227	63.1161 (42a)
Hot water usage for baths	24.3422	23.9807	23.4716	22.5329	21.8301	21.0507	20.6297	21.1353	21.6857	22.5196	23.4776	24.2599 (42b)
Hot water usage for other uses	34.2361	32.9912	31.7462	30.5013	29.2563	28.0114	28.0114	29.2563	30.5013	31.7462	32.9912	34.2361 (42c)
Average daily hot water use (litres/day)												112.1075 (43)
Daily hot water use	121.9371	119.3785	116.2370	111.3987	107.4918	103.2827	101.6199	104.7473	108.0521	112.4768	117.3915	121.6121 (44)
Energy conte	193.1186	169.9934	178.6519	152.4992	144.7046	126.9981	122.9004	129.6991	133.2391	152.6300	167.2457	190.4152 (45)
Energy content (annual)												1862.0953
Distribution loss (46)m = 0.15 x (45)m	28.9678	25.4990	26.7978	22.8749	21.7057	19.0497	18.4351	19.4549	19.9859	22.8945	25.0869	28.5623 (46)
Water storage loss:												150.0000 (47)
Store volume												1.4500 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.7830 (55)
Enter (49) or (54) in (55)												
Total storage loss	24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (56)
If cylinder contains dedicated solar storage	24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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 per year (kWh/year) = Sum(64)m =												2421.7863 (64)

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Heat gains from water heating, kWh/month	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)
102.2403 90.8710 97.4301 87.5076 86.1426 79.0285 78.8927 81.1533 81.1036 88.7778 92.4108 101.3414 (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	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.4940	18.2026	14.8033	11.2071	8.3774	7.0726	7.6422	9.9336	13.3328	16.9291	19.7587	21.0636 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.2295	251.8157	245.2985	231.4241	213.9103	197.4497	186.4531	183.8668	190.3840	204.2584	221.7722	238.2328 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013 (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)	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5)	137.4197	135.2247	130.9544	121.5383	115.7831	109.7618	106.0386	109.0770	112.6439	119.3250	128.3483	136.2115 (72)
Total internal gains	493.8339	491.9337	477.7470	450.8603	424.7615	400.9748	386.8246	389.5681	403.0515	427.2032	456.5700	482.1986 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	6.0000	10.6334	0.7600	0.7000	0.7700	23.5217 (74)						
South	3.1700	46.7521	0.7600	0.7000	0.7700	54.6393 (78)						
East	0.6200	26.0000	0.7600	0.7000	1.0000	7.7183 (82)						
West	1.8600	26.0000	0.7600	0.7000	1.0000	23.1548 (82)						
Solar gains	109.0340	198.5570	304.3637	429.6354	527.5109	543.6145	515.8458	440.0723	347.4648	228.3964	132.9682	91.7581 (83)
Total gains	602.8679	690.4907	782.1107	880.4957	952.2724	944.5893	902.6703	829.6405	750.5162	655.5996	589.5382	573.9567 (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	23.4877	23.5459	23.6044	23.9016	23.9619	24.2681	24.2681	24.3303	24.1447	23.9619	23.8415	23.7224
alpha	2.5658	2.5697	2.5736	2.5934	2.5975	2.6179	2.6179	2.6220	2.6096	2.5975	2.5894	2.5815
util living area	0.8698	0.8259	0.7544	0.6409	0.5059	0.3707	0.2745	0.3088	0.4804	0.6951	0.8272	0.8810 (86)
Living	19.4630	19.7138	20.0644	20.4407	20.6917	20.8222	20.8627	20.8552	20.7597	20.4188	19.8858	19.4136
Non living	18.2660	18.5750	19.0020	19.4544	19.7377	19.8824	19.9184	19.9153	19.8221	19.4445	18.8027	18.2116
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31
16 / 9	0	0	0	0	0	0	0	0	0	0	0	0
MIT	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000	21.0000 (87)
Th 2	20.0528	20.0549	20.0570	20.0676	20.0698	20.0804	20.0804	20.0826	20.0762	20.0698	20.0655	20.0613 (88)
util rest of house	0.8561	0.8086	0.7311	0.6094	0.4659	0.3226	0.2196	0.2507	0.4275	0.6595	0.8071	0.8682 (89)
MIT 2	20.0528	20.0549	20.0570	20.0676	20.0698	20.0804	20.0804	20.0826	20.0762	20.0698	20.0655	20.0613 (90)
Living area fraction												fLA = Living area / (4) =
MIT	20.3847	20.3860	20.3874	20.3943	20.3957	20.4026	20.4026	20.4040	20.3999	20.3957	20.3929	20.3902 (91)
Temperature adjustment												0.0000
adjusted MIT	20.3847	20.3860	20.3874	20.3943	20.3957	20.4026	20.4026	20.4040	20.3999	20.3957	20.3929	20.3902 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8611	0.8149	0.7395	0.6207	0.4802	0.3397	0.2391	0.2714	0.4465	0.6725	0.8145	0.8729 (94)
Useful gains	519.1269	562.6765	578.3976	546.5457	457.3183	320.9166	215.8307	225.1497	335.1244	440.8842	480.1545	501.0185 (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	961.4325	923.3610	825.9890	675.1553	509.4839	335.6879	219.9861	231.0444	366.3160	573.9332	782.7684	958.1633 (97)
Space heating kWh	329.0754	242.3800	184.2080	92.5989	38.8112	0.0000	0.0000	0.0000	0.0000	98.9885	217.8821	340.1158 (98a)
Space heating requirement - total per year (kWh/year)												1544.0598
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	329.0754	242.3800	184.2080	92.5989	38.8112	0.0000	0.0000	0.0000	0.0000	98.9885	217.8821	340.1158 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1544.0598
Space heating per m2												(98c) / (4) =
												26.7833 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												200.9840 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	329.0754	242.3800	184.2080	92.5989	38.8112	0.0000	0.0000	0.0000	0.0000	98.9885	217.8821	340.1158 (98)
Space heating efficiency (main heating system 1)	200.9840	200.9840	200.9840	200.9840	200.9840	0.0000	0.0000	0.0000	0.0000	200.9840	200.9840	200.9840 (210)

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Space heating fuel (main heating system)	163.7321	120.5967	91.6531	46.0728	19.3106	0.0000	0.0000	0.0000	0.0000	49.2519	108.4077	169.2253	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506	(64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.4150	9.4071	10.4150	10.0791	10.4150	10.0791	10.4150	10.4150	10.0791	10.4150	10.0791	10.4150	(231)
Lighting	17.9383	14.3907	12.9573	9.4931	7.3327	5.9909	6.6891	8.6948	11.2937	14.8179	16.7368	18.4368	(232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-46.1625	-72.5232	-115.3904	-136.4468	-149.0916	-137.0043	-134.7029	-125.7663	-106.7173	-84.8878	-52.4501	-38.7736	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	-17.1840	-43.1514	-105.8960	-191.7366	-281.1520	-295.5093	-288.1214	-227.6187	-147.4971	-69.7983	-24.7068	-12.8453	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												768.2502	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2421.7863	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.7150) mechanical ventilation fans (SFP = 0.7150)												122.6288	(230a)
Total electricity for the above, kWh/year												122.6288	(231)
Electricity for lighting (calculated in Appendix L)												144.7721	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2905.1336	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												552.3039	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	768.2502	16.4900	126.6845	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2421.7863	16.4900	399.3526	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	122.6288	16.4900	20.2215	(249)
Energy for lighting	144.7721	16.4900	23.8729	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1199.9169	16.4900	-197.8663	
PV Unit electricity exported	-1705.2167	5.5900	-95.3216	
Total			-293.1879	(252)
Total energy cost			276.9435	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		0.9713	(257)
SAP value		84.2559	
SAP rating (Section 12)		84	(258)
SAP band		B	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	768.2502	0.1559	119.7957	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2421.7863	0.1409	341.2681	(264)
Space and water heating			461.0638	(265)
Pumps, fans and electric keep-hot	122.6288	0.1387	17.0101	(267)
Energy for lighting	144.7721	0.1443	20.8951	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1199.9169	0.1336	-160.2576	
PV Unit electricity exported	-1705.2167	0.1215	-207.2654	
Total			-367.5230	(269)
Total CO2, kg/year			131.4460	(272)

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CO2 emissions per m2 2.2800 (273)
 EI value 98.2841
 EI rating 98 (274)
 EI band A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.5810 (5)

2. Ventilation rate

	Value	Reference
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	6.9000	6.5000	6.3000	5.6000	5.6000	4.9000	4.8000	4.7000	5.2000	6.0000	6.3000	6.9000 (22)
Wind factor	1.7250	1.6250	1.5750	1.4000	1.4000	1.2250	1.2000	1.1750	1.3000	1.5000	1.5750	1.7250 (22a)
Adj infilt rate	0.2199	0.2072	0.2008	0.1785	0.1785	0.1562	0.1530	0.1498	0.1658	0.1913	0.2008	0.2199 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												44.5000 (23c)
Effective ac	0.4974	0.4847	0.4783	0.4560	0.4560	0.4337	0.4305	0.4273	0.4432	0.4688	0.4783	0.4974 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Window (Uw = 1.20)			9.1700	1.1450	10.5000		(27)
RL			1.8600	1.1450	2.1298		(27a)
RL			0.6200	1.1450	0.7099		(27a)
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000 (28a)
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796	60.0000	3493.2000 (29a)
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600 (30)
Total net area of external elements Aum(A, m2)			149.8200				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.8118		(33)
Party Floor 1			50.1300			0.0000	0.0000 (32d)
Party Ceiling 1			50.1300			0.0000	0.0000 (32b)
Internal Wall 1			44.0000			9.0000	396.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	5054.1600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							87.6697 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				5.5500	0.0880	0.4884	
E3 Sill				2.5500	0.0470	0.1198	
E4 Jamb				8.9600	0.0400	0.3584	
E5 Ground floor (normal)				4.6200	0.0330	0.1525	
E14 Flat roof				0.0000	0.0490	0.0000	
E16 Corner (normal)				10.0000	0.0350	0.3500	
E17 Corner (inverted - internal area greater than external area)				2.0000	0.0350	0.0700	
E7 Party floor between dwellings (in blocks of flats)				25.3500	0.0310	0.7859	
E11 Eaves (insulation at rafter level)				20.3000	0.0420	0.8526	
E13 Gable (insulation at rafter level)				11.5200	0.0320	0.3686	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5462 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	39.3580 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	23.0770	22.4855	22.1897	21.1546	21.1546	20.1195	19.9716	19.8238	20.5631	21.7461	22.1897	23.0770 (38)

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Heat transfer coeff 62.4350	61.8435	61.5477	60.5126	60.5126	59.4775	59.3296	59.1818	59.9211	61.1041	61.5477	62.4350 (39)	
Average = Sum(39)m / 12 =											60.8207	
HLP	Jan 1.0830	Feb 1.0727	Mar 1.0676	Apr 1.0497	May 1.0497	Jun 1.0317	Jul 1.0291	Aug 1.0266	Sep 1.0394	Oct 1.0599	Nov 1.0676	Dec 1.0830 (40)
HLP (average)	1.0550											
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9145 (42)
Hot water usage for mixer showers 63.3588	62.4067	61.0192	58.3645	56.4054	54.2206	52.9788	54.3558	55.8652	58.2110	60.9227	63.1161 (42a)	
Hot water usage for baths 24.3422	23.9807	23.4716	22.5329	21.8301	21.0507	20.6297	21.1353	21.6857	22.5196	23.4776	24.2599 (42b)	
Hot water usage for other uses 34.2361	32.9912	31.7462	30.5013	29.2563	28.0114	28.0114	29.2563	30.5013	31.7462	32.9912	34.2361 (42c)	
Average daily hot water use (litres/day)												112.1075 (43)
Daily hot water use 121.9371	119.3785	116.2370	111.3987	107.4918	103.2827	101.6199	104.7473	108.0521	112.4768	117.3915	121.6121 (44)	
Energy conte 193.1186	169.9934	178.6519	152.4992	144.7046	126.9981	122.9004	129.6991	133.2391	152.6300	167.2457	190.4152 (45)	
Energy content (annual)												Total = Sum(45)m = 1862.0953
Distribution loss (46)m = 0.15 x (45)m 28.9678	25.4990	26.7978	22.8749	21.7057	19.0497	18.4351	19.4549	19.9859	22.8945	25.0869	28.5623 (46)	
Water storage loss: Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): Temperature factor from Table 2b												1.4500 (48)
Enter (49) or (54) in (55)												0.5400 (49)
Total storage loss												0.7830 (50)
24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (56)	
If cylinder contains dedicated solar storage 24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (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 240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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)	
FV 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 240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (64)	
											Total per year (kWh/year) = Sum(64)m = 2421.7863 (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 102.2403	90.8710	97.4301	87.5076	86.1426	79.0285	78.8927	81.1533	81.1036	88.7778	92.4108	101.3414 (65)	

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

Metabolic gains (Table 5), Watts Jan (66)m 114.8683	Feb 114.8683	Mar 114.8683	Apr 114.8683	May 114.8683	Jun 114.8683	Jul 114.8683	Aug 114.8683	Sep 114.8683	Oct 114.8683	Nov 114.8683	Dec 114.8683 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5 20.4940	18.2026	14.8033	11.2071	8.3774	7.0726	7.6422	9.9336	13.3328	16.9291	19.7587	21.0636 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5 249.2295	251.8157	245.2985	231.4241	213.9103	197.4497	186.4531	183.8668	190.3840	204.2584	221.7722	238.2328 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5 48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013 (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) -76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5) 137.4197	135.2247	130.9544	121.5383	115.7831	109.7618	106.0386	109.0770	112.6439	119.3250	128.3483	136.2115 (72)
Total internal gains 493.8339	491.9337	477.7470	450.8603	424.7615	400.9748	386.8246	389.5681	403.0515	427.2032	456.5700	482.1986 (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						
North	6.0000	14.5421	0.7600	0.7000	0.7700	32.1679 (74)						
South	3.1700	60.3000	0.7600	0.7000	0.7700	70.4727 (78)						
East	0.6200	37.0000	0.7600	0.7000	1.0000	10.9837 (82)						
West	1.8600	37.0000	0.7600	0.7000	1.0000	32.9510 (82)						
Solar gains	146.5753	227.5070	349.0680	506.0310	591.0403	662.4776	566.6636	522.4374	417.1663	274.7834	171.6129	119.5025 (83)
Total gains	640.4092	719.4406	826.8149	956.8913	1015.8018	1063.4524	953.4882	912.0055	820.2177	701.9866	628.1830	601.7011 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	Jan 22.4863	Feb 22.7014	Mar 22.8105	Apr 23.2007	May 23.2007	Jun 23.6044	Jul 23.6633	Aug 23.7224	Sep 23.4297	Oct 22.9761	Nov 22.8105	Dec 22.4863
alpha	2.4991	2.5134	2.5207	2.5467	2.5467	2.5736	2.5776	2.5815	2.5620	2.5317	2.5207	2.4991
util living area	0.8148	0.7735	0.7013	0.5970	0.4832	0.3507	0.2948	0.2950	0.4183	0.6119	0.7514	0.8220 (86)
Living	19.8422	20.0021	20.2456	20.5089	20.7017	20.8223	20.8525	20.8540	20.7957	20.5765	20.2179	19.8541

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10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	518.2638	25.1600	130.3952 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2421.7863	25.1600	609.3214 (247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000 (247a)
Pumps, fans and electric keep-hot	122.6288	25.1600	30.8534 (249)
Energy for lighting	144.7721	25.1600	36.4247 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1327.6151	25.1600	-334.0280
PV Unit electricity exported	-2137.2912	5.8100	-124.1766
Total			-458.2046 (252)
Total energy cost			348.7901 (255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	518.2638	0.1558	80.7433 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2421.7863	0.1409	341.2681 (264)
Space and water heating			422.0114 (265)
Pumps, fans and electric keep-hot	122.6288	0.1387	17.0101 (267)
Energy for lighting	144.7721	0.1443	20.8951 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1327.6151	0.1342	-178.1847
PV Unit electricity exported	-2137.2912	0.1227	-262.1405
Total			-440.3252 (269)
Total CO2, kg/year			19.5915 (272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	518.2638	1.5768	817.1856 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2421.7863	1.5211	3683.6742 (278)
Space and water heating			4500.8598 (279)
Pumps, fans and electric keep-hot	122.6288	1.5128	185.5129 (281)
Energy for lighting	144.7721	1.5338	222.0563 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1327.6151	1.4960	-1986.1255
PV Unit electricity exported	-2137.2912	0.4501	-961.9769
Total			-2948.1024 (283)
Total Primary energy kWh/year			1960.3266 (286)

SAP 10 EPC IMPROVEMENTS

ASHP & Solar

Current energy efficiency rating: B 84
 Current environmental impact rating: A 98

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

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

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)	Total Savings £0	0.00 kg/m ²	

Potential energy efficiency rating: B 84
 Potential environmental impact rating: A 98

Fuel prices for cost data on this page from database revision number 538 TEST (29 Feb 2024)
 Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Southern England):

	Current £807	Potential £807	£0 Saving
Electricity			
Space heating	£161	£161	£0
Water heating	£609	£609	£0
Lighting	£36	£36	£0
Generated (PV)	-£458	-£458	£0
Total cost of fuels	£349	£349	£0
Total cost of uses	£348	£348	£0
Delivered energy	-4 kWh/m ²	-4 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.0 tonnes	0.0 tonnes	0.0 tonnes
CO2 emissions per m ²	0 kg/m ²	0 kg/m ²	0 kg/m ²
Primary energy	34 kWh/m ²	34 kWh/m ²	0 kWh/m ²

Full SAP Calculation Printout



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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 140.5810 (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)

	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												
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) =												44.5000 (23c)
Effective ac	0.4401	0.4369	0.4337	0.4177	0.4146	0.3986	0.3986	0.3954	0.4050	0.4146	0.4209	0.4273 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Window (Uw = 1.20)			9.1700	1.1450	10.5000		(27)
RL			1.8600	1.1450	2.1298		(27a)
RL			0.6200	1.1450	0.7099		(27a)
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000 (28a)
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796	60.0000	3493.2000 (29a)
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600 (30)
Total net area of external elements Aum(A, m2)			149.8200				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	35.8118	(33)
Party Floor 1			50.1300			0.0000	0.0000 (32a)
Party Ceiling 1			50.1300			0.0000	0.0000 (32b)
Internal Wall 1			44.0000			9.0000	396.0000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5054.1600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		87.6697 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.5500	0.0880	0.4884
E3 Sill	2.5500	0.0470	0.1198
E4 Jamb	8.9600	0.0400	0.3584
E5 Ground floor (normal)	4.6200	0.0330	0.1525
E14 Flat roof	0.0000	0.0490	0.0000
E16 Corner (normal)	10.0000	0.0350	0.3500
E17 Corner (inverted - internal area greater than external area)	2.0000	0.0350	0.0700
E7 Party floor between dwellings (in blocks of flats)	25.3500	0.0310	0.7859
E11 Eaves (insulation at rafter level)	20.3000	0.0420	0.8526
E13 Gable (insulation at rafter level)	11.5200	0.0320	0.3686

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5462 (36)
Point Thermal bridges		(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) =	39.3580 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	20.4153	20.2674	20.1195	19.3801	19.2323	18.4929	18.4929	18.3450	18.7887	19.2323	19.5280	19.8238 (38)
Heat transfer coeff	59.7733	59.6254	59.4775	58.7381	58.5903	57.8509	57.8509	57.7030	58.1466	58.5903	58.8860	59.1818 (39)
Average = Sum(39)m / 12 =												58.7012

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0368	1.0343	1.0317	1.0189	1.0163	1.0035	1.0035	1.0009	1.0086	1.0163	1.0214	1.0266 (40)
HLP (average)												1.0182
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												
Hot water usage for mixer showers												1.9145 (42)
Hot water usage for baths	63.3588	62.4067	61.0192	58.3645	56.4054	54.2206	52.9788	54.3558	55.8652	58.2110	60.9227	63.1161 (42a)
Hot water usage for other uses	24.3422	23.9807	23.4716	22.5329	21.8301	21.0507	20.6297	21.1353	21.6857	22.5196	23.4776	24.2599 (42b)
Average daily hot water use (litres/day)	34.2361	32.9912	31.7462	30.5013	29.2563	28.0114	28.0114	29.2563	30.5013	31.7462	32.9912	34.2361 (42c)
Daily hot water use												112.1075 (43)
Energy content (annual)	121.9371	119.3785	116.2370	111.3987	107.4918	103.2827	101.6199	104.7473	108.0521	112.4768	117.3915	121.6121 (44)
Distribution loss (46)m = 0.15 x (45)m	193.1186	169.9934	178.6519	152.4992	144.7046	126.9981	122.9004	129.6991	133.2391	152.6300	167.2457	190.4152 (45)
Water storage loss:	28.9678	25.4990	26.7978	22.8749	21.7057	19.0497	18.4351	19.4549	19.9859	22.8945	25.0869	28.5623 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7830 (55)
Total storage loss	24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (56)
If cylinder contains dedicated solar storage	24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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	102.2403	90.8710	97.4301	87.5076	86.1426	79.0285	78.8927	81.1533	81.1036	88.7778	92.4108	101.3414 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683	114.8683 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	20.4940	18.2026	14.8033	11.2071	8.3774	7.0726	7.6422	9.9336	13.3328	16.9291	19.7587	21.0636 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	249.2295	251.8157	245.2985	231.4241	213.9103	197.4497	186.4531	183.8668	190.3840	204.2584	221.7722	238.2328 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013	48.4013 (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)	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789	-76.5789 (71)
Water heating gains (Table 5)	137.4197	135.2247	130.9544	121.5383	115.7831	109.7618	106.0386	109.0770	112.6439	119.3250	128.3483	136.2115 (72)
Total internal gains	493.8339	491.9337	477.7470	450.8603	424.7615	400.9748	386.8246	389.5681	403.0515	427.2032	456.5700	482.1986 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
North	6.0000	10.6334	0.7600	0.7000	0.7700	23.5217 (74)						
South	3.1700	46.7521	0.7600	0.7000	0.7700	54.6393 (78)						
East	0.6200	26.0000	0.7600	0.7000	1.0000	7.7183 (82)						
West	1.8600	26.0000	0.7600	0.7000	1.0000	23.1548 (82)						
Solar gains	109.0340	198.5570	304.3637	429.6354	527.5109	543.6145	515.8458	440.0723	347.4648	228.3964	132.9682	91.7581 (83)
Total gains	602.8679	690.4907	782.1107	880.4957	952.2724	944.5893	902.6703	829.6405	750.5162	655.5996	589.5382	573.9567 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												
Utilisation factor for gains for living area, nil,m (see Table 9a)												21.0000 (85)
tau	23.4877	23.5459	23.6044	23.9016	23.9619	24.2681	24.2681	24.3303	24.1447	23.9619	23.8415	23.7224
alpha	2.5658	2.5697	2.5736	2.5934	2.5975	2.6179	2.6179	2.6220	2.6096	2.5975	2.5894	2.5815
util living area	0.8698	0.8259	0.7544	0.6409	0.5059	0.3707	0.2745	0.3088	0.4804	0.6951	0.8272	0.8810 (86)
Living	19.4630	19.7138	20.0644	20.4407	20.6917	20.8222	20.8627	20.8552	20.7597	20.4188	19.8858	19.4136
Non living	18.2660	18.5750	19.0020	19.4544	19.7377	19.8824	19.9184	19.9153	19.8221	19.4445	18.8027	18.2116
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	31	28	31	30	31	30	31	31	30	31	30	31

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10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	768.2502	16.4900	126.6845 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2421.7863	16.4900	399.3526 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	122.6288	16.4900	20.2215 (249)
Energy for lighting	144.7721	16.4900	23.8729 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1199.9169	16.4900	-197.8663
PV Unit electricity exported	-1705.2167	5.5900	-95.3216
Total			-293.1879 (252)
Total energy cost			276.9435 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	$[(255) \times (256)] / [(4) + 45.0] =$	0.9713 (257)
SAP value		84.2559
SAP rating (Section 12)		84 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	768.2502	0.1559	119.7957 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2421.7863	0.1409	341.2681 (264)
Space and water heating			461.0638 (265)
Pumps, fans and electric keep-hot	122.6288	0.1387	17.0101 (267)
Energy for lighting	144.7721	0.1443	20.8951 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1199.9169	0.1336	-160.2576
PV Unit electricity exported	-1705.2167	0.1215	-207.2654
Total			-367.5230 (269)
Total CO2, kg/year			131.4460 (272)
CO2 emissions per m2			2.2800 (273)
EI value			98.2841
EI rating			98 (274)
EI band			A

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	4.4100 (1b)	x 2.3000 (2b)	= 10.1430 (1b) - (3b)
First floor	53.2400 (1c)	x 2.4500 (2c)	= 130.4380 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.6500		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 140.5810 (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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	6.9000	6.5000	6.3000	5.6000	5.6000	4.9000	4.8000	4.7000	5.2000	6.0000	6.3000	6.9000 (22)
Wind factor	1.7250	1.6250	1.5750	1.4000	1.4000	1.2250	1.2000	1.1750	1.3000	1.5000	1.5750	1.7250 (22a)

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Adj infilt rate	0.2199	0.2072	0.2008	0.1785	0.1785	0.1562	0.1530	0.1498	0.1658	0.1913	0.2008	0.2199 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.4974	0.4847	0.4783	0.4560	0.4560	0.4337	0.4305	0.4273	0.4432	0.4688	0.4783	0.4974 (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
Window (Uw = 1.20)			9.1700	1.1450	10.5000		(27)
RL			1.8600	1.1450	2.1298		(27a)
RL			0.6200	1.1450	0.7099		(27a)
Ground Floor			4.4100	0.1500	0.6615	110.0000	485.1000 (28a)
External Wall	67.3900	9.1700	58.2200	0.1800	10.4796	60.0000	3493.2000 (29a)
Sloping Roof	78.0200	2.4800	75.5400	0.1500	11.3310	9.0000	679.8600 (30)
Total net area of external elements Aum(A, m ²)			149.8200				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =	35.8118			(33)
Party Floor 1			50.1300			0.0000	0.0000 (32d)
Party Ceiling 1			50.1300			0.0000	0.0000 (32b)
Internal Wall 1			44.0000			9.0000	396.0000 (32c)

Heat capacity Cm = Sum(A x k) (28) ... (30) + (32) + (32a) ... (32e) = 5054.1600 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 87.6697 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.5500	0.0880	0.4884
E3 Sill	2.5500	0.0470	0.1198
E4 Jamb	8.9600	0.0400	0.3584
E5 Ground floor (normal)	4.6200	0.0330	0.1525
E14 Flat roof	0.0000	0.0490	0.0000
E16 Corner (normal)	10.0000	0.0350	0.3500
E17 Corner (inverted - internal area greater than external area)	2.0000	0.0350	0.0700
E7 Party floor between dwellings (in blocks of flats)	25.3500	0.0310	0.7859
E11 Eaves (insulation at rafter level)	20.3000	0.0420	0.8526
E13 Gable (insulation at rafter level)	11.5200	0.0320	0.3686

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.5462 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 39.3580 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	23.0770	22.4855	22.1897	21.1546	21.1546	20.1195	19.9716	19.8238	20.5631	21.7461	22.1897	23.0770 (38)
Average = Sum(39)m / 12 =	62.4350	61.8435	61.5477	60.5126	60.5126	59.4775	59.3296	59.1818	59.9211	61.1041	61.5477	62.4350 (39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0830	1.0727	1.0676	1.0497	1.0497	1.0317	1.0291	1.0266	1.0394	1.0599	1.0676	1.0830 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9145 (42)
Hot water usage for mixer showers												63.1161 (42a)
Hot water usage for baths												24.2599 (42b)
Hot water usage for other uses												34.2361 (42c)
Average daily hot water use (litres/day)												112.1075 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	121.9371	119.3785	116.2370	111.3987	107.4918	103.2827	101.6199	104.7473	108.0521	112.4768	117.3915	121.6121 (44)
Energy content (annual)	193.1186	169.9934	178.6519	152.4992	144.7046	126.9981	122.9004	129.6991	133.2391	152.6300	167.2457	190.4152 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1862.0953
Water storage loss:	28.9678	25.4990	26.7978	22.8749	21.7057	19.0497	18.4351	19.4549	19.9859	22.8945	25.0869	28.5623 (46)
Store volume												150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.4500 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.7830 (55)
Total storage loss	24.2730	21.9240	24.2730	23.4900	24.2730	23.4900	24.2730	24.2730	23.4900	24.2730	23.4900	24.2730 (56)
If cylinder contains dedicated solar storage												24.2730 (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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (62)
WVHRS	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	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506 (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	102.2403	90.8710	97.4301	87.5076	86.1426	79.0285	78.8927	81.1533	81.1036	88.7778	92.4108	101.3414 (65)

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

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Water heating													
Water heating requirement	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	240.6540	212.9286	226.1873	198.5012	192.2400	173.0001	170.4358	177.2345	179.2411	200.1654	213.2477	237.9506	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	10.4150	9.4071	10.4150	10.0791	10.4150	10.0791	10.4150	10.0791	10.4150	10.0791	10.4150	10.0791	(231)
Lighting	17.9383	14.3907	12.9573	9.4931	7.3327	5.9909	6.6891	8.6948	11.2937	14.8179	16.7368	18.4368	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-60.0861	-81.2192	-126.2536	-148.3309	-156.6789	-147.9349	-140.1356	-136.4457	-119.0564	-96.9557	-65.0529	-49.4653	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-28.9935	-56.6825	-134.8073	-243.9970	-328.5186	-381.0389	-326.5639	-287.6755	-193.1671	-95.9347	-38.9831	-20.9290	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												518.2638	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2421.7863	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.7150)													
mechanical ventilation fans (SFP = 0.7150)												122.6288	(230a)
Total electricity for the above, kWh/year												122.6288	(231)
Electricity for lighting (calculated in Appendix L)												144.7721	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-3464.9064	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												-257.4553	(238)

10a. Fuel costs - using BEDF prices (538)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	518.2638	25.1600	130.3952	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2421.7863	25.1600	609.3214	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	122.6288	25.1600	30.8534	(249)
Energy for lighting	144.7721	25.1600	36.4247	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1327.6151	25.1600	-334.0280	
PV Unit electricity exported	-2137.2912	5.8100	-124.1766	
Total			-458.2046	(252)
Total energy cost			348.7901	(255)

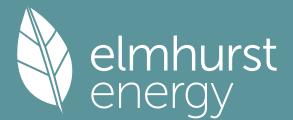
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	518.2638	0.1558	80.7433	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2421.7863	0.1409	341.2681	(264)
Space and water heating			422.0114	(265)
Pumps, fans and electric keep-hot	122.6288	0.1387	17.0101	(267)
Energy for lighting	144.7721	0.1443	20.8951	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1327.6151	0.1342	-178.1847	
PV Unit electricity exported	-2137.2912	0.1227	-262.1405	
Total			-440.3252	(269)
Total CO2, kg/year			19.5915	(272)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	518.2638	1.5768	817.1856	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2421.7863	1.5211	3683.6742	(278)
Space and water heating			4500.8598	(279)
Pumps, fans and electric keep-hot	122.6288	1.5128	185.5129	(281)
Energy for lighting	144.7721	1.5338	222.0563	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1327.6151	1.4960	-1986.1255	
PV Unit electricity exported	-2137.2912	0.4501	-961.9769	
Total			-2948.1024	(283)
Total Primary energy kWh/year			1960.3266	(286)

Predicted Energy Assessment

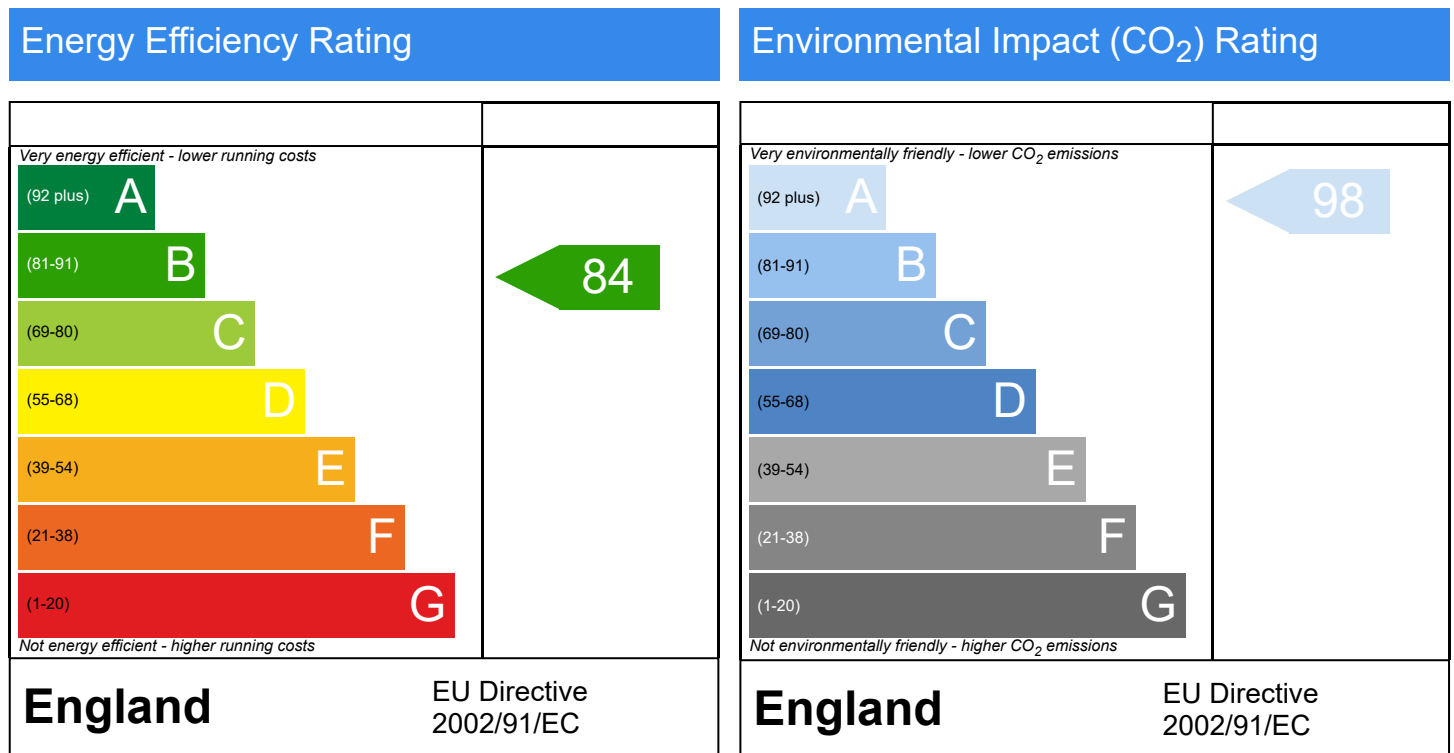


First Floor, 3 Avenue Road , , TR114A2

Dwelling type: Flat, Detached
 Date of assessment: 30/03/2024
 Produced by: Mark Scotson
 Total floor area: 57.65 m²
 DRRN: 0274-4874-0071

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.

Summary for Input Data



Property Reference	First Floor, 3 Avenue Road	Issued on Date	30/03/2024
Assessment Reference	ASHP & Solar	Prop Type Ref	1
Property	First Floor, 3 Avenue Road , , TR114A2		

SAP Rating	84 B	DER	2.43	TER	13.22
Environmental	98 A	% DER < TER			81.62
CO ₂ Emissions (t/year)	0.02	DFEE	34.95	TFEE	37.85
Compliance Check	See BREL	% DFEE < TFEE			7.67
% DPER < TPER	28.98	DPER	49.21	TPER	69.29

Assessor Details	Mr. Mark Scotson	Assessor ID	AX66-0001
Client	Client , Client		

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

Orientation	South
Property Tenure	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, Detached
Position of Flat	Top-floor flat
Which Floor	2
2.0 Number of Storeys	2
3.0 Date Built	2023
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	4.62 m	4.41 m ²	2.30 m
1st Storey:	25.35 m	53.24 m ²	2.45 m

8.0 Living Area	20.20	m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	External Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	67.39	58.22	0.00	None	9.17	Enter Gross Area

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Plasterboard on timber frame	9.00	44.00

10.0 External Roofs	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
	Sloping Roof	External Slope Roof	Plasterboard, insulated slope	0.15	9.00	78.02	75.54	None	0.00	Enter Gross Area	2.48

10.1 Party Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Ceiling 1	Other	0.00	50.13

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Ground Floor	Ground Floor - Solid	Lowest occupied	Slab on ground, screed over insulation	0.15	None	0.00	110.00	4.41

11.1 Party Floors

Summary for Input Data



Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	+1	Other	0.00	50.13

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double glazed			0.76		0.70	1.20
Opening	Manufacturer	Window	Double glazed			0.76		0.70	1.20
Roof Window	Manufacturer	Roof Light	Double glazed			0.76		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
W	Window	External Wall	South	3.17	
W	Window	External Wall	North	6.00	
RL	Roof Window	Sloping Roof	West	1.86	0
RL	Roof Window	Sloping Roof	East	0.62	0

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	5.55	0.09	0.09	No
E3 Sill	Independently assessed	2.55	0.05	0.05	No
E4 Jamb	Independently assessed	8.96	0.04	0.04	No
E5 Ground floor (normal)	Independently assessed	4.62	0.03	0.03	No
E14 Flat roof	Independently assessed	0.00	0.05	0.05	No
E16 Corner (normal)	Independently assessed	10.00	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	2.00	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	25.35	0.03	0.03	No
E11 Eaves (insulation at rafter level)	Independently assessed	20.30	0.04	0.04	No
E13 Gable (insulation at rafter level)	Independently assessed	11.52	0.03	0.03	No

Y-value W/m²K

18.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

Approved Installation

Mechanical Ventilation data Type

Type

MV Reference Number

Configuration

MVHR Duct Insulated

Manufacturer SFP

Duct Type

MVHR Efficiency

Wet Rooms

SFP from Installer Commissioning Certificate

MVHR System Location

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	100.00	5	500	10

24.0 Main Heating 1

Summary for Input Data



Description	ASHP	
Percentage of Heat	100.00	%
Database Ref. No.	101633	
Fuel Type	Electricity	
In Winter	0.00	
In Summer	0.00	
Model Name	ECODAN	
Manufacturer	Mitsubishi Electric Europe B.V.	
System Type	Heat Pump	
Controls SAP Code	2207	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Underfloor	
Underfloor Heating	Yes - Pipes in thin screed	
Flow Temperature	Enter value	
Flow Temperature Value	35.00	

25.0 Main Heating 2

26.0 Heat Networks

Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1									
Heat source 2									
Heat source 3									
Heat source 4									
Heat source 5									

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	Yes

28.1 Showers

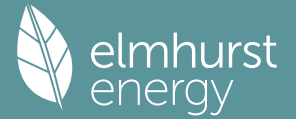
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
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28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Hot Water Cylinder		
Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.45	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

Summary for Input Data



31.0 Thermal Store

None

32.0 Photovoltaic Unit

One Dwelling

Export Capable Meter? Yes

Connected To Dwelling Yes

Diverter No

Battery Capacity [kWh] 0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
4.00	East	30°	None Or Little		No	1.00		

34.0 Small-scale Hydro

None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

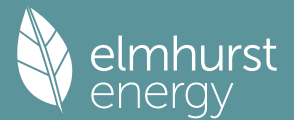
Lower cost measures

None

Further measures to achieve even higher standards

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

Thermal Bridging



Property Reference	First Floor, 3 Avenue Road	Issued on Date	30/03/2024
Assessment Reference	ASHP & Solar	Prop Type Ref	Detached Flat
Property	First Floor, 3 Avenue Road , , TR114A2		

SAP Rating	84 B	DER	2.43	TER	13.22
Environmental	98 A	% DER < TER			81.62
CO ₂ Emissions (t/year)	0.02	DFEE	34.95	TFEE	37.85
Compliance Check	See BREL	% DFEE < TFEE			7.67
% DPER < TPER	28.98	DPER	49.21	TPER	69.29

Assessor Details	Mr. Mark Scotson	Assessor ID	AX66-0001
Client	Client , Client		

	Junction details	Source Type	Psi (W/mK)	Length (m)	Result	Reference
External wall	E2 Other lintels (including other steel lintels)	Independently assessed	0.088	5.55	0.49	
External wall	E3 Sill	Independently assessed	0.047	2.55	0.12	
External wall	E4 Jamb	Independently assessed	0.040	8.96	0.36	
External wall	E5 Ground floor (normal)	Independently assessed	0.033	4.62	0.15	
External wall	E14 Flat roof	Independently assessed	0.049	0.00	0.00	
External wall	E16 Corner (normal)	Independently assessed	0.035	10.00	0.35	
External wall	E17 Corner (inverted – internal area greater than external area)	Independently assessed	0.035	2.00	0.07	
External wall	E7 Party floor between dwellings (in blocks of flats)	Independently assessed	0.031	25.35	0.79	
External wall	E11 Eaves (insulation at rafter level)	Independently assessed	0.042	20.30	0.85	
External wall	E13 Gable (insulation at rafter level)	Independently assessed	0.032	11.52	0.37	

Total: W/mK:
 Y-Value: W/m²K: