Summary for Input Data

elmhurst energy

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.18	**TER**	10.65
Environmental	93 A	**% DER < TER**			4.41
CO_2 Emissions (t/year)	0.5	**DFEE**	13.57	**TFEE**	13.75
Compliance Check	See BREL	**% DFEE < TFEE**			1.31
% DPER < TPER	2.24	**DPER**	54.93	**TPER**	56.19

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	253.04	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	50.10 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	24.50	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	18.20	12.20	0.00	None	6.00	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	16.10	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	77.70

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling	Concrete floor slab, carpeted	100.00	50.10

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)

Party Floor	Lowest occupied	Concrete floor slab, carpeted		100.00	50.10

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Rear	Window	External Wall	North	6.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	3.30	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	3.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	7.20	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	0.00	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	15.20	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	0.00	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.10	0.10	RCDs	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

Summary for Input Data

elmhurst energy

Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
0.90	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.18	**TER**	10.65
Environmental	93 A	**% DER < TER**			4.41
CO_2 Emissions (t/year)	0.5	**DFEE**	13.57	**TFEE**	13.75
Compliance Check	See BREL	**% DFEE < TFEE**			1.31
% DPER < TPER	2.24	**DPER**	54.93	**TPER**	56.19

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.2300	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.7324			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Party Ceiling			50.1000			100.0000	5010.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	13679.3001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		273.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	15.2000	0.0010	0.0152	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.5395 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	10.2719 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	(39)
Average = Sum(39)m / 12 =												29.2849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	(40)
HLP (average)												0.5845	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6930	(42)
Hot water usage for mixer showers	72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)
Average daily hot water use (litres/day)												116.8403	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	
alpha	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	
util living area													
	0.9723	0.9482	0.8995	0.7639	0.5782	0.4044	0.2926	0.3256	0.5156	0.7888	0.9365	0.9780	(86)
MIT	20.7703	20.8422	20.9180	20.9830	20.9987	21.0000	21.0000	21.0000	20.9996	20.9811	20.8818	20.7450	(87)
Th 2	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	(88)
util rest of house													
	0.9654	0.9367	0.8801	0.7334	0.5441	0.3693	0.2556	0.2862	0.4743	0.7534	0.9210	0.9724	(89)
MIT 2	20.2442	20.3114	20.3794	20.4323	20.4432	20.4439	20.4439	20.4439	20.4438	20.4316	20.3488	20.2201	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.5015	20.5710	20.6428	20.7016	20.7149	20.7158	20.7159	20.7159	20.7156	20.7003	20.6095	20.4768	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5015	20.5710	20.6428	20.7016	20.7149	20.7158	20.7159	20.7159	20.7156	20.7003	20.6095	20.4768	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9662	0.9395	0.8874	0.7477	0.5608	0.3865	0.2737	0.3055	0.4945	0.7700	0.9259	0.9728	(94)
Useful gains	382.5286	396.3022	382.2156	339.3143	263.5553	179.0903	120.5324	126.3887	193.6272	288.9366	349.5097	374.3962	(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													
	474.4579	458.9226	414.1700	345.6100	263.9990	179.1018	120.5327	126.3897	193.7374	295.7864	395.6234	476.6652	(97)
Space heating kWh													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98a)
Space heating requirement - total per year (kWh/year)												253.4996	
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													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												253.4996	
Space heating per m2											(98c) / (4) =	5.0599	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	76.8487	47.2819	26.7124	5.0931	0.3709	0.0000	0.0000	0.0000	0.0000	5.7261	37.3055	85.4923	(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													
	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.7028	87.6026	87.4766	87.3425	87.3033	87.3000	87.3000	87.3000	87.3000	87.3476	87.5504	87.7408	(217)
Fuel for water heating, kWh/month													
	246.3241	217.5766	229.9066	198.3724	189.6767	167.9481	163.4563	171.5225	175.1736	198.8096	215.3209	242.9699	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.2748	-24.0576	-36.2743	-42.8125	-47.8918	-45.3646	-44.8644	-41.5504	-35.8764	-28.4694	-18.3028	-13.9443	(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	-6.2641	-13.5534	-27.7815	-43.0350	-58.1654	-58.9066	-58.0288	-48.3479	-34.5320	-19.6112	-8.4317	-4.9169	(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												284.8310	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2417.0573	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-777.2577	(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	2229.1915	(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	284.8310	0.2100	59.8145	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2417.0573	0.2100	507.5820	(264)
Space and water heating			567.3965	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	0.1336	-52.8586	
PV Unit electricity exported	-381.5745	0.1251	-47.7299	
Total			-100.5885	(269)
Total CO2, kg/year			510.2166	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.1800	(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	284.8310	1.1300	321.8590	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2417.0573	1.1300	2731.2747	(278)
Space and water heating			3053.1338	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	1.4937	-591.0175	
PV Unit electricity exported	-381.5745	0.4591	-175.1869	
Total			-766.2043	(283)
Total Primary energy kWh/year			2752.0201	(286)
Dwelling Primary energy Rate (DPER)			54.9300	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.0662			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 253.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	15.2000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.9660 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 10.0322 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	33.0515	32.8960	32.7435	32.0272	31.8932	31.2694	31.2694	31.1539	31.5097	31.8932	32.1643	32.4477	(39)

Average = Sum(39)m / 12 = 32.0266

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6597	0.6566	0.6536	0.6393	0.6366	0.6241	0.6241	0.6218	0.6289	0.6366	0.6420	0.6477	(40)
HLP (average)												0.6393	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)

Energy content (annual) Total = Sum(45)m = 1638.5940

Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)

Total per year (kWh/year) = Sum(64)m = 1994.5871 (64)

12Total per year (kWh/year) 1995 (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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	106.5449	107.0488	107.5473	109.9525	110.4144	112.6172	112.6172	113.0348	111.7584	110.4144	109.4838	108.5275	
alpha	8.1030	8.1366	8.1698	8.3302	8.3610	8.5078	8.5078	8.5357	8.4506	8.3610	8.2989	8.2352	
util living area	0.9804	0.9642	0.9298	0.8101	0.6252	0.4307	0.3113	0.3451	0.5515	0.8290	0.9520	0.9830	(86)
MIT	20.6150	20.7106	20.8251	20.9542	20.9945	20.9998	21.0000	21.0000	20.9985	20.9538	20.7946	20.6076	(87)
Th 2	20.3766	20.3793	20.3820	20.3948	20.3972	20.4083	20.4083	20.4104	20.4040	20.3972	20.3923	20.3873	(88)
util rest of house	0.9755	0.9557	0.9141	0.7795	0.5864	0.3910	0.2695	0.3009	0.5046	0.7943	0.9395	0.9787	(89)
MIT 2	19.9382	20.0582	20.1980	20.3525	20.3930	20.4082	20.4083	20.4104	20.4031	20.3564	20.1732	19.9383	(90)
Living area fraction									fLA = Living area / (4) =			0.4890	(91)
MIT	20.2692	20.3773	20.5047	20.6467	20.6872	20.6975	20.6977	20.6987	20.6942	20.6486	20.4771	20.2656	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2692	20.3773	20.5047	20.6467	20.6872	20.6975	20.6977	20.6987	20.6942	20.6486	20.4771	20.2656	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9745	0.9557	0.9175	0.7926	0.6052	0.4104	0.2899	0.3225	0.5275	0.8093	0.9414	0.9777	(94)
Useful gains	384.0209	401.6370	394.3652	359.9536	284.8406	190.6076	128.1289	133.9155	207.3331	304.4995	355.0724	374.7124	(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	527.8053	509.1398	458.5618	376.2151	286.6303	190.6653	128.1313	133.9213	207.7827	320.4813	430.2656	521.2930	(97)
Space heating kWh	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98a)
Space heating requirement - total per year (kWh/year)												415.1051	
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	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												415.1051	
Space heating per m2											(98c) / (4) =	8.2855	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	115.7745	78.1839	51.6908	12.6713	1.4410	0.0000	0.0000	0.0000	0.0000	12.8685	58.5921	118.0259	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	83.1313	82.6424	81.9204	80.8209	80.3649	80.3000	80.3000	80.3000	80.3000	80.8200	82.1683	83.1867	(217)
Fuel for water heating, kWh/month	236.8289	210.9311	226.8358	202.9617	196.9468	176.5844	174.2568	182.4218	185.5532	206.4913	214.4393	234.3603	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	449.2479	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2448.6113	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(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	2296.9504	(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	449.2479	0.2100	94.3421	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2448.6113	0.2100	514.2084	(264)
Space and water heating			608.5504	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			533.4908	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.6500	(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	449.2479	1.1300	507.6502	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2448.6113	1.1300	2766.9308	(278)
Space and water heating			3274.5810	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			2815.2653	(286)
Target Primary Energy Rate (TPER)			56.1900	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.18	**TER**	10.65
Environmental	93 A	**% DER < TER**			4.41
CO_2 Emissions (t/year)	0.5	**DFEE**	13.57	**TFEE**	13.75
Compliance Check	See BREL	**% DFEE < TFEE**			1.31
% DPER < TPER	2.24	**DPER**	54.93	**TPER**	56.19

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3986	(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) =	0.3388	(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	0.4319	0.4235	0.4150	0.3727	0.3642	0.3218	0.3218	0.3134	0.3388	0.3642	0.3811	0.3981	(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	0.5933	0.5897	0.5861	0.5694	0.5663	0.5518	0.5518	0.5491	0.5574	0.5663	0.5726	0.5792	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.7324			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Party Ceiling			50.1000			80.0000	4008.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12677.3001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		253.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693
E4 Jamb	7.2000	0.0160	0.1152
E5 Ground floor (normal)	0.0000	0.0740	0.0000

E6 Intermediate floor within a dwelling	15.2000	0.0010	0.0152	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.5395 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 10.2719 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.5603	22.4226	22.2876	21.6534	21.5347	20.9824	20.9824	20.8801	21.1951	21.5347	21.7748	22.0257	(38)
Heat transfer coeff	32.8323	32.6945	32.5595	31.9253	31.8067	31.2543	31.2543	31.1520	31.4671	31.8067	32.0467	32.2976	(39)
Average = Sum(39)m / 12 =												31.9247	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6553	0.6526	0.6499	0.6372	0.6349	0.6238	0.6238	0.6218	0.6281	0.6349	0.6397	0.6447	(40)
HLP (average)												0.6372	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (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

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 50.1511 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
Energy conte	86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)
Energy content (annual)										Total = Sum(45)m =		832.9018	

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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)

Total per year (kWh/year) = Sum(64)m = 707.9666 (64)
12Total per year (kWh/year) 708 (64)
Electric shower(s)

42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 479.2135 (64a)
Heat gains from water heating, kWh/month

28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)
Total internal gains	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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	107.2564	107.7083	108.1550	110.3034	110.7149	112.6716	112.6716	113.0416	111.9098	110.7149	109.8856	109.0318	
alpha	8.1504	8.1806	8.2103	8.3536	8.3810	8.5114	8.5114	8.5361	8.4607	8.3810	8.3257	8.2688	
util living area													
	0.9926	0.9844	0.9642	0.8695	0.6836	0.4679	0.3377	0.3785	0.6097	0.8949	0.9792	0.9939	(86)
MIT	20.5023	20.6088	20.7446	20.9224	20.9898	20.9996	21.0000	20.9999	20.9968	20.9164	20.7036	20.4922	(87)
Th 2	20.3805	20.3829	20.3853	20.3966	20.3987	20.4086	20.4086	20.4104	20.4048	20.3987	20.3944	20.3900	(88)
util rest of house													
	0.9905	0.9801	0.9547	0.8429	0.6428	0.4249	0.2923	0.3301	0.5588	0.8667	0.9728	0.9922	(89)
MIT 2	19.9285	20.0351	20.1681	20.3386	20.3926	20.4084	20.4086	20.4104	20.4033	20.3381	20.1384	19.9268	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.2091	20.3157	20.4500	20.6241	20.6846	20.6975	20.6978	20.6987	20.6935	20.6209	20.4148	20.2033	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2091	20.3157	20.4500	20.6241	20.6846	20.6975	20.6978	20.6987	20.6935	20.6209	20.4148	20.2033	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9899	0.9796	0.9558	0.8534	0.6624	0.4459	0.3145	0.3538	0.5836	0.8777	0.9731	0.9916	(94)
Useful gains	333.4886	356.6289	359.2911	346.4747	282.3950	190.4641	128.0689	133.9012	206.5357	289.3527	316.4456	324.0824	(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													
	522.3319	504.0084	454.2061	374.2954	285.7707	190.5739	128.0736	133.9133	207.4788	318.7313	426.6951	516.8700	(97)
Space heating kWh													
	140.4994	99.0390	70.6168	20.0309	2.5115	0.0000	0.0000	0.0000	0.0000	21.8577	79.3796	143.4340	(98a)
Space heating requirement - total per year (kWh/year)												577.3689	
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													
	140.4994	99.0390	70.6168	20.0309	2.5115	0.0000	0.0000	0.0000	0.0000	21.8577	79.3796	143.4340	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												577.3689	
Space heating per m2											(98c) / (4) =	11.5243	(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	293.7904	231.2818	236.7553	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9924	0.9981	0.9961	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	291.5446	230.8371	235.8336	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	123.8820	157.2220	129.7931	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	30.9705	39.3055	32.4483	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												102.7243	(107)
Energy for space heating												11.5243	(99)
Energy for space cooling												2.0504	(108)
Total												13.5747	(109)
Fabric Energy Efficiency (DFEE)												13.6	(109)

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)

Infiltration rate 0.4236 (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) = 0.3600 (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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.0662			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 253.0399 (35)
List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650	
E3 Sill	3.3000	0.0500	0.1650	
E4 Jamb	7.2000	0.0500	0.3600	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	15.2000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.9660 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 10.0322 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	33.0515	32.8960	32.7435	32.0272	31.8932	31.2694	31.2694	31.1539	31.5097	31.8932	32.1643	32.4477	(39)
Average = Sum(39)m / 12 =												32.0266	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6597	0.6566	0.6536	0.6393	0.6366	0.6241	0.6241	0.6218	0.6289	0.6366	0.6420	0.6477	(40)
HLP (average)												0.6393	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)
Average daily hot water use (litres/day)												50.1511	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
Energy conte	86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)
Energy content (annual)										Total = Sum(45)m =		832.9018	
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	73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(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	73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)
										Total per year (kWh/year) = Sum(64)m =		707.9666	(64)
12Total per year (kWh/year)												708	(64)
Electric shower(s)	42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		479.2135	(64a)
Heat gains from water heating, kWh/month	28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)													
	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)													
	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)
Total internal gains													
	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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	106.5449	107.0488	107.5473	109.9525	110.4144	112.6172	112.6172	113.0348	111.7584	110.4144	109.4838	108.5275	
alpha	8.1030	8.1366	8.1698	8.3302	8.3610	8.5078	8.5078	8.5357	8.4506	8.3610	8.2989	8.2352	
util living area													
	0.9928	0.9847	0.9650	0.8709	0.6852	0.4682	0.3379	0.3786	0.6105	0.8959	0.9795	0.9940	(86)
MIT	20.4944	20.6019	20.7392	20.9208	20.9895	20.9996	21.0000	20.9999	20.9968	20.9151	20.7001	20.4867	(87)
Th 2	20.3766	20.3793	20.3820	20.3948	20.3972	20.4083	20.4083	20.4104	20.4040	20.3972	20.3923	20.3873	(88)
util rest of house													
	0.9907	0.9805	0.9556	0.8443	0.6442	0.4251	0.2925	0.3301	0.5594	0.8677	0.9732	0.9923	(89)
MIT 2	19.9172	20.0252	20.1601	20.3356	20.3908	20.4082	20.4083	20.4104	20.4025	20.3355	20.1332	19.9191	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.1994	20.3072	20.4433	20.6218	20.6836	20.6974	20.6977	20.6987	20.6931	20.6189	20.4104	20.1967	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1994	20.3072	20.4433	20.6218	20.6836	20.6974	20.6977	20.6987	20.6931	20.6189	20.4104	20.1967	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9900	0.9799	0.9566	0.8547	0.6639	0.4461	0.3147	0.3538	0.5843	0.8787	0.9734	0.9917	(94)
Useful gains	333.5494	356.7669	359.5915	347.0125	283.0449	190.5510	128.1264	133.9086	206.7882	289.6793	316.5484	324.1165	(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													
	525.5012	506.8347	456.5517	375.4152	286.5159	190.6616	128.1311	133.9208	207.7464	319.5362	428.1211	519.0555	(97)
Space heating kWh													
	142.8122	100.8456	72.1384	20.4499	2.5825	0.0000	0.0000	0.0000	0.0000	22.2136	80.3323	145.0346	(98a)
Space heating requirement - total per year (kWh/year)												586.4089	
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													
	142.8122	100.8456	72.1384	20.4499	2.5825	0.0000	0.0000	0.0000	0.0000	22.2136	80.3323	145.0346	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												586.4089	
Space heating per m2											(98c) / (4) =	11.7048	(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	293.9323	231.3935	236.7694	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9923	0.9981	0.9961	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	291.6741	230.9459	235.8471	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	123.7888	157.1410	129.7831	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	30.9472	39.2853	32.4458	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												102.6782	(107)
Energy for space heating												11.7048	(99)
Energy for space cooling												2.0495	(108)
Total												13.7542	(109)
Fabric Energy Efficiency (TFEE)												13.8	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.18	**TER**	10.65
Environmental	93 A	**% DER < TER**			4.41
CO_2 Emissions (t/year)	0.5	**DFEE**	13.57	**TFEE**	13.75
Compliance Check	See BREL	**% DFEE < TFEE**			1.31
% DPER < TPER	2.24	**DPER**	54.93	**TPER**	56.19

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	115.2300	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.7324			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Party Ceiling			50.1000			100.0000	5010.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	13679.3001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		273.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	15.2000	0.0010	0.0152	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				0.5395 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	10.2719 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	29.2849	(39)
Average = Sum(39)m / 12 =												29.2849	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	0.5845	(40)
HLP (average)												0.5845	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6930	(42)
Hot water usage for mixer showers	72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)
Average daily hot water use (litres/day)												116.8403	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	129.7531	
alpha	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	9.6502	
util living area													
	0.9723	0.9482	0.8995	0.7639	0.5782	0.4044	0.2926	0.3256	0.5156	0.7888	0.9365	0.9780	(86)
MIT	20.7703	20.8422	20.9180	20.9830	20.9987	21.0000	21.0000	21.0000	20.9996	20.9811	20.8818	20.7450	(87)
Th 2	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	20.4439	(88)
util rest of house													
	0.9654	0.9367	0.8801	0.7334	0.5441	0.3693	0.2556	0.2862	0.4743	0.7534	0.9210	0.9724	(89)
MIT 2	20.2442	20.3114	20.3794	20.4323	20.4432	20.4439	20.4439	20.4439	20.4438	20.4316	20.3488	20.2201	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.5015	20.5710	20.6428	20.7016	20.7149	20.7158	20.7159	20.7159	20.7156	20.7003	20.6095	20.4768	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.5015	20.5710	20.6428	20.7016	20.7149	20.7158	20.7159	20.7159	20.7156	20.7003	20.6095	20.4768	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9662	0.9395	0.8874	0.7477	0.5608	0.3865	0.2737	0.3055	0.4945	0.7700	0.9259	0.9728	(94)
Useful gains	382.5286	396.3022	382.2156	339.3143	263.5553	179.0903	120.5324	126.3887	193.6272	288.9366	349.5097	374.3962	(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													
	474.4579	458.9226	414.1700	345.6100	263.9990	179.1018	120.5327	126.3897	193.7374	295.7864	395.6234	476.6652	(97)
Space heating kWh													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98a)
Space heating requirement - total per year (kWh/year)												253.4996	
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													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												253.4996	
Space heating per m2											(98c) / (4) =	5.0599	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	68.3954	42.0809	23.7741	4.5329	0.3301	0.0000	0.0000	0.0000	0.0000	5.0962	33.2019	76.0882	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	76.8487	47.2819	26.7124	5.0931	0.3709	0.0000	0.0000	0.0000	0.0000	5.7261	37.3055	85.4923	(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													
	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.7028	87.6026	87.4766	87.3425	87.3033	87.3000	87.3000	87.3000	87.3000	87.3476	87.5504	87.7408	(217)
Fuel for water heating, kWh/month													
	246.3241	217.5766	229.9066	198.3724	189.6767	167.9481	163.4563	171.5225	175.1736	198.8096	215.3209	242.9699	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.2748	-24.0576	-36.2743	-42.8125	-47.8918	-45.3646	-44.8644	-41.5504	-35.8764	-28.4694	-18.3028	-13.9443	(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	-6.2641	-13.5534	-27.7815	-43.0350	-58.1654	-58.9066	-58.0288	-48.3479	-34.5320	-19.6112	-8.4317	-4.9169	(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												284.8310	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2417.0573	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-777.2577	(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	2229.1915	(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	284.8310	0.2100	59.8145	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2417.0573	0.2100	507.5820	(264)
Space and water heating			567.3965	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	0.1336	-52.8586	
PV Unit electricity exported	-381.5745	0.1251	-47.7299	
Total			-100.5885	(269)
Total CO2, kg/year			510.2166	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.1800	(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	284.8310	1.1300	321.8590	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2417.0573	1.1300	2731.2747	(278)
Space and water heating			3053.1338	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	1.4937	-591.0175	
PV Unit electricity exported	-381.5745	0.4591	-175.1869	
Total			-766.2043	(283)
Total Primary energy kWh/year			2752.0201	(286)
Dwelling Primary energy Rate (DPER)			54.9300	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			18.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		9.0662			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 253.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	15.2000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.9660 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 10.0322 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	33.0515	32.8960	32.7435	32.0272	31.8932	31.2694	31.2694	31.1539	31.5097	31.8932	32.1643	32.4477	(39)

Average = Sum(39)m / 12 = 32.0266

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6597	0.6566	0.6536	0.6393	0.6366	0.6241	0.6241	0.6218	0.6289	0.6366	0.6420	0.6477	(40)
HLP (average)												0.6393	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers	52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)

Energy content (annual) Total = Sum(45)m = 1638.5940

Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)

Total per year (kWh/year) = Sum(64)m = 1994.5871 (64)

12Total per year (kWh/year) 1995 (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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	106.5449	107.0488	107.5473	109.9525	110.4144	112.6172	112.6172	113.0348	111.7584	110.4144	109.4838	108.5275	
alpha	8.1030	8.1366	8.1698	8.3302	8.3610	8.5078	8.5078	8.5357	8.4506	8.3610	8.2989	8.2352	
util living area	0.9804	0.9642	0.9298	0.8101	0.6252	0.4307	0.3113	0.3451	0.5515	0.8290	0.9520	0.9830	(86)
MIT	20.6150	20.7106	20.8251	20.9542	20.9945	20.9998	21.0000	21.0000	20.9985	20.9538	20.7946	20.6076	(87)
Th 2	20.3766	20.3793	20.3820	20.3948	20.3972	20.4083	20.4083	20.4104	20.4040	20.3972	20.3923	20.3873	(88)
util rest of house	0.9755	0.9557	0.9141	0.7795	0.5864	0.3910	0.2695	0.3009	0.5046	0.7943	0.9395	0.9787	(89)
MIT 2	19.9382	20.0582	20.1980	20.3525	20.3930	20.4082	20.4083	20.4104	20.4031	20.3564	20.1732	19.9383	(90)
Living area fraction									fLA = Living area / (4) =			0.4890	(91)
MIT	20.2692	20.3773	20.5047	20.6467	20.6872	20.6975	20.6977	20.6987	20.6942	20.6486	20.4771	20.2656	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2692	20.3773	20.5047	20.6467	20.6872	20.6975	20.6977	20.6987	20.6942	20.6486	20.4771	20.2656	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9745	0.9557	0.9175	0.7926	0.6052	0.4104	0.2899	0.3225	0.5275	0.8093	0.9414	0.9777	(94)
Useful gains	384.0209	401.6370	394.3652	359.9536	284.8406	190.6076	128.1289	133.9155	207.3331	304.4995	355.0724	374.7124	(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	527.8053	509.1398	458.5618	376.2151	286.6303	190.6653	128.1313	133.9213	207.7827	320.4813	430.2656	521.2930	(97)
Space heating kWh	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98a)
Space heating requirement - total per year (kWh/year)												415.1051	
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	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												415.1051	
Space heating per m2											(98c) / (4) =	8.2855	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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	106.9756	72.2419	47.7623	11.7083	1.3315	0.0000	0.0000	0.0000	0.0000	11.8905	54.1391	109.0559	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	115.7745	78.1839	51.6908	12.6713	1.4410	0.0000	0.0000	0.0000	0.0000	12.8685	58.5921	118.0259	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	83.1313	82.6424	81.9204	80.8209	80.3649	80.3000	80.3000	80.3000	80.3000	80.8200	82.1683	83.1867	(217)
Fuel for water heating, kWh/month	236.8289	210.9311	226.8358	202.9617	196.9468	176.5844	174.2568	182.4218	185.5532	206.4913	214.4393	234.3603	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	449.2479	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2448.6113	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(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	2296.9504	(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	449.2479	0.2100	94.3421	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2448.6113	0.2100	514.2084	(264)
Space and water heating			608.5504	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			533.4908	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.6500	(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	449.2479	1.1300	507.6502	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2448.6113	1.1300	2766.9308	(278)
Space and water heating			3274.5810	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			2815.2653	(286)
Target Primary Energy Rate (TPER)			56.1900	(287)

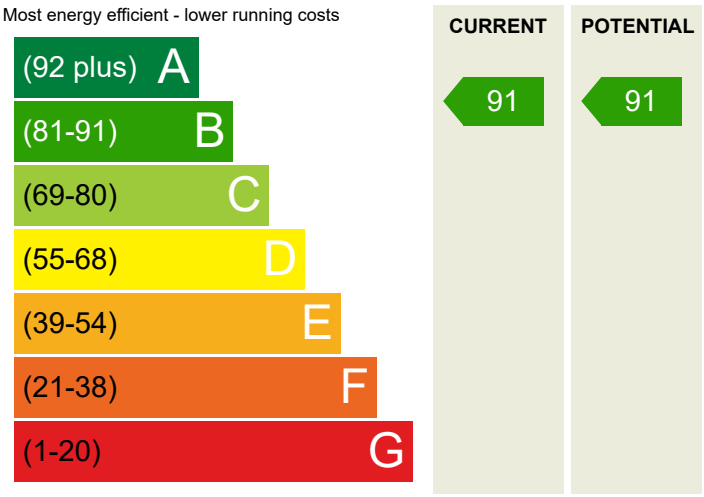
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-1B2P Apartment (1F)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	50

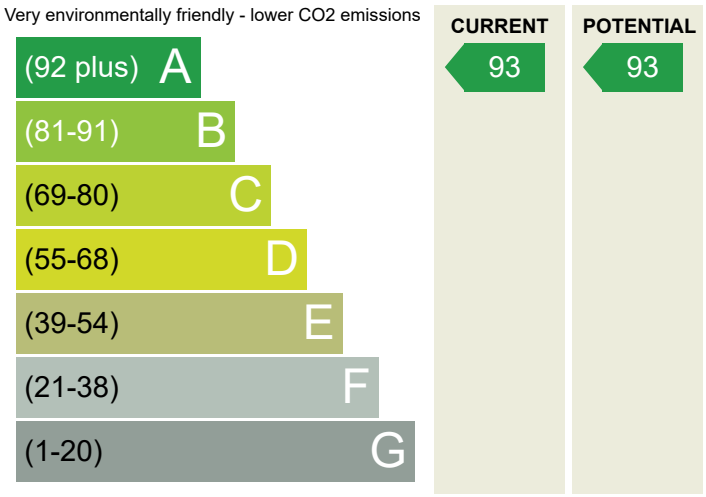
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

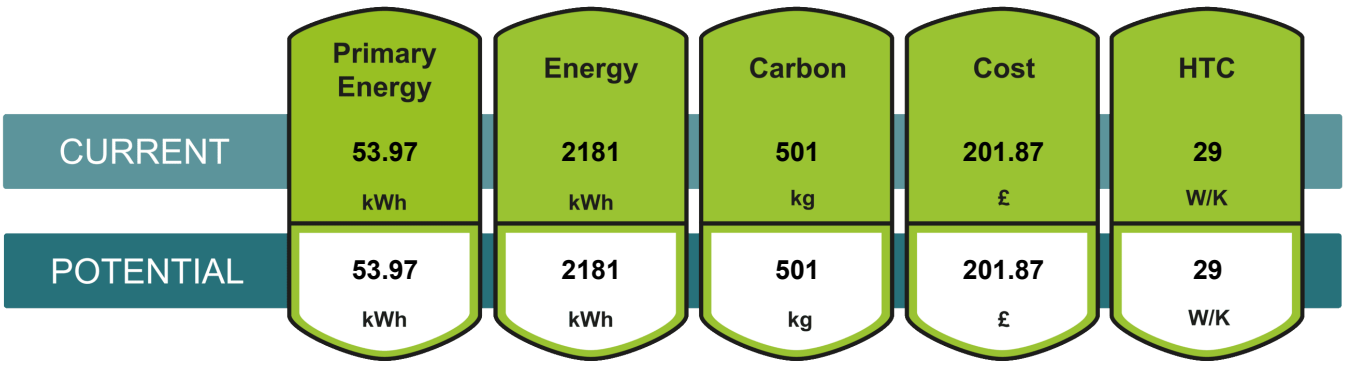
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

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

Energy Report

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£54	£54	
Heating	£138	£138	
Hot Water	£135	£135	
New Technologies e.g. Impact of PV	-(£125)	-(£125)	
TOTAL	£202	£202	

Estimated energy use and potential savings

Space Heating
243
kWh per year

Water Heating
2418
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	90 B	**DER**	11.82	**TER**	12.33
Environmental	92 A	**% DER < TER**			4.14
CO_2 Emissions (t/year)	0.58	**DFEE**	20.62	**TFEE**	21.51
Compliance Check	See BREL	**% DFEE < TFEE**			4.14
% DPER < TPER	2.26	**DPER**	63.74	**TPER**	65.22

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	50.10 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	24.50	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	18.20	12.20	0.00	None	6.00	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	16.10	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	77.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	50.10	50.10	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

elmhurst energy

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor	Lowest occupied	Concrete floor slab, carpeted	100.00	50.10

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Rear	Window	External Wall	North	6.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	3.30	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	3.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	7.20	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	0.00	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	7.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	7.60	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	0.00	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	6.70	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
0.90	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	90 B	**DER**	11.82	**TER**	12.33
Environmental	92 A	**% DER < TER**			4.14
CO_2 Emissions (t/year)	0.58	**DFEE**	20.62	**TFEE**	21.51
Compliance Check	See BREL	**% DFEE < TFEE**			4.14
% DPER < TPER	2.26	**DPER**	63.74	**TPER**	65.22

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
External Roof	50.1000		50.1000	0.1000	5.0100	9.0000	450.9000	(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.7424			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9120.2001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		182.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	7.6000	0.0580	0.4408	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1010	0.6767	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.6494 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 16.3918 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	(39)

Average = Sum(39)m / 12 = 35.4048

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	(40)
HLP (average)												0.7067	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 116.8403 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	
alpha	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	
util living area	0.9650	0.9474	0.9159	0.8267	0.6710	0.4850	0.3531	0.3925	0.6078	0.8441	0.9395	0.9698	(86)
MIT	20.3645	20.4824	20.6389	20.8382	20.9578	20.9943	20.9992	20.9986	20.9809	20.8436	20.5824	20.3270	(87)
Th 2	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	(88)
util rest of house	0.9586	0.9381	0.9011	0.7996	0.6304	0.4361	0.3000	0.3363	0.5546	0.8138	0.9273	0.9641	(89)
MIT 2	19.7632	19.8769	20.0261	20.2074	20.3062	20.3320	20.3347	20.3344	20.3240	20.2155	19.9749	19.7268	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.0572	20.1730	20.3258	20.5159	20.6249	20.6559	20.6597	20.6592	20.6452	20.5227	20.2720	20.0203	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0572	20.1730	20.3258	20.5159	20.6249	20.6559	20.6597	20.6592	20.6452	20.5227	20.2720	20.0203	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9555	0.9355	0.9009	0.8073	0.6484	0.4598	0.3260	0.3638	0.5798	0.8228	0.9261	0.9610	(94)
Useful gains	378.2897	394.6220	388.0593	366.3502	304.7419	213.0493	143.5799	150.5133	227.0121	308.7442	349.5720	369.8800	(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	557.8821	540.7371	489.4990	411.2577	315.9825	214.4062	143.7313	150.7968	231.7322	351.3106	466.3509	560.1147	(97)
Space heating kWh	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98a)
Space heating requirement - total per year (kWh/year)												605.2585	
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	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												605.2585	
Space heating per m2											(98c) / (4) =	12.0810	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	150.1311	110.3251	84.7991	36.3297	9.3966	0.0000	0.0000	0.0000	0.0000	35.5836	94.4728	159.0276	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.9419	87.8707	87.7574	87.5630	87.3802	87.3000	87.3000	87.3000	87.3000	87.5580	87.8174	87.9705	(217)
Fuel for water heating, kWh/month	245.6544	216.9129	229.1711	197.8728	189.5097	167.9481	163.4563	171.5225	175.1736	198.3319	214.6663	242.3357	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.2748	-24.0576	-36.2743	-42.8125	-47.8918	-45.3646	-44.8644	-41.5504	-35.8764	-28.4694	-18.3028	-13.9443	(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	-6.2641	-13.5534	-27.7815	-43.0350	-58.1654	-58.9066	-58.0288	-48.3479	-34.5320	-19.6112	-8.4317	-4.9169	(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												680.0657	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2412.5553	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-777.2577	(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	2619.9243	(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	680.0657	0.2100	142.8138	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2412.5553	0.2100	506.6366	(264)
Space and water heating			649.4504	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	0.1336	-52.8586	
PV Unit electricity exported	-381.5745	0.1251	-47.7299	
Total			-100.5885	(269)
Total CO2, kg/year			592.2705	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.8200	(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	680.0657	1.1300	768.4742	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2412.5553	1.1300	2726.1875	(278)
Space and water heating			3494.6617	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	1.4937	-591.0175	
PV Unit electricity exported	-381.5745	0.4591	-175.1869	
Total			-766.2043	(283)
Total Primary energy kWh/year			3193.5481	(286)
Dwelling Primary energy Rate (DPER)			63.7400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
External Roof	50.1000		50.1000	0.1100	5.5110			(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5772			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 182.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	7.6000	0.0600	0.4560
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1200	0.8040

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.2260 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 16.8032 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	39.8225	39.6670	39.5145	38.7982	38.6642	38.0404	38.0404	37.9249	38.2807	38.6642	38.9353	39.2187	(39)

Average = Sum(39)m / 12 = 38.7976

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7949	0.7918	0.7887	0.7744	0.7717	0.7593	0.7593	0.7570	0.7641	0.7717	0.7772	0.7828	(40)
HLP (average)												0.7744	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)
Energy content (annual)										Total = Sum(45)m =		1638.5940	
Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
									Total per year (kWh/year) = Sum(64)m =			1994.5871	(64)
12Total per year (kWh/year)												1995	(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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	63.6170	63.8665	64.1129	65.2965	65.5228	66.5973	66.5973	66.8002	66.1793	65.5228	65.0666	64.5964	
alpha	5.2411	5.2578	5.2742	5.3531	5.3682	5.4398	5.4398	5.4533	5.4120	5.3682	5.3378	5.3064	
util living area	0.9727	0.9591	0.9343	0.8562	0.7121	0.5167	0.3775	0.4179	0.6442	0.8696	0.9509	0.9756	(86)
MIT	20.1633	20.2999	20.4903	20.7594	20.9271	20.9895	20.9984	20.9973	20.9673	20.7761	20.4554	20.1511	(87)
Th 2	20.2578	20.2605	20.2631	20.2756	20.2779	20.2888	20.2888	20.2908	20.2846	20.2779	20.2732	20.2683	(88)
util rest of house	0.9673	0.9512	0.9214	0.8303	0.6690	0.4620	0.3171	0.3545	0.5863	0.8406	0.9402	0.9707	(89)
MIT 2	19.2887	19.4613	19.6991	20.0294	20.2136	20.2817	20.2880	20.2895	20.2604	20.0559	19.6672	19.2815	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.7164	19.8714	20.0860	20.3863	20.5625	20.6278	20.6354	20.6356	20.6060	20.4081	20.0526	19.7068	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7164	19.8714	20.0860	20.3863	20.5625	20.6278	20.6354	20.6356	20.6060	20.4081	20.0526	19.7068	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9626	0.9464	0.9179	0.8345	0.6865	0.4883	0.3466	0.3855	0.6129	0.8463	0.9364	0.9663	(94)
Useful gains	379.3345	397.7330	394.5702	379.0022	323.1161	226.7773	153.1906	160.0795	240.8919	318.4072	353.1928	370.3380	(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	613.9201	593.8688	536.8429	445.6499	342.6633	229.3013	153.5092	160.6353	249.0558	379.2239	504.3145	608.1553	(97)
Space heating kWh	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98a)
Space heating requirement - total per year (kWh/year)												805.7066	
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	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												805.7066	
Space heating per m2											(98c) / (4) =	16.0820	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	188.8871	142.6442	114.5573	51.9332	15.7393	0.0000	0.0000	0.0000	0.0000	48.9693	117.7571	191.4893	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.1242	83.7900	83.2216	82.0975	80.9591	80.3000	80.3000	80.3000	80.3000	81.9918	83.3793	84.1741	(217)
Fuel for water heating, kWh/month	234.0336	208.0424	223.2890	199.8057	195.5013	176.5844	174.2568	182.4218	185.5532	203.5402	211.3246	231.6112	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	871.9769	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2425.9641	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(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	2697.0321	(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	871.9769	0.2100	183.1151	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2425.9641	0.2100	509.4525	(264)
Space and water heating			692.5676	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			617.5080	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3300	(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	871.9769	1.1300	985.3339	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2425.9641	1.1300	2741.3394	(278)
Space and water heating			3726.6733	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			3267.3577	(286)
Target Primary Energy Rate (TPER)			65.2200	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	90 B	**DER**	11.82	**TER**	12.33
Environmental	92 A	**% DER < TER**			4.14
CO_2 Emissions (t/year)	0.58	**DFEE**	20.62	**TFEE**	21.51
Compliance Check	See BREL	**% DFEE < TFEE**			4.14
% DPER < TPER	2.26	**DPER**	63.74	**TPER**	65.22

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.2300	(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) =	0.1736	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3986	(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) =	0.3388	(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	0.4319	0.4235	0.4150	0.3727	0.3642	0.3218	0.3218	0.3134	0.3388	0.3642	0.3811	0.3981	(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	0.5933	0.5897	0.5861	0.5694	0.5663	0.5518	0.5518	0.5491	0.5574	0.5663	0.5726	0.5792	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
External Roof	50.1000		50.1000	0.1000	5.0100	9.0000	450.9000	(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.7424			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 9120.2001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	182.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693
E4 Jamb	7.2000	0.0160	0.1152
E5 Ground floor (normal)	0.0000	0.0740	0.0000

E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	7.6000	0.0580	0.4408	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1010	0.6767	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.6494 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 16.3918 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.5603	22.4226	22.2876	21.6534	21.5347	20.9824	20.9824	20.8801	21.1951	21.5347	21.7748	22.0257	(38)
Heat transfer coeff	38.9522	38.8144	38.6794	38.0452	37.9266	37.3742	37.3742	37.2719	37.5870	37.9266	38.1666	38.4175	(39)

Average = Sum(39)m / 12 = 38.0446

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7775	0.7747	0.7720	0.7594	0.7570	0.7460	0.7460	0.7440	0.7502	0.7570	0.7618	0.7668	(40)
HLP (average)												0.7594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (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

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 50.1511 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
Energy conte	86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)

Energy content (annual) Total = Sum(45)m = 832.9018
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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)

Total per year (kWh/year) = Sum(64)m = 707.9666 (64)
12Total per year (kWh/year) 708 (64)
Electric shower(s)

42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 479.2135 (64a)
Heat gains from water heating, kWh/month

28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)
Total internal gains	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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	65.0384	65.2693	65.4971	66.5889	66.7972	67.7844	67.7844	67.9705	67.4007	66.7972	66.3771	65.9435	
alpha	5.3359	5.3513	5.3665	5.4393	5.4531	5.5190	5.5190	5.5314	5.4934	5.4531	5.4251	5.3962	
util living area	0.9854	0.9761	0.9582	0.8925	0.7553	0.5498	0.4023	0.4499	0.6919	0.9100	0.9716	0.9873	(86)
MIT	20.0498	20.1953	20.4006	20.7064	20.9080	20.9868	20.9980	20.9964	20.9565	20.7168	20.3574	20.0346	(87)
Th 2	20.2729	20.2753	20.2776	20.2887	20.2907	20.3004	20.3004	20.3022	20.2967	20.2907	20.2866	20.2822	(88)
util rest of house	0.9823	0.9710	0.9492	0.8708	0.7137	0.4934	0.3391	0.3831	0.6340	0.8871	0.9648	0.9846	(89)
MIT 2	19.4040	19.5491	19.7516	20.0497	20.2262	20.2934	20.2997	20.3008	20.2709	20.0655	19.7189	19.3966	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.7198	19.8651	20.0690	20.3708	20.5596	20.6325	20.6412	20.6410	20.6062	20.3840	20.0311	19.7086	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7198	19.8651	20.0690	20.3708	20.5596	20.6325	20.6412	20.6410	20.6062	20.3840	20.0311	19.7086	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9794	0.9677	0.9463	0.8735	0.7301	0.5204	0.3700	0.4157	0.6602	0.8904	0.9619	0.9819	(94)
Useful gains	329.9626	352.3110	355.7015	354.6555	311.2521	222.2781	150.6364	157.3321	233.6347	293.5259	312.8131	320.9331	(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	600.6360	580.8623	524.8395	436.4109	336.0138	225.4592	151.0358	158.0699	244.5474	371.0731	493.5365	595.8036	(97)
Space heating kWh	201.3810	153.5865	125.8387	58.8639	18.4227	0.0000	0.0000	0.0000	0.0000	57.6952	130.1208	204.5037	(98a)
Space heating requirement - total per year (kWh/year)												950.4125	
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	201.3810	153.5865	125.8387	58.8639	18.4227	0.0000	0.0000	0.0000	0.0000	57.6952	130.1208	204.5037	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												950.4125	
Space heating per m2											(98c) / (4) =	18.9703	(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	351.3175	276.5691	283.2665	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9373	0.9705	0.9562	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	329.2920	268.4122	270.8647	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	96.7039	129.2661	103.7300	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	24.1760	32.3165	25.9325	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												82.4250	(107)
Energy for space heating												18.9703	(99)
Energy for space cooling												1.6452	(108)
Total												20.6155	(109)
Fabric Energy Efficiency (DFEE)												20.6	(109)

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)

Infiltration rate	0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
External Roof	50.1000		50.1000	0.1100	5.5110			(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5772			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	182.0399	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	7.6000	0.0600	0.4560
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1200	0.8040

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	2.2260	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	16.8032	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	39.8225	39.6670	39.5145	38.7982	38.6642	38.0404	38.0404	37.9249	38.2807	38.6642	38.9353	39.2187	(39)
Average = Sum(39)m / 12 =												38.7976	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7949	0.7918	0.7887	0.7744	0.7717	0.7593	0.7593	0.7570	0.7641	0.7717	0.7772	0.7828	(40)
HLP (average)												0.7744	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6930	(42)

Hot water usage for mixer showers

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

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day)	50.1511	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
Energy conte	86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)
Energy content (annual)										Total = Sum(45)m =		832.9018	

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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(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													
73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)
								Total per year (kWh/year) = Sum(64)m =			707.9666	(64)
12Total per year (kWh/year)											708	(64)	
Electric shower(s)													
42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)
								Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			479.2135	(64a)
Heat gains from water heating, kWh/month													
28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)													
	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)													
	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)
Total internal gains													
	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	63.6170	63.8665	64.1129	65.2965	65.5228	66.5973	66.5973	66.8002	66.1793	65.5228	65.0666	64.5964	
alpha	5.2411	5.2578	5.2742	5.3531	5.3682	5.4398	5.4398	5.4533	5.4120	5.3682	5.3378	5.3064	
util living area													
	0.9858	0.9769	0.9599	0.8969	0.7634	0.5582	0.4091	0.4573	0.7005	0.9136	0.9726	0.9876	(86)
MIT	20.0112	20.1589	20.3690	20.6856	20.8981	20.9848	20.9976	20.9958	20.9514	20.6985	20.3290	19.9988	(87)
Th 2	20.2578	20.2605	20.2631	20.2756	20.2779	20.2888	20.2888	20.2908	20.2846	20.2779	20.2732	20.2683	(88)
util rest of house													
	0.9828	0.9720	0.9512	0.8755	0.7217	0.5004	0.3439	0.3885	0.6418	0.8911	0.9660	0.9850	(89)
MIT 2	19.3538	19.5013	19.7090	20.0192	20.2063	20.2807	20.2879	20.2892	20.2557	20.0377	19.6802	19.3500	(90)
Living area fraction									fLA = Living area / (4) =			0.4890	(91)
MIT	19.6753	19.8229	20.0317	20.3451	20.5446	20.6251	20.6350	20.6348	20.5959	20.3608	19.9975	19.6672	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6753	19.8229	20.0317	20.3451	20.5446	20.6251	20.6350	20.6348	20.5959	20.3608	19.9975	19.6672	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9799	0.9686	0.9480	0.8778	0.7377	0.5281	0.3758	0.4220	0.6681	0.8940	0.9630	0.9823	(94)
Useful gains	330.1240	352.6428	356.3571	356.3824	314.5109	225.5351	153.0177	159.7368	236.4425	294.7130	313.1626	321.0574	(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													
	612.2834	591.9456	534.6992	444.0488	341.9699	229.1957	153.4926	160.6024	248.6681	377.3939	502.1664	606.6059	(97)
Space heating kWh													
	209.9266	160.8114	132.6865	63.1198	20.4295	0.0000	0.0000	0.0000	0.0000	61.5145	136.0827	212.4481	(98a)
Space heating requirement - total per year (kWh/year)												997.0193	
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													
	209.9266	160.8114	132.6865	63.1198	20.4295	0.0000	0.0000	0.0000	0.0000	61.5145	136.0827	212.4481	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												997.0193	
Space heating per m2										(98c) / (4) =		19.9006	(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	357.5797	281.4989	288.2290	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9314	0.9670	0.9517	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	333.0601	272.2213	274.3015	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	93.9908	126.4322	101.1730	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	23.4977	31.6080	25.2932	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												80.3990	(107)
Energy for space heating												19.9006	(99)
Energy for space cooling												1.6048	(108)
Total												21.5054	(109)
Fabric Energy Efficiency (TFEE)												21.5	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	90 B	**DER**	11.82	**TER**	12.33
Environmental	92 A	**% DER < TER**			4.14
CO_2 Emissions (t/year)	0.58	**DFEE**	20.62	**TFEE**	21.51
Compliance Check	See BREL	**% DFEE < TFEE**			4.14
% DPER < TPER	2.26	**DPER**	63.74	**TPER**	65.22

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
External Roof	50.1000		50.1000	0.1000	5.0100	9.0000	450.9000	(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.7424			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Floor			50.1000			80.0000	4008.0000	(32d)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9120.2001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		182.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	7.6000	0.0580	0.4408	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1010	0.6767	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.6494 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 16.3918 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	35.4048	(39)

Average = Sum(39)m / 12 = 35.4048

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	0.7067	(40)
HLP (average)												0.7067	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 116.8403 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	71.5550	
alpha	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	5.7703	
util living area	0.9650	0.9474	0.9159	0.8267	0.6710	0.4850	0.3531	0.3925	0.6078	0.8441	0.9395	0.9698	(86)
MIT	20.3645	20.4824	20.6389	20.8382	20.9578	20.9943	20.9992	20.9986	20.9809	20.8436	20.5824	20.3270	(87)
Th 2	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	20.3349	(88)
util rest of house	0.9586	0.9381	0.9011	0.7996	0.6304	0.4361	0.3000	0.3363	0.5546	0.8138	0.9273	0.9641	(89)
MIT 2	19.7632	19.8769	20.0261	20.2074	20.3062	20.3320	20.3347	20.3344	20.3240	20.2155	19.9749	19.7268	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.0572	20.1730	20.3258	20.5159	20.6249	20.6559	20.6597	20.6592	20.6452	20.5227	20.2720	20.0203	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0572	20.1730	20.3258	20.5159	20.6249	20.6559	20.6597	20.6592	20.6452	20.5227	20.2720	20.0203	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9555	0.9355	0.9009	0.8073	0.6484	0.4598	0.3260	0.3638	0.5798	0.8228	0.9261	0.9610	(94)
Useful gains	378.2897	394.6220	388.0593	366.3502	304.7419	213.0493	143.5799	150.5133	227.0121	308.7442	349.5720	369.8800	(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	557.8821	540.7371	489.4990	411.2577	315.9825	214.4062	143.7313	150.7968	231.7322	351.3106	466.3509	560.1147	(97)
Space heating kWh	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98a)
Space heating requirement - total per year (kWh/year)												605.2585	
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	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												605.2585	
Space heating per m2											(98c) / (4) =	12.0810	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	133.6167	98.1893	75.4712	32.3334	8.3630	0.0000	0.0000	0.0000	0.0000	31.6694	84.0808	141.5346	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	150.1311	110.3251	84.7991	36.3297	9.3966	0.0000	0.0000	0.0000	0.0000	35.5836	94.4728	159.0276	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.9419	87.8707	87.7574	87.5630	87.3802	87.3000	87.3000	87.3000	87.3000	87.5580	87.8174	87.9705	(217)
Fuel for water heating, kWh/month	245.6544	216.9129	229.1711	197.8728	189.5097	167.9481	163.4563	171.5225	175.1736	198.3319	214.6663	242.3357	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-16.2748	-24.0576	-36.2743	-42.8125	-47.8918	-45.3646	-44.8644	-41.5504	-35.8764	-28.4694	-18.3028	-13.9443	(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	-6.2641	-13.5534	-27.7815	-43.0350	-58.1654	-58.9066	-58.0288	-48.3479	-34.5320	-19.6112	-8.4317	-4.9169	(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												680.0657	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2412.5553	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-777.2577	(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	2619.9243	(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	680.0657	0.2100	142.8138	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2412.5553	0.2100	506.6366	(264)
Space and water heating			649.4504	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	0.1336	-52.8586	
PV Unit electricity exported	-381.5745	0.1251	-47.7299	
Total			-100.5885	(269)
Total CO2, kg/year			592.2705	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.8200	(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	680.0657	1.1300	768.4742	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2412.5553	1.1300	2726.1875	(278)
Space and water heating			3494.6617	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.6833	1.4937	-591.0175	
PV Unit electricity exported	-381.5745	0.4591	-175.1869	
Total			-766.2043	(283)
Total Primary energy kWh/year			3193.5481	(286)
Dwelling Primary energy Rate (DPER)			63.7400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
External Roof	50.1000		50.1000	0.1100	5.5110			(30)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		14.5772			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 182.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	7.6000	0.0600	0.4560
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	6.7000	0.1200	0.8040

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.2260 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 16.8032 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	39.8225	39.6670	39.5145	38.7982	38.6642	38.0404	38.0404	37.9249	38.2807	38.6642	38.9353	39.2187	(39)

Average = Sum(39)m / 12 = 38.7976

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7949	0.7918	0.7887	0.7744	0.7717	0.7593	0.7593	0.7570	0.7641	0.7717	0.7772	0.7828	(40)
HLP (average)												0.7744	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)
Energy content (annual)										Total = Sum(45)m =		1638.5940	
Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
									Total per year (kWh/year) = Sum(64)m =			1994.5871	(64)
12Total per year (kWh/year)												1995	(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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	63.6170	63.8665	64.1129	65.2965	65.5228	66.5973	66.5973	66.8002	66.1793	65.5228	65.0666	64.5964	
alpha	5.2411	5.2578	5.2742	5.3531	5.3682	5.4398	5.4398	5.4533	5.4120	5.3682	5.3378	5.3064	
util living area	0.9727	0.9591	0.9343	0.8562	0.7121	0.5167	0.3775	0.4179	0.6442	0.8696	0.9509	0.9756	(86)
MIT	20.1633	20.2999	20.4903	20.7594	20.9271	20.9895	20.9984	20.9973	20.9673	20.7761	20.4554	20.1511	(87)
Th 2	20.2578	20.2605	20.2631	20.2756	20.2779	20.2888	20.2888	20.2908	20.2846	20.2779	20.2732	20.2683	(88)
util rest of house	0.9673	0.9512	0.9214	0.8303	0.6690	0.4620	0.3171	0.3545	0.5863	0.8406	0.9402	0.9707	(89)
MIT 2	19.2887	19.4613	19.6991	20.0294	20.2136	20.2817	20.2880	20.2895	20.2604	20.0559	19.6672	19.2815	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.7164	19.8714	20.0860	20.3863	20.5625	20.6278	20.6354	20.6356	20.6060	20.4081	20.0526	19.7068	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7164	19.8714	20.0860	20.3863	20.5625	20.6278	20.6354	20.6356	20.6060	20.4081	20.0526	19.7068	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9626	0.9464	0.9179	0.8345	0.6865	0.4883	0.3466	0.3855	0.6129	0.8463	0.9364	0.9663	(94)
Useful gains	379.3345	397.7330	394.5702	379.0022	323.1161	226.7773	153.1906	160.0795	240.8919	318.4072	353.1928	370.3380	(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	613.9201	593.8688	536.8429	445.6499	342.6633	229.3013	153.5092	160.6353	249.0558	379.2239	504.3145	608.1553	(97)
Space heating kWh	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98a)
Space heating requirement - total per year (kWh/year)												805.7066	
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	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												805.7066	
Space heating per m2											(98c) / (4) =	16.0820	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	174.5317	131.8033	105.8509	47.9863	14.5431	0.0000	0.0000	0.0000	0.0000	45.2476	108.8076	176.9361	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	188.8871	142.6442	114.5573	51.9332	15.7393	0.0000	0.0000	0.0000	0.0000	48.9693	117.7571	191.4893	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.1242	83.7900	83.2216	82.0975	80.9591	80.3000	80.3000	80.3000	80.3000	81.9918	83.3793	84.1741	(217)
Fuel for water heating, kWh/month	234.0336	208.0424	223.2890	199.8057	195.5013	176.5844	174.2568	182.4218	185.5532	203.5402	211.3246	231.6112	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	871.9769	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2425.9641	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(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	2697.0321	(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	871.9769	0.2100	183.1151	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2425.9641	0.2100	509.4525	(264)
Space and water heating			692.5676	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			617.5080	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3300	(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	871.9769	1.1300	985.3339	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2425.9641	1.1300	2741.3394	(278)
Space and water heating			3726.6733	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			3267.3577	(286)
Target Primary Energy Rate (TPER)			65.2200	(287)

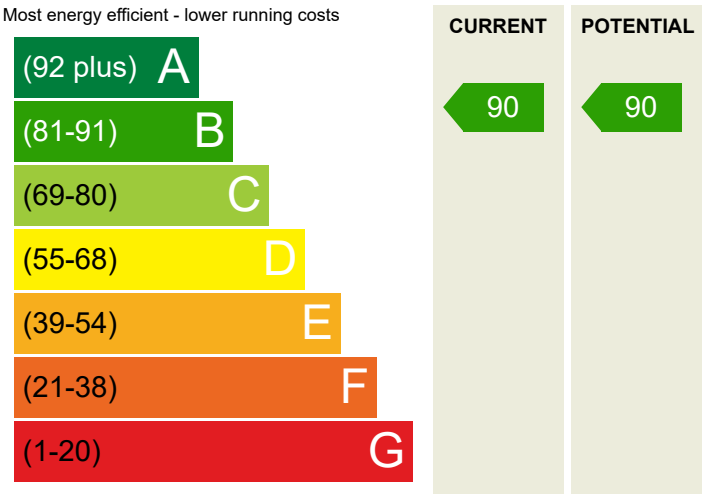
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-1B2P Apartment (2F)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	50

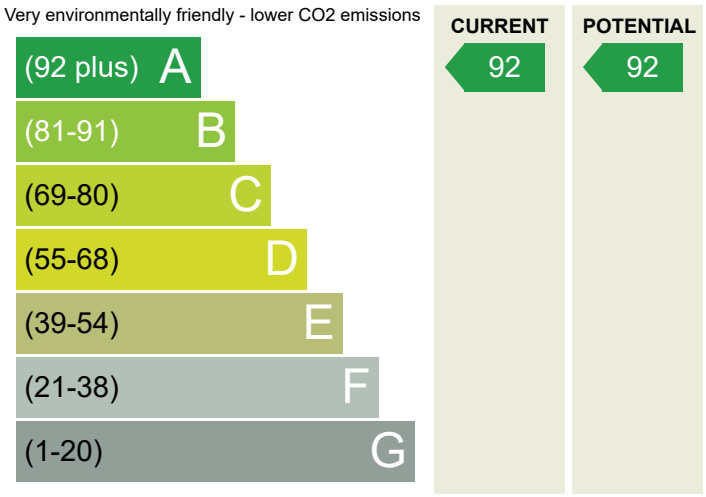
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

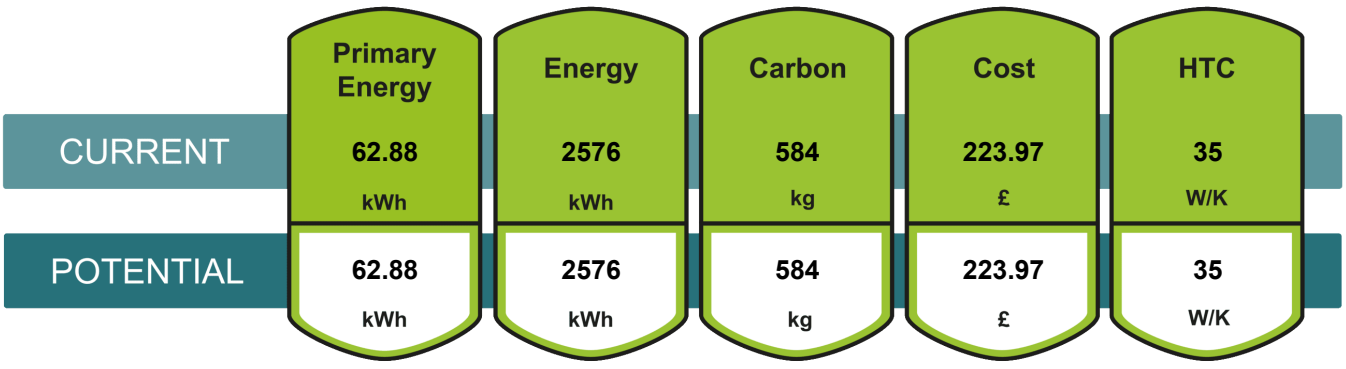
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£54	£54	
Heating	£160	£160	
Hot Water	£135	£135	
New Technologies e.g. Impact of PV	-(£125)	-(£125)	
TOTAL	£224	£224	

Estimated energy use and potential savings

Space Heating
642
kWh per year

Water Heating
2413
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	89 B	**DER**	12.77	**TER**	12.56
Environmental	91 B	**% DER < TER**			-1.67
CO_2 Emissions (t/year)	0.63	**DFEE**	24.38	**TFEE**	22.82
Compliance Check	See BREL	**% DFEE < TFEE**			-6.86
% DPER < TPER	-3.93	**DPER**	69.06	**TPER**	66.45

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	248.04	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	50.10 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	24.50	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	18.20	12.20	0.00	None	6.00	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	16.10	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	77.70

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling	Concrete floor slab, carpeted	100.00	50.10

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	50.10

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Rear	Window	External Wall	North	6.00	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	3.30	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	3.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	7.20	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	7.60	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	7.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	6.70	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.10	0.10	RCDs	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

Summary for Input Data

elmhurst energy

Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
0.80	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	89 B	**DER**	12.77	**TER**	12.56
Environmental	91 B	**% DER < TER**			-1.67
CO_2 Emissions (t/year)	0.63	**DFEE**	24.38	**TFEE**	22.82
Compliance Check	See BREL	**% DFEE < TFEE**			-6.86
% DPER < TPER	-3.93	**DPER**	69.06	**TPER**	66.45

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.2300	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			6.0000	1.2357	7.4144			(27)
Ground Floor			50.1000	0.1700	8.5170	75.0000	3757.5000	(28a)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.2494			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Ceiling			50.1000			100.0000	5010.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13428.8001	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	268.0399	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	7.6000	0.0740	0.5624	
E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	6.7000	0.1080	0.7236	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				1.8179 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	20.0673 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	(39)
Average = Sum(39)m / 12 =												39.0803	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	(40)
HLP (average)												0.7800	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6930	(42)
Hot water usage for mixer showers	72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)
Average daily hot water use (litres/day)												116.8403	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	
alpha	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	
util living area	0.9899	0.9820	0.9646	0.8977	0.7434	0.5371	0.3902	0.4340	0.6743	0.9125	0.9780	0.9918	(86)
MIT	20.4363	20.5352	20.6731	20.8584	20.9696	20.9973	20.9998	20.9995	20.9878	20.8615	20.6238	20.4058	(87)
Th 2	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	(88)
util rest of house	0.9869	0.9767	0.9541	0.8710	0.6947	0.4772	0.3256	0.3655	0.6091	0.8836	0.9706	0.9893	(89)
MIT 2	19.7660	19.8627	19.9957	20.1645	20.2524	20.2696	20.2706	20.2705	20.2649	20.1704	19.9500	19.7360	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.0938	20.1916	20.3270	20.5038	20.6031	20.6255	20.6272	20.6270	20.6184	20.5084	20.2795	20.0636	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0938	20.1916	20.3270	20.5038	20.6031	20.6255	20.6272	20.6270	20.6184	20.5084	20.2795	20.0636	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9860	0.9761	0.9550	0.8801	0.7175	0.5065	0.3572	0.3990	0.6407	0.8938	0.9707	0.9885	(94)
Useful gains	390.3708	411.7202	411.3700	399.4006	337.1959	234.6812	157.3319	165.0785	250.8799	335.3795	366.4289	380.4336	(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	617.2262	597.5999	540.3624	453.4815	347.9375	235.4766	157.3837	165.1935	254.7422	387.2217	515.0576	619.9530	(97)
Space heating kWh	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98a)
Space heating requirement - total per year (kWh/year)												760.3777	
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	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												760.3777	
Space heating per m2											(98c) / (4) =	15.1772	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	189.6410	140.3497	107.8319	43.7509	8.9795	0.0000	0.0000	0.0000	0.0000	43.3377	120.2389	200.2275	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.0376	87.9652	87.8420	87.6071	87.3768	87.3000	87.3000	87.3000	87.3000	87.6041	87.9080	88.0659	(217)
Fuel for water heating, kWh/month	245.3875	216.6798	228.9503	197.7734	189.5171	167.9481	163.4563	171.5225	175.1736	198.2274	214.4450	242.0730	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.7443	-21.9500	-33.3328	-39.6339	-44.5941	-42.3328	-41.8606	-38.6368	-33.1711	-26.0928	-16.6332	-12.6155	(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	-5.2903	-11.4820	-23.6057	-36.6749	-49.6790	-50.3527	-49.6000	-41.2728	-29.4141	-16.6456	-7.1307	-4.1500	(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												854.3570	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2411.1540	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-690.8958	(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	2879.1763	(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	854.3570	0.2100	179.4150	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2411.1540	0.2100	506.3423	(264)
Space and water heating			685.7573	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.5980	0.1334	-48.7865	
PV Unit electricity exported	-325.2977	0.1250	-40.6636	
Total			-89.4501	(269)
Total CO2, kg/year			639.7158	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.7700	(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	854.3570	1.1300	965.4234	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2411.1540	1.1300	2724.6041	(278)
Space and water heating			3690.0275	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.5980	1.4931	-545.8811	
PV Unit electricity exported	-325.2977	0.4588	-149.2493	
Total			-695.1304	(283)
Total Primary energy kWh/year			3459.9878	(286)
Dwelling Primary energy Rate (DPER)			69.0600	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
Ground Floor			50.1000	0.1300	6.5130			(28a)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.5792			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 248.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650	
E3 Sill	3.3000	0.0500	0.1650	
E4 Jamb	7.2000	0.0500	0.3600	
E5 Ground floor (normal)	7.6000	0.1600	1.2160	
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	6.7000	0.0800	0.5360	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.7180 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 18.2972 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	41.3165	41.1610	41.0085	40.2922	40.1582	39.5344	39.5344	39.4189	39.7747	40.1582	40.4293	40.7127	(39)

Average = Sum(39)m / 12 = 40.2916

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8247	0.8216	0.8185	0.8042	0.8016	0.7891	0.7891	0.7868	0.7939	0.8016	0.8070	0.8126	(40)
HLP (average)												0.8042	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)
Energy content (annual)										Total = Sum(45)m =		1638.5940	
Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
									Total per year (kWh/year) = Sum(64)m =			1994.5871	(64)
12Total per year (kWh/year)												1995	(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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	83.5474	83.8632	84.1750	85.6713	85.9572	87.3136	87.3136	87.5695	86.7861	85.9572	85.3808	84.7865	
alpha	6.5698	6.5909	6.6117	6.7114	6.7305	6.8209	6.8209	6.8380	6.7857	6.7305	6.6921	6.6524	
util living area	0.9890	0.9812	0.9646	0.8990	0.7520	0.5408	0.3932	0.4358	0.6787	0.9113	0.9761	0.9906	(86)
MIT	20.3126	20.4266	20.5874	20.8179	20.9551	20.9957	20.9996	20.9992	20.9822	20.8281	20.5547	20.3016	(87)
Th 2	20.2320	20.2347	20.2373	20.2497	20.2520	20.2628	20.2628	20.2648	20.2586	20.2520	20.2473	20.2424	(88)
util rest of house	0.9859	0.9760	0.9546	0.8733	0.7037	0.4803	0.3276	0.3666	0.6135	0.8832	0.9685	0.9879	(89)
MIT 2	19.4396	19.5850	19.7872	20.0707	20.2160	20.2604	20.2626	20.2645	20.2473	20.0888	19.7572	19.4340	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.8665	19.9965	20.1785	20.4361	20.5774	20.6200	20.6230	20.6238	20.6067	20.4503	20.1472	19.8583	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8665	19.9965	20.1785	20.4361	20.5774	20.6200	20.6230	20.6238	20.6067	20.4503	20.1472	19.8583	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9841	0.9741	0.9537	0.8802	0.7254	0.5098	0.3597	0.4005	0.6448	0.8914	0.9673	0.9862	(94)
Useful gains	387.8192	409.3753	409.9321	399.7420	341.4108	236.7767	158.9520	166.3034	253.4039	335.3769	364.8426	377.9859	(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	643.1546	621.3880	560.9339	464.8134	356.5018	237.9972	159.0476	166.4962	258.8021	395.5710	527.4889	637.4925	(97)
Space heating kWh	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98a)
Space heating requirement - total per year (kWh/year)												857.8291	
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	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												857.8291	
Space heating per m2											(98c) / (4) =	17.1223	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	205.5947	154.1911	121.5859	50.7050	12.1512	0.0000	0.0000	0.0000	0.0000	48.4679	126.7373	208.9534	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.3049	83.9525	83.3376	82.0637	80.8179	80.3000	80.3000	80.3000	80.3000	81.9779	83.5261	84.3606	(217)
Fuel for water heating, kWh/month	233.5319	207.6396	222.9784	199.8879	195.8429	176.5844	174.2568	182.4218	185.5532	203.5748	210.9534	231.0992	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	928.3865	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2424.3242	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2751.8018	(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	928.3865	0.2100	194.9612	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2424.3242	0.2100	509.1081	(264)
Space and water heating			704.0692	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			629.0096	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5600	(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	928.3865	1.1300	1049.0767	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2424.3242	1.1300	2739.4863	(278)
Space and water heating			3788.5630	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			3329.2474	(286)
Target Primary Energy Rate (TPER)			66.4500	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	89 B	**DER**	12.77	**TER**	12.56
Environmental	91 B	**% DER < TER**			-1.67
CO_2 Emissions (t/year)	0.63	**DFEE**	24.38	**TFEE**	22.82
Compliance Check	See BREL	**% DFEE < TFEE**			-6.86
% DPER < TPER	-3.93	**DPER**	69.06	**TPER**	66.45

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3986	(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) =	0.3388	(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	0.4319	0.4235	0.4150	0.3727	0.3642	0.3218	0.3218	0.3134	0.3388	0.3642	0.3811	0.3981	(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	0.5933	0.5897	0.5861	0.5694	0.5663	0.5518	0.5518	0.5491	0.5574	0.5663	0.5726	0.5792	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			6.0000	1.2357	7.4144			(27)
Ground Floor			50.1000	0.1700	8.5170	75.0000	3757.5000	(28a)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.2494			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Ceiling			50.1000			80.0000	4008.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 12426.8001 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	248.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693
E4 Jamb	7.2000	0.0160	0.1152
E5 Ground floor (normal)	7.6000	0.0740	0.5624

E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	6.7000	0.1080	0.7236	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.8179 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 20.0673 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	22.5603	22.4226	22.2876	21.6534	21.5347	20.9824	20.9824	20.8801	21.1951	21.5347	21.7748	22.0257	(38)
Heat transfer coeff	42.6277	42.4899	42.3549	41.7207	41.6021	41.0497	41.0497	40.9474	41.2625	41.6021	41.8421	42.0930	(39)
Average = Sum(39)m / 12 =												41.7201	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8509	0.8481	0.8454	0.8327	0.8304	0.8194	0.8194	0.8173	0.8236	0.8304	0.8352	0.8402	(40)
HLP (average)												0.8327	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (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

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 50.1511 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
Energy conte	86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)
Energy content (annual)										Total = Sum(45)m =		832.9018	

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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)

Total per year (kWh/year) = Sum(64)m = 707.9666 (64)
12Total per year (kWh/year) 708 (64)
Electric shower(s)

42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 479.2135 (64a)
Heat gains from water heating, kWh/month

28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)
Total internal gains	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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	80.9776	81.2402	81.4991	82.7380	82.9740	84.0905	84.0905	84.3005	83.6569	82.9740	82.4980	82.0061	
alpha	6.3985	6.4160	6.4333	6.5159	6.5316	6.6060	6.6060	6.6200	6.5771	6.5316	6.4999	6.4671	
util living area	0.9956	0.9917	0.9831	0.9412	0.8216	0.6053	0.4424	0.4952	0.7580	0.9537	0.9898	0.9963	(86)
MIT	20.1425	20.2638	20.4422	20.7196	20.9163	20.9904	20.9989	20.9979	20.9623	20.7295	20.4066	20.1291	(87)
Th 2	20.2095	20.2118	20.2142	20.2250	20.2271	20.2366	20.2366	20.2384	20.2329	20.2271	20.2230	20.2186	(88)
util rest of house	0.9942	0.9892	0.9777	0.9230	0.7760	0.5374	0.3663	0.4145	0.6907	0.9355	0.9862	0.9952	(89)
MIT 2	19.4277	19.5499	19.7276	20.0016	20.1724	20.2323	20.2363	20.2377	20.2132	20.0164	19.7011	19.4220	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.7772	19.8990	20.0771	20.3527	20.5362	20.6030	20.6092	20.6094	20.5795	20.3652	20.0461	19.7678	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7772	19.8990	20.0771	20.3527	20.5362	20.6030	20.6092	20.6094	20.5795	20.3652	20.0461	19.7678	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9933	0.9880	0.9765	0.9263	0.7952	0.5704	0.4036	0.4540	0.7223	0.9392	0.9852	0.9944	(94)
Useful gains	334.6525	359.7040	367.0829	376.1018	339.0057	243.6250	164.3310	171.8504	255.6159	309.6265	320.3809	325.0049	(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	659.7576	637.3064	575.0563	477.8152	367.6026	246.4230	164.5782	172.3658	267.3597	406.2509	541.6924	655.2964	(97)
Space heating kWh	241.8782	186.5488	154.7322	73.2336	21.2761	0.0000	0.0000	0.0000	0.0000	71.8886	159.3443	245.7368	(98a)
Space heating requirement - total per year (kWh/year)												1154.6386	
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	241.8782	186.5488	154.7322	73.2336	21.2761	0.0000	0.0000	0.0000	0.0000	71.8886	159.3443	245.7368	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1154.6386	
Space heating per m2											(98c) / (4) =	23.0467	(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	385.8672	303.7678	311.2003	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9337	0.9722	0.9559	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	360.2870	295.3191	297.4726	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	74.3875	109.2474	83.9337	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	18.5969	27.3118	20.9834	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												66.8921	(107)
Energy for space heating												23.0467	(99)
Energy for space cooling												1.3352	(108)
Total												24.3819	(109)
Fabric Energy Efficiency (DFEE)												24.4	(109)

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)

Infiltration rate	0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			6.0000	1.1450	6.8702			(27)
Ground Floor			50.1000	0.1300	6.5130			(28a)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.5792			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	248.0399	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0500	0.1650
E4 Jamb	7.2000	0.0500	0.3600
E5 Ground floor (normal)	7.6000	0.1600	1.2160
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	6.7000	0.0800	0.5360
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	2.7180	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	18.2972	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	41.3165	41.1610	41.0085	40.2922	40.1582	39.5344	39.5344	39.4189	39.7747	40.1582	40.4293	40.7127	(39)

Average = Sum(39)m / 12 =	40.2916	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8247	0.8216	0.8185	0.8042	0.8016	0.7891	0.7891	0.7868	0.7939	0.8016	0.8070	0.8126	(40)
HLP (average)												0.8042	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6930	(42)

Hot water usage for mixer showers

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

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day)	50.1511	(43)

Daily hot water use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
54.7141	53.2138	51.5756	49.5361	47.7168	45.8261	45.4327	47.0676	48.7444	50.6861	52.7438	54.6372	(44)
86.6538	75.7758	79.2699	67.8124	64.2360	56.3485	54.9469	58.2795	60.1067	68.7806	75.1432	85.5487	(45)

Energy content (annual) Total = Sum(45)m =	832.9018	

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)
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)
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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(62)
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)
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)
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)
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

73.6557	64.4094	67.3794	57.6405	54.6006	47.8962	46.7049	49.5375	51.0907	58.4635	63.8717	72.7164	(64)

Total per year (kWh/year) = Sum(64)m =	707.9666	(64)
12Total per year (kWh/year)	708	(64)

Electric shower(s)

42.1289	37.5372	40.9892	39.1154	39.8494	38.0125	39.2796	39.8494	39.1154	40.9892	40.2184	42.1289	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	479.2135	(64a)

Heat gains from water heating, kWh/month

28.9462	25.4867	27.0921	24.1890	23.6125	21.4772	21.4961	22.3467	22.5515	24.8632	26.0225	28.7113	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)

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

	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)

	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)

Water heating gains (Table 5)

	38.9061	37.9266	36.4142	33.5958	31.7372	29.8294	28.8926	30.0359	31.3216	33.4182	36.1424	38.5905	(72)

Total internal gains

	317.4062	326.8083	312.5879	304.3125	289.3355	280.4400	270.2417	269.8545	277.7507	285.3045	301.1470	310.5828	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	336.9044	364.0704	375.9053	406.0164	426.3401	427.1075	407.1746	378.4933	353.8788	329.6602	325.2006	326.8375	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	83.5474	83.8632	84.1750	85.6713	85.9572	87.3136	87.3136	87.5695	86.7861	85.9572	85.3808	84.7865	
alpha	6.5698	6.5909	6.6117	6.7114	6.7305	6.8209	6.8209	6.8380	6.7857	6.7305	6.6921	6.6524	
util living area	0.9954	0.9912	0.9817	0.9352	0.8064	0.5855	0.4265	0.4774	0.7395	0.9489	0.9890	0.9961	(86)
MIT	20.1880	20.3086	20.4829	20.7522	20.9318	20.9932	20.9993	20.9986	20.9707	20.7589	20.4478	20.1775	(87)
Th 2	20.2320	20.2347	20.2373	20.2497	20.2520	20.2628	20.2628	20.2648	20.2586	20.2520	20.2473	20.2424	(88)
util rest of house	0.9940	0.9886	0.9760	0.9159	0.7605	0.5211	0.3554	0.4020	0.6736	0.9296	0.9852	0.9950	(89)
MIT 2	19.4916	19.6132	19.7869	20.0533	20.2079	20.2598	20.2626	20.2644	20.2434	20.0653	19.7622	19.4898	(90)
Living area fraction									fLA = Living area / (4) =			0.4890	(91)
MIT	19.8322	19.9532	20.1273	20.3951	20.5619	20.6184	20.6229	20.6234	20.5991	20.4045	20.0975	19.8261	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8322	19.9532	20.1273	20.3951	20.5619	20.6184	20.6229	20.6234	20.5991	20.4045	20.0975	19.8261	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9931	0.9874	0.9750	0.9201	0.7804	0.5525	0.3902	0.4390	0.7049	0.9341	0.9842	0.9942	(94)
Useful gains	334.5658	359.4761	366.5018	373.5592	332.7073	235.9661	158.8822	166.1422	249.4432	307.9199	320.0773	324.9336	(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	641.7359	619.6059	558.8332	463.1617	355.8773	237.9350	159.0414	166.4821	258.4985	393.7318	525.4788	636.1821	(97)
Space heating kWh	228.5345	174.8073	143.0946	64.5138	17.2385	0.0000	0.0000	0.0000	0.0000	63.8441	147.8891	231.5689	(98a)
Space heating requirement - total per year (kWh/year)												1071.4908	
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	228.5345	174.8073	143.0946	64.5138	17.2385	0.0000	0.0000	0.0000	0.0000	63.8441	147.8891	231.5689	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1071.4908	
Space heating per m2										(98c) / (4) =		21.3870	(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	371.6233	292.5545	299.5834	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9466	0.9789	0.9657	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	351.7927	286.3938	289.2955	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	463.6030	442.1570	410.2867	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	80.5034	115.8878	90.0174	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	20.1259	28.9720	22.5044	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												71.6022	(107)
Energy for space heating												21.3870	(99)
Energy for space cooling												1.4292	(108)
Total												22.8162	(109)
Fabric Energy Efficiency (TFEE)												22.8	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	1B2P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	89 B	**DER**	12.77	**TER**	12.56
Environmental	91 B	**% DER < TER**			-1.67
CO_2 Emissions (t/year)	0.63	**DFEE**	24.38	**TFEE**	22.82
Compliance Check	See BREL	**% DFEE < TFEE**			-6.86
% DPER < TPER	-3.93	**DPER**	69.06	**TPER**	66.45

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

		Area		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		50.1000	(1b)	x 2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	115.2300	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Window			6.0000	1.2357	7.4144			(27)
Ground Floor			50.1000	0.1700	8.5170	75.0000	3757.5000	(28a)
External Wall	18.2000	6.0000	12.2000	0.1900	2.3180	140.0000	1708.0001	(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.2494			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000	140.0000	2254.0001	(32)
Party Ceiling			50.1000			100.0000	5010.0000	(32b)
Partitions			77.7000			9.0000	699.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13428.8001	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	268.0399	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650
E3 Sill	3.3000	0.0210	0.0693

E4 Jamb	7.2000	0.0160	0.1152	
E5 Ground floor (normal)	7.6000	0.0740	0.5624	
E6 Intermediate floor within a dwelling	7.6000	0.0010	0.0076	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	6.7000	0.1080	0.7236	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				1.8179 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	20.0673 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	19.0129	(38)
Heat transfer coeff	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	39.0803	(39)
Average = Sum(39)m / 12 =												39.0803	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	0.7800	(40)
HLP (average)												0.7800	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6930	(42)
Hot water usage for mixer showers	72.3337	71.2466	69.6626	66.6319	64.3952	61.9010	60.4833	62.0553	63.7785	66.4566	69.5524	72.0565	(42a)
Hot water usage for baths	22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)
Hot water usage for other uses	31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)
Average daily hot water use (litres/day)												116.8403	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.0478	124.4605	121.2382	116.1679	112.1120	107.7271	105.9160	109.1229	112.5229	117.1427	122.2962	126.6937	(44)
Energy conte	201.2126	177.2300	186.3387	159.0281	150.9244	132.4630	128.0962	135.1169	138.7520	158.9616	174.2334	198.3718	(45)
Energy content (annual)										Total = Sum(45)m =		1940.7285	
Distribution loss (46)m = 0.15 x (45)m	30.1819	26.5845	27.9508	23.8542	22.6387	19.8694	19.2144	20.2675	20.8128	23.8442	26.1350	29.7558	(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	14.8205	13.3728	14.7759	14.2354	14.6697	14.1557	14.6012	14.6223	14.1746	14.6938	14.2810	14.8120	(61)
Total heat required for water heating calculated for each month	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
										Total per year (kWh/year) = Sum(64)m =		2113.9434	(64)
12Total per year (kWh/year)												2114	(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	70.6083	62.2722	65.6516	56.4357	53.8498	47.5829	46.2423	48.5819	49.6787	56.5282	61.5028	69.6616	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	94.9037	92.6669	88.2414	78.3829	72.3787	66.0873	62.1536	65.2983	68.9982	75.9787	85.4206	93.6312	(72)
Total internal gains	376.4038	384.5487	367.4151	352.0995	332.9770	316.6979	303.5027	305.1169	315.4273	330.8650	353.4253	368.6235	(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)

Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	395.9020	421.8108	430.7325	453.8035	469.9816	463.3654	440.4355	413.7556	391.5554	375.2207	377.4788	384.8782	(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	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	95.4502	
alpha	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	7.3633	
util living area	0.9899	0.9820	0.9646	0.8977	0.7434	0.5371	0.3902	0.4340	0.6743	0.9125	0.9780	0.9918	(86)
MIT	20.4363	20.5352	20.6731	20.8584	20.9696	20.9973	20.9998	20.9995	20.9878	20.8615	20.6238	20.4058	(87)
Th 2	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	20.2707	(88)
util rest of house	0.9869	0.9767	0.9541	0.8710	0.6947	0.4772	0.3256	0.3655	0.6091	0.8836	0.9706	0.9893	(89)
MIT 2	19.7660	19.8627	19.9957	20.1645	20.2524	20.2696	20.2706	20.2705	20.2649	20.1704	19.9500	19.7360	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	20.0938	20.1916	20.3270	20.5038	20.6031	20.6255	20.6272	20.6270	20.6184	20.5084	20.2795	20.0636	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0938	20.1916	20.3270	20.5038	20.6031	20.6255	20.6272	20.6270	20.6184	20.5084	20.2795	20.0636	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9860	0.9761	0.9550	0.8801	0.7175	0.5065	0.3572	0.3990	0.6407	0.8938	0.9707	0.9885	(94)
Useful gains	390.3708	411.7202	411.3700	399.4006	337.1959	234.6812	157.3319	165.0785	250.8799	335.3795	366.4289	380.4336	(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	617.2262	597.5999	540.3624	453.4815	347.9375	235.4766	157.3837	165.1935	254.7422	387.2217	515.0576	619.9530	(97)
Space heating kWh	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98a)
Space heating requirement - total per year (kWh/year)												760.3777	
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	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												760.3777	
Space heating per m2											(98c) / (4) =	15.1772	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	168.7804	124.9112	95.9704	38.9383	7.9918	0.0000	0.0000	0.0000	0.0000	38.5706	107.0127	178.2025	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	189.6410	140.3497	107.8319	43.7509	8.9795	0.0000	0.0000	0.0000	0.0000	43.3377	120.2389	200.2275	(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	216.0332	190.6028	201.1146	173.2634	165.5940	146.6187	142.6974	149.7392	152.9266	173.6554	188.5144	213.1838	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.0376	87.9652	87.8420	87.6071	87.3768	87.3000	87.3000	87.3000	87.3000	87.6041	87.9080	88.0659	(217)
Fuel for water heating, kWh/month	245.3875	216.6798	228.9503	197.7734	189.5171	167.9481	163.4563	171.5225	175.1736	198.2274	214.4450	242.0730	(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	8.2984	7.4953	8.2984	8.0307	8.2984	8.0307	8.2984	8.2984	8.0307	8.2984	8.0307	8.2984	(231)
Lighting	25.6306	20.5619	18.5137	13.5639	10.4772	8.5599	9.5576	12.4233	16.1367	21.1722	23.9140	26.3430	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.7443	-21.9500	-33.3328	-39.6339	-44.5941	-42.3328	-41.8606	-38.6368	-33.1711	-26.0928	-16.6332	-12.6155	(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	-5.2903	-11.4820	-23.6057	-36.6749	-49.6790	-50.3527	-49.6000	-41.2728	-29.4141	-16.6456	-7.1307	-4.1500	(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												854.3570	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2411.1540	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												11.7070	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												97.7070	(231)
Electricity for lighting (calculated in Appendix L)												206.8540	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-690.8958	(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	2879.1763	(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	854.3570	0.2100	179.4150	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2411.1540	0.2100	506.3423	(264)
Space and water heating			685.7573	(265)
Pumps, fans and electric keep-hot	97.7070	0.1387	13.5532	(267)
Energy for lighting	206.8540	0.1443	29.8554	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.5980	0.1334	-48.7865	
PV Unit electricity exported	-325.2977	0.1250	-40.6636	
Total			-89.4501	(269)
Total CO2, kg/year			639.7158	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.7700	(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	854.3570	1.1300	965.4234	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2411.1540	1.1300	2724.6041	(278)
Space and water heating			3690.0275	(279)
Pumps, fans and electric keep-hot	97.7070	1.5128	147.8111	(281)
Energy for lighting	206.8540	1.5338	317.2796	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.5980	1.4931	-545.8811	
PV Unit electricity exported	-325.2977	0.4588	-149.2493	
Total			-695.1304	(283)
Total Primary energy kWh/year			3459.9878	(286)
Dwelling Primary energy Rate (DPER)			69.0600	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		50.1000	(1b) x	2.3000	(2b) =	115.2300	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		115.2300	(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) =	0.1736	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4236	(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) =	0.3600	(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	0.4590	0.4500	0.4410	0.3960	0.3870	0.3420	0.3420	0.3330	0.3600	0.3870	0.4050	0.4230	(22b)
Effective ac	0.6054	0.6013	0.5973	0.5784	0.5749	0.5585	0.5585	0.5555	0.5648	0.5749	0.5820	0.5895	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			6.0000	1.1450	6.8702			(27)
Ground Floor			50.1000	0.1300	6.5130			(28a)
External Wall	18.2000	6.0000	12.2000	0.1800	2.1960			(29a)
Total net area of external elements Aum(A, m2)			68.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		15.5792			(33)
Main dwelling								
Party Wall			16.1000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 248.0399 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	3.3000	0.0500	0.1650	
E3 Sill	3.3000	0.0500	0.1650	
E4 Jamb	7.2000	0.0500	0.3600	
E5 Ground floor (normal)	7.6000	0.1600	1.2160	
E6 Intermediate floor within a dwelling	7.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	6.7000	0.0800	0.5360	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.7180 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 18.2972 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.0193	22.8637	22.7112	21.9950	21.8610	21.2372	21.2372	21.1216	21.4775	21.8610	22.1321	22.4155	(38)
Heat transfer coeff	41.3165	41.1610	41.0085	40.2922	40.1582	39.5344	39.5344	39.4189	39.7747	40.1582	40.4293	40.7127	(39)

Average = Sum(39)m / 12 = 40.2916

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8247	0.8216	0.8185	0.8042	0.8016	0.7891	0.7891	0.7868	0.7939	0.8016	0.8070	0.8126	(40)
HLP (average)												0.8042	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6930 (42)

Hot water usage for mixer showers

52.6063	51.8157	50.6637	48.4595	46.8329	45.0189	43.9878	45.1311	46.3844	48.3321	50.5836	52.4047	(42a)

Hot water usage for baths

22.7457	22.4079	21.9322	21.0550	20.3983	19.6700	19.2767	19.7490	20.2634	21.0426	21.9378	22.6688	(42b)

Hot water usage for other uses

31.9685	30.8060	29.6435	28.4810	27.3185	26.1560	26.1560	27.3185	28.4810	29.6435	30.8060	31.9685	(42c)

Average daily hot water use (litres/day) 98.6523 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	107.3204	105.0296	102.2394	97.9956	94.5497	90.8450	89.4205	92.1987	95.1288	99.0182	103.3274	107.0420	(44)
Energy conte	169.9693	149.5607	157.1381	134.1511	127.2821	111.7045	108.1464	114.1612	117.3033	134.3668	147.2088	167.6019	(45)
Energy content (annual)										Total = Sum(45)m =		1638.5940	
Distribution loss (46)m = 0.15 x (45)m	25.4954	22.4341	23.5707	20.1227	19.0923	16.7557	16.2220	17.1242	17.5955	20.1550	22.0813	25.1403	(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	50.9589	46.0274	50.9589	48.3266	48.1815	44.8003	45.5677	46.9834	46.9128	50.4586	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	220.9282	195.5881	208.0970	182.4776	175.4636	156.5047	153.7141	161.1447	164.2161	184.8253	196.5238	218.5608	(62)
WWHRS	-24.0494	-21.2695	-22.2722	-18.4422	-17.1875	-14.7075	-13.7859	-14.6599	-15.2169	-17.9391	-20.3228	-23.6040	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
									Total per year (kWh/year) = Sum(64)m =			1994.5871	(64)
12Total per year (kWh/year)												1995	(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	69.2545	61.2358	64.9881	56.6869	54.3667	48.3418	47.3506	49.7045	50.7315	57.2916	61.2757	68.4673	(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	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	84.6523	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.6108	91.4619	82.6108	85.3645	82.6108	85.3645	82.6108	82.6108	85.3645	82.6108	85.3645	82.6108	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.4937	149.0242	145.1673	136.9565	126.5918	116.8505	110.3427	108.8121	112.6690	120.8798	131.2445	140.9858	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	31.4652	(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)	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	-67.7218	(71)
Water heating gains (Table 5)	93.0840	91.1247	87.3496	78.7318	73.0735	67.1414	63.6433	66.8071	70.4605	77.0048	85.1051	92.0260	(72)
Total internal gains	374.5841	383.0065	366.5234	352.4484	333.6717	317.7520	304.9924	306.6257	316.8896	331.8911	353.1098	367.0183	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	19.4982	37.2621	63.3174	101.7040	137.0046	146.6675	136.9328	108.6387	76.1280	44.3557	24.0536	16.2547	(83)
Total gains	394.0824	420.2686	429.8408	454.1524	470.6763	464.4195	441.9252	415.2644	393.0177	376.2468	377.1633	383.2730	(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	83.5474	83.8632	84.1750	85.6713	85.9572	87.3136	87.3136	87.5695	86.7861	85.9572	85.3808	84.7865	
alpha	6.5698	6.5909	6.6117	6.7114	6.7305	6.8209	6.8209	6.8380	6.7857	6.7305	6.6921	6.6524	
util living area	0.9890	0.9812	0.9646	0.8990	0.7520	0.5408	0.3932	0.4358	0.6787	0.9113	0.9761	0.9906	(86)
MIT	20.3126	20.4266	20.5874	20.8179	20.9551	20.9957	20.9996	20.9992	20.9822	20.8281	20.5547	20.3016	(87)
Th 2	20.2320	20.2347	20.2373	20.2497	20.2520	20.2628	20.2628	20.2648	20.2586	20.2520	20.2473	20.2424	(88)
util rest of house	0.9859	0.9760	0.9546	0.8733	0.7037	0.4803	0.3276	0.3666	0.6135	0.8832	0.9685	0.9879	(89)
MIT 2	19.4396	19.5850	19.7872	20.0707	20.2160	20.2604	20.2626	20.2645	20.2473	20.0888	19.7572	19.4340	(90)
Living area fraction										fLA = Living area / (4) =		0.4890	(91)
MIT	19.8665	19.9965	20.1785	20.4361	20.5774	20.6200	20.6230	20.6238	20.6067	20.4503	20.1472	19.8583	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8665	19.9965	20.1785	20.4361	20.5774	20.6200	20.6230	20.6238	20.6067	20.4503	20.1472	19.8583	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9841	0.9741	0.9537	0.8802	0.7254	0.5098	0.3597	0.4005	0.6448	0.8914	0.9673	0.9862	(94)
Useful gains	387.8192	409.3753	409.9321	399.7420	341.4108	236.7767	158.9520	166.3034	253.4039	335.3769	364.8426	377.9859	(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	643.1546	621.3880	560.9339	464.8134	356.5018	237.9972	159.0476	166.4962	258.8021	395.5710	527.4889	637.4925	(97)
Space heating kWh	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98a)
Space heating requirement - total per year (kWh/year)												857.8291	
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	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												857.8291	
Space heating per m2											(98c) / (4) =	17.1223	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	189.9695	142.4726	112.3453	46.8514	11.2277	0.0000	0.0000	0.0000	0.0000	44.7844	117.1053	193.0729	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	205.5947	154.1911	121.5859	50.7050	12.1512	0.0000	0.0000	0.0000	0.0000	48.4679	126.7373	208.9534	(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	196.8788	174.3186	185.8248	164.0354	158.2761	141.7973	139.9282	146.4847	148.9992	166.8863	176.2011	194.9567	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.3049	83.9525	83.3376	82.0637	80.8179	80.3000	80.3000	80.3000	80.3000	81.9779	83.5261	84.3606	(217)
Fuel for water heating, kWh/month	233.5319	207.6396	222.9784	199.8879	195.8429	176.5844	174.2568	182.4218	185.5532	203.5748	210.9534	231.0992	(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	17.1649	13.7703	12.3986	9.0838	7.0166	5.7326	6.4007	8.3199	10.8068	14.1791	16.0152	17.6420	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.2756	-25.2611	-37.6510	-43.9626	-48.8465	-46.1517	-45.6273	-42.3884	-36.8754	-29.6502	-19.3263	-14.8348	(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	-7.1765	-15.3373	-30.9257	-47.0863	-62.8656	-63.3557	-62.5702	-52.6643	-38.2176	-22.0977	-9.6374	-5.6541	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	928.3865	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2424.3242	(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)	138.5305	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-825.4393	(233)
Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2751.8018	(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	928.3865	0.2100	194.9612	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2424.3242	0.2100	509.1081	(264)
Space and water heating			704.0692	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	138.5305	0.1443	19.9942	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	0.1338	-54.5706	
PV Unit electricity exported	-417.5885	0.1255	-52.4125	
Total			-106.9831	(269)
Total CO2, kg/year			629.0096	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5600	(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	928.3865	1.1300	1049.0767	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2424.3242	1.1300	2739.4863	(278)
Space and water heating			3788.5630	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	138.5305	1.5338	212.4827	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-407.8508	1.4945	-609.5162	
PV Unit electricity exported	-417.5885	0.4607	-192.3829	
Total			-801.8991	(283)
Total Primary energy kWh/year			3329.2474	(286)
Target Primary Energy Rate (TPER)			66.4500	(287)

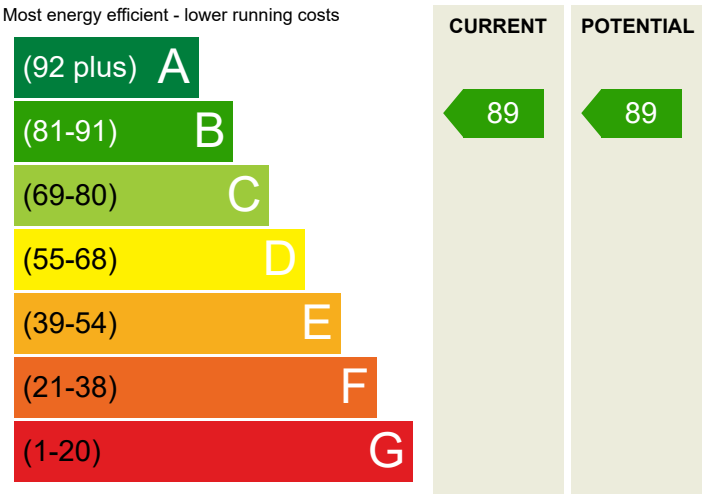
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-1B2P Apartment (GF)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	50

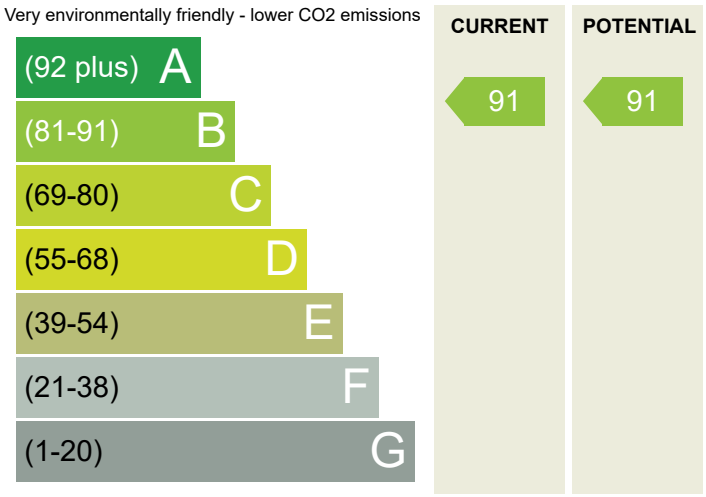
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

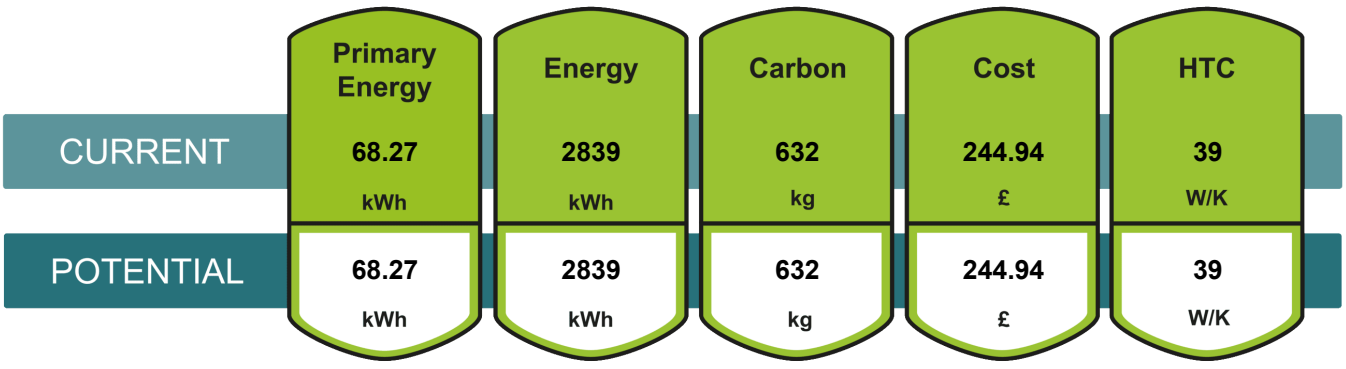
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£54	£54	
Heating	£170	£170	
Hot Water	£135	£135	
New Technologies e.g. Impact of PV	-(£114)	-(£114)	
TOTAL	£245	£245	

Estimated energy use and potential savings

Space Heating
820
kWh per year

Water Heating
2411
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.28	**TER**	9.68
Environmental	93 A	**% DER < TER**			4.13
CO_2 Emissions (t/year)	0.58	**DFEE**	14.69	**TFEE**	15.29
Compliance Check	See BREL	**% DFEE < TFEE**			3.93
% DPER < TPER	2.71	**DPER**	49.39	**TPER**	50.76

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	62.80 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	25.60	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	21.40	13.20	0.00	None	8.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	33.50	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	106.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	62.80	62.80	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor	Lowest occupied	Concrete floor slab, carpeted	100.00	62.80

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Window	External Wall	South	8.20	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	4.60	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	4.60	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	10.80	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	0.00	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	17.80	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	0.00	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

28.1 Showers

Summary for Input Data

elmhurst energy

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
1.20	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.28	**TER**	9.68
Environmental	93 A	**% DER < TER**			4.13
CO_2 Emissions (t/year)	0.58	**DFEE**	14.69	**TFEE**	15.29
Compliance Check	See BREL	**% DFEE < TFEE**			3.93
% DPER < TPER	2.71	**DPER**	49.39	**TPER**	50.76

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	17.8000	0.0010	0.0178	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.6920 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 19.6131 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	(39)

Average = Sum(39)m / 12 = 43.4457

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	(40)
HLP (average)												0.6918	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 130.4945 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)

Energy content (annual) Total = Sum(45)m = 2167.5261

Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)

Total per year (kWh/year) = Sum(64)m = 2341.4213 (64)

12Total per year (kWh/year) 2341 (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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(84)

---

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	
alpha	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	
util living area	0.9523	0.9016	0.8360	0.7276	0.5875	0.4276	0.3048	0.3218	0.4774	0.7257	0.9031	0.9624	(86)
MIT	20.5785	20.7396	20.8578	20.9477	20.9880	20.9987	20.9999	20.9998	20.9973	20.9557	20.7726	20.5284	(87)
Th 2	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	(88)
util rest of house	0.9433	0.8859	0.8130	0.6958	0.5487	0.3844	0.2597	0.2763	0.4331	0.6885	0.8848	0.9550	(89)
MIT 2	19.9772	20.1273	20.2336	20.3097	20.3405	20.3474	20.3480	20.3480	20.3467	20.3173	20.1603	19.9294	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	20.2223	20.3769	20.4881	20.5697	20.6045	20.6129	20.6138	20.6137	20.6119	20.5775	20.4099	20.1736	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2223	20.3769	20.4881	20.5697	20.6045	20.6129	20.6138	20.6137	20.6119	20.5775	20.4099	20.1736	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9413	0.8866	0.8181	0.7069	0.5641	0.4020	0.2781	0.2948	0.4511	0.7019	0.8867	0.9527	(94)
Useful gains	525.5628	570.1024	552.4866	487.3169	382.6687	260.8426	174.3526	183.0262	282.0727	417.3076	490.2511	507.8326	(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	691.7548	672.4051	607.7212	507.0001	386.8603	261.2355	174.3804	183.0681	282.9142	433.4800	578.2578	693.9829	(97)
Space heating kWh	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98a)
Space heating requirement - total per year (kWh/year)												464.6723	
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	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												464.6723	
Space heating per m2											(98c) / (4) =	7.3992	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	138.9291	77.2443	46.1737	15.9235	3.5040	0.0000	0.0000	0.0000	0.0000	13.5194	71.1965	155.6133	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.8713	87.7112	87.5603	87.4148	87.3279	87.3000	87.3000	87.3000	87.3000	87.3983	87.6898	87.9203	(217)
Fuel for water heating, kWh/month	272.6924	240.9913	254.6306	219.5315	209.8799	185.7324	180.6548	189.6640	193.8035	220.0136	238.2686	268.9208	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.2537	-31.1879	-46.6885	-54.6927	-60.8165	-57.4549	-56.7826	-52.7317	-45.7862	-36.6815	-23.8084	-18.2332	(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	-8.7982	-18.9601	-38.7193	-59.7705	-80.5932	-81.5733	-80.4083	-67.1327	-48.0916	-27.4260	-11.8374	-6.9151	(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	522.1037	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2674.7834	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)		
mechanical ventilation fans (SFP = 0.0833)	14.6746	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	100.6746	(231)
Electricity for lighting (calculated in Appendix L)	219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1036.3436	(233)

Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2480.6110	(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	522.1037	0.2100	109.6418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2674.7834	0.2100	561.7045	(264)
Space and water heating			671.3463	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-506.1179	0.1337	-67.6917	
PV Unit electricity exported	-530.2257	0.1252	-66.3695	
Total			-134.0612	(269)
Total CO2, kg/year			582.9151	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.2800	(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	522.1037	1.1300	589.9772	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2674.7834	1.1300	3022.5052	(278)
Space and water heating			3612.4824	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-506.1179	1.4943	-756.2711	
PV Unit electricity exported	-530.2257	0.4594	-243.6030	
Total			-999.8740	(283)
Total Primary energy kWh/year			3101.4211	(286)
Dwelling Primary energy Rate (DPER)			49.3900	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300	
E3 Sill	4.6000	0.0500	0.2300	
E4 Jamb	10.8000	0.0500	0.5400	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	17.8000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.2760 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 19.9493 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	48.0060	47.8420	47.6812	46.9260	46.7847	46.1270	46.1270	46.0052	46.3804	46.7847	47.0706	47.3694	(39)

Average = Sum(39)m / 12 = 46.9254

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7644	0.7618	0.7593	0.7472	0.7450	0.7345	0.7345	0.7326	0.7385	0.7450	0.7495	0.7543	(40)
HLP (average)												0.7472	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
									Total per year (kWh/year) = Sum(64)m =			2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	75.7283	75.9880	76.2442	77.4712	77.7052	78.8132	78.8132	79.0218	78.3827	77.7052	77.2333	76.7461	
alpha	6.0486	6.0659	6.0829	6.1647	6.1803	6.2542	6.2542	6.2681	6.2255	6.1803	6.1489	6.1164	
util living area	0.9641	0.9248	0.8702	0.7657	0.6257	0.4521	0.3224	0.3397	0.5070	0.7621	0.9223	0.9706	(86)
MIT	20.4295	20.6179	20.7734	20.9131	20.9776	20.9975	20.9997	20.9997	20.9948	20.9278	20.6868	20.3965	(87)
Th 2	20.2843	20.2865	20.2888	20.2993	20.3013	20.3105	20.3105	20.3122	20.3069	20.3013	20.2973	20.2931	(88)
util rest of house	0.9566	0.9111	0.8487	0.7330	0.5831	0.4041	0.2720	0.2890	0.4575	0.7238	0.9060	0.9644	(89)
MIT 2	19.6351	19.8660	20.0514	20.2165	20.2830	20.3089	20.3104	20.3120	20.3035	20.2360	19.9617	19.6017	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.9589	20.1725	20.3457	20.5004	20.5661	20.5896	20.5914	20.5923	20.5853	20.5180	20.2573	19.9257	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9589	20.1725	20.3457	20.5004	20.5661	20.5896	20.5914	20.5923	20.5853	20.5180	20.2573	19.9257	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9527	0.9087	0.8505	0.7427	0.5995	0.4236	0.2925	0.3097	0.4775	0.7360	0.9050	0.9606	(94)
Useful gains	528.6059	581.4146	572.2781	511.5104	406.8805	275.5309	184.0506	192.7826	299.1597	437.5056	498.7637	508.9196	(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	751.7238	730.6674	660.1792	544.3629	414.8003	276.2835	184.1105	192.8686	300.7913	464.0129	619.3208	744.9162	(97)
Space heating kWh	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98a)
Space heating requirement - total per year (kWh/year)												643.3463	
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	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												643.3463	
Space heating per m2											(98c) / (4) =	10.2444	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	179.6533	108.5475	70.7775	25.5994	6.3770	0.0000	0.0000	0.0000	0.0000	21.3436	93.9407	190.0232	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	83.8438	83.0835	82.2490	81.2191	80.5554	80.3000	80.3000	80.3000	80.3000	81.0706	82.8026	83.9825	(217)
Fuel for water heating, kWh/month	255.1575	227.8582	245.0933	219.8336	215.9013	196.3236	194.6221	201.8548	203.4036	223.2554	230.7070	252.1800	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	696.2622	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2666.1904	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2579.5758	(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	696.2622	0.2100	146.2151	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2666.1904	0.2100	559.9000	(264)
Space and water heating			706.1150	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			607.8991	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6800	(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	696.2622	1.1300	786.7763	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2666.1904	1.1300	3012.7951	(278)
Space and water heating			3799.5715	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3187.7759	(286)
Target Primary Energy Rate (TPER)			50.7600	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.28	**TER**	9.68
Environmental	93 A	**% DER < TER**			4.13
CO_2 Emissions (t/year)	0.58	**DFEE**	14.69	**TFEE**	15.29
Compliance Check	See BREL	**% DFEE < TFEE**			3.93
% DPER < TPER	2.71	**DPER**	49.39	**TPER**	50.76

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3635	(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) =	0.3089	(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	0.3939	0.3862	0.3785	0.3398	0.3321	0.2935	0.2935	0.2858	0.3089	0.3321	0.3476	0.3630	(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	0.5776	0.5746	0.5716	0.5577	0.5552	0.5431	0.5431	0.5408	0.5477	0.5552	0.5604	0.5659	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966
E4 Jamb	10.8000	0.0160	0.1728
E5 Ground floor (normal)	0.0000	0.0740	0.0000

E6 Intermediate floor within a dwelling	17.8000	0.0010	0.0178	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.6920 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 19.6131 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	27.5305	27.3869	27.2462	26.5851	26.4614	25.8856	25.8856	25.7789	26.1074	26.4614	26.7116	26.9732	(38)
Heat transfer coeff	47.1436	47.0000	46.8592	46.1981	46.0745	45.4987	45.4987	45.3920	45.7204	46.0745	46.3247	46.5863	(39)
Average = Sum(39)m / 12 =												46.1976	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7507	0.7484	0.7462	0.7356	0.7337	0.7245	0.7245	0.7228	0.7280	0.7337	0.7377	0.7418	(40)
HLP (average)												0.7356	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (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

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 56.0140 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)
Energy content (annual)										Total = Sum(45)m =		930.2736	
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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)
										Total per year (kWh/year) = Sum(64)m =		790.7326	(64)
12Total per year (kWh/year)												791	(64)
Electric shower(s)	47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		535.1993	(64a)
Heat gains from water heating, kWh/month	32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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	77.1137	77.3493	77.5816	78.6918	78.9031	79.9016	79.9016	80.0893	79.5140	78.9031	78.4769	78.0362	
alpha	6.1409	6.1566	6.1721	6.2461	6.2602	6.3268	6.3268	6.3393	6.3009	6.2602	6.2318	6.2024	
util living area	0.9781	0.9468	0.8996	0.7999	0.6589	0.4758	0.3389	0.3585	0.5351	0.8015	0.9470	0.9828	(86)
MIT	20.3462	20.5534	20.7290	20.8935	20.9720	20.9969	20.9997	20.9996	20.9935	20.9080	20.6241	20.3087	(87)
Th 2	20.2963	20.2983	20.3002	20.3095	20.3112	20.3192	20.3192	20.3207	20.3161	20.3112	20.3077	20.3040	(88)
util rest of house	0.9732	0.9363	0.8812	0.7689	0.6159	0.4262	0.2866	0.3057	0.4841	0.7653	0.9347	0.9789	(89)
MIT 2	19.7084	19.9094	20.0753	20.2291	20.2931	20.3178	20.3191	20.3206	20.3127	20.2450	19.9877	19.6785	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.9684	20.1719	20.3418	20.4999	20.5699	20.5946	20.5966	20.5974	20.5902	20.5153	20.2471	19.9354	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9684	20.1719	20.3418	20.4999	20.5699	20.5946	20.5966	20.5974	20.5902	20.5153	20.2471	19.9354	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9705	0.9342	0.8824	0.7778	0.6324	0.4463	0.3079	0.3272	0.5047	0.7765	0.9335	0.9765	(94)
Useful gains	478.7823	541.3013	542.6563	495.4130	398.7241	271.8091	181.7652	190.4189	294.6699	422.8285	462.5077	458.0761	(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	738.6653	717.7795	648.6151	535.8944	408.6736	272.7465	181.8384	190.5270	296.7365	456.8421	609.0347	733.0548	(97)
Space heating kWh	193.3529	118.5934	78.8334	29.1466	7.4025	0.0000	0.0000	0.0000	0.0000	25.3062	105.4994	204.5842	(98a)
Space heating requirement - total per year (kWh/year)												762.7185	
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	193.3529	118.5934	78.8334	29.1466	7.4025	0.0000	0.0000	0.0000	0.0000	25.3062	105.4994	204.5842	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												762.7185	
Space heating per m2											(98c) / (4) =	12.1452	(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	427.6873	336.6900	344.9794	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9779	0.9924	0.9909	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	418.2432	334.1314	341.8264	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	180.6634	234.6615	223.1048	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	45.1659	58.6654	55.7762	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												159.6074	(107)
Energy for space heating												12.1452	(99)
Energy for space cooling												2.5415	(108)
Total												14.6867	(109)
Fabric Energy Efficiency (DFEE)												14.7	(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		Storey height		Volume	
		(m2)		(m)		(m3)	
Main dwelling							
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.4400	(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) =	0.1385	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			5.0000	(17)

Infiltration rate 0.3885 (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) = 0.3302 (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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(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	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)
List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300	
E3 Sill	4.6000	0.0500	0.2300	
E4 Jamb	10.8000	0.0500	0.5400	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	17.8000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.1260 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 19.9493 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	48.0060	47.8420	47.6812	46.9260	46.7847	46.1270	46.1270	46.0052	46.3804	46.7847	47.0706	47.3694	(39)

Average = Sum(39)m / 12 = 46.9254

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7644	0.7618	0.7593	0.7472	0.7450	0.7345	0.7345	0.7326	0.7385	0.7450	0.7495	0.7543	(40)
HLP (average)												0.7472	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (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

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 56.0140 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)

Energy content (annual) Total = Sum(45)m = 930.2736
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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)

Total per year (kWh/year) = Sum(64)m = 790.7326 (64)
12Total per year (kWh/year) 791 (64)
Electric shower(s)

47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 535.1993 (64a)
Heat gains from water heating, kWh/month

32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains													
	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	75.7283	75.9880	76.2442	77.4712	77.7052	78.8132	78.8132	79.0218	78.3827	77.7052	77.2333	76.7461	
alpha	6.0486	6.0659	6.0829	6.1647	6.1803	6.2542	6.2542	6.2681	6.2255	6.1803	6.1489	6.1164	
util living area													
	0.9789	0.9491	0.9038	0.8065	0.6668	0.4821	0.3435	0.3632	0.5422	0.8080	0.9491	0.9834	(86)
MIT	20.3183	20.5286	20.7098	20.8838	20.9686	20.9964	20.9996	20.9995	20.9925	20.8999	20.6051	20.2831	(87)
Th 2	20.2843	20.2865	20.2888	20.2993	20.3013	20.3105	20.3105	20.3122	20.3069	20.3013	20.2973	20.2931	(88)
util rest of house													
	0.9742	0.9389	0.8858	0.7756	0.6232	0.4312	0.2898	0.3091	0.4900	0.7718	0.9372	0.9796	(89)
MIT 2	19.6711	19.8755	20.0475	20.2114	20.2810	20.3087	20.3103	20.3120	20.3030	20.2291	19.9606	19.6442	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	19.9349	20.1417	20.3175	20.4855	20.5613	20.5891	20.5913	20.5922	20.5841	20.5025	20.2233	19.9046	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9349	20.1417	20.3175	20.4855	20.5613	20.5891	20.5913	20.5922	20.5841	20.5025	20.2233	19.9046	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9714	0.9366	0.8866	0.7841	0.6398	0.4519	0.3117	0.3312	0.5111	0.7827	0.9357	0.9771	(94)
Useful gains	479.2453	542.6756	545.2421	499.4463	403.3852	275.1790	184.0213	192.7378	298.3704	426.1996	463.5946	458.3879	(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													
	750.5704	729.1951	658.8342	543.6630	414.5720	276.2585	184.1080	192.8649	300.7354	463.2876	617.7221	743.9189	(97)
Space heating kWh													
	201.8659	125.3411	84.5125	31.8360	8.3230	0.0000	0.0000	0.0000	0.0000	27.5935	110.9718	212.4351	(98a)
Space heating requirement - total per year (kWh/year)												802.8790	
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													
	201.8659	125.3411	84.5125	31.8360	8.3230	0.0000	0.0000	0.0000	0.0000	27.5935	110.9718	212.4351	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												802.8790	
Space heating per m2											(98c) / (4) =	12.7847	(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	433.5939	341.3399	349.6396	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9756	0.9914	0.9898	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	423.0226	338.4159	346.0580	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	177.2222	231.4739	219.9565	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	44.3056	57.8685	54.9891	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												157.1632	(107)
Energy for space heating												12.7847	(99)
Energy for space cooling												2.5026	(108)
Total												15.2873	(109)
Fabric Energy Efficiency (TFEE)												15.3	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (1F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.28	**TER**	9.68
Environmental	93 A	**% DER < TER**			4.13
CO_2 Emissions (t/year)	0.58	**DFEE**	14.69	**TFEE**	15.29
Compliance Check	See BREL	**% DFEE < TFEE**			3.93
% DPER < TPER	2.71	**DPER**	49.39	**TPER**	50.76

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	17.8000	0.0010	0.0178	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 0.6920 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 19.6131 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	43.4457	(39)

Average = Sum(39)m / 12 = 43.4457

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	0.6918	(40)
HLP (average)												0.6918	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 130.4945 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)

Energy content (annual) Total = Sum(45)m = 2167.5261

Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)

Total per year (kWh/year) = Sum(64)m = 2341.4213 (64)

12Total per year (kWh/year) 2341 (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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(84)

---

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	83.6773	
alpha	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	6.5785	
util living area	0.9523	0.9016	0.8360	0.7276	0.5875	0.4276	0.3048	0.3218	0.4774	0.7257	0.9031	0.9624	(86)
MIT	20.5785	20.7396	20.8578	20.9477	20.9880	20.9987	20.9999	20.9998	20.9973	20.9557	20.7726	20.5284	(87)
Th 2	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	20.3481	(88)
util rest of house	0.9433	0.8859	0.8130	0.6958	0.5487	0.3844	0.2597	0.2763	0.4331	0.6885	0.8848	0.9550	(89)
MIT 2	19.9772	20.1273	20.2336	20.3097	20.3405	20.3474	20.3480	20.3480	20.3467	20.3173	20.1603	19.9294	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	20.2223	20.3769	20.4881	20.5697	20.6045	20.6129	20.6138	20.6137	20.6119	20.5775	20.4099	20.1736	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.2223	20.3769	20.4881	20.5697	20.6045	20.6129	20.6138	20.6137	20.6119	20.5775	20.4099	20.1736	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9413	0.8866	0.8181	0.7069	0.5641	0.4020	0.2781	0.2948	0.4511	0.7019	0.8867	0.9527	(94)
Useful gains	525.5628	570.1024	552.4866	487.3169	382.6687	260.8426	174.3526	183.0262	282.0727	417.3076	490.2511	507.8326	(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	691.7548	672.4051	607.7212	507.0001	386.8603	261.2355	174.3804	183.0681	282.9142	433.4800	578.2578	693.9829	(97)
Space heating kWh	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98a)
Space heating requirement - total per year (kWh/year)												464.6723	
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	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												464.6723	
Space heating per m2											(98c) / (4) =	7.3992	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	123.6469	68.7475	41.0946	14.1719	3.1185	0.0000	0.0000	0.0000	0.0000	12.0323	63.3648	138.4958	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	138.9291	77.2443	46.1737	15.9235	3.5040	0.0000	0.0000	0.0000	0.0000	13.5194	71.1965	155.6133	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.8713	87.7112	87.5603	87.4148	87.3279	87.3000	87.3000	87.3000	87.3000	87.3983	87.6898	87.9203	(217)
Fuel for water heating, kWh/month	272.6924	240.9913	254.6306	219.5315	209.8799	185.7324	180.6548	189.6640	193.8035	220.0136	238.2686	268.9208	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.2537	-31.1879	-46.6885	-54.6927	-60.8165	-57.4549	-56.7826	-52.7317	-45.7862	-36.6815	-23.8084	-18.2332	(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	-8.7982	-18.9601	-38.7193	-59.7705	-80.5932	-81.5733	-80.4083	-67.1327	-48.0916	-27.4260	-11.8374	-6.9151	(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	522.1037	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2674.7834	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)		
mechanical ventilation fans (SFP = 0.0833)	14.6746	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	100.6746	(231)
Electricity for lighting (calculated in Appendix L)	219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1036.3436	(233)

Wind generation	0.0000	(234)
Hydro-electric generation (Appendix N)	0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)	0.0000	(235)
Appendix Q - special features		
Energy saved or generated	-0.0000	(236)
Energy used	0.0000	(237)
Total delivered energy for all uses	2480.6110	(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	522.1037	0.2100	109.6418	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2674.7834	0.2100	561.7045	(264)
Space and water heating			671.3463	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-506.1179	0.1337	-67.6917	
PV Unit electricity exported	-530.2257	0.1252	-66.3695	
Total			-134.0612	(269)
Total CO2, kg/year			582.9151	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.2800	(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	522.1037	1.1300	589.9772	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2674.7834	1.1300	3022.5052	(278)
Space and water heating			3612.4824	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-506.1179	1.4943	-756.2711	
PV Unit electricity exported	-530.2257	0.4594	-243.6030	
Total			-999.8740	(283)
Total Primary energy kWh/year			3101.4211	(286)
Dwelling Primary energy Rate (DPER)			49.3900	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300	
E3 Sill	4.6000	0.0500	0.2300	
E4 Jamb	10.8000	0.0500	0.5400	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	17.8000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 1.2760 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 19.9493 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	48.0060	47.8420	47.6812	46.9260	46.7847	46.1270	46.1270	46.0052	46.3804	46.7847	47.0706	47.3694	(39)

Average = Sum(39)m / 12 = 46.9254

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7644	0.7618	0.7593	0.7472	0.7450	0.7345	0.7345	0.7326	0.7385	0.7450	0.7495	0.7543	(40)
HLP (average)												0.7472	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
									Total per year (kWh/year) = Sum(64)m =			2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	75.7283	75.9880	76.2442	77.4712	77.7052	78.8132	78.8132	79.0218	78.3827	77.7052	77.2333	76.7461	
alpha	6.0486	6.0659	6.0829	6.1647	6.1803	6.2542	6.2542	6.2681	6.2255	6.1803	6.1489	6.1164	
util living area	0.9641	0.9248	0.8702	0.7657	0.6257	0.4521	0.3224	0.3397	0.5070	0.7621	0.9223	0.9706	(86)
MIT	20.4295	20.6179	20.7734	20.9131	20.9776	20.9975	20.9997	20.9997	20.9948	20.9278	20.6868	20.3965	(87)
Th 2	20.2843	20.2865	20.2888	20.2993	20.3013	20.3105	20.3105	20.3122	20.3069	20.3013	20.2973	20.2931	(88)
util rest of house	0.9566	0.9111	0.8487	0.7330	0.5831	0.4041	0.2720	0.2890	0.4575	0.7238	0.9060	0.9644	(89)
MIT 2	19.6351	19.8660	20.0514	20.2165	20.2830	20.3089	20.3104	20.3120	20.3035	20.2360	19.9617	19.6017	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.9589	20.1725	20.3457	20.5004	20.5661	20.5896	20.5914	20.5923	20.5853	20.5180	20.2573	19.9257	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9589	20.1725	20.3457	20.5004	20.5661	20.5896	20.5914	20.5923	20.5853	20.5180	20.2573	19.9257	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9527	0.9087	0.8505	0.7427	0.5995	0.4236	0.2925	0.3097	0.4775	0.7360	0.9050	0.9606	(94)
Useful gains	528.6059	581.4146	572.2781	511.5104	406.8805	275.5309	184.0506	192.7826	299.1597	437.5056	498.7637	508.9196	(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	751.7238	730.6674	660.1792	544.3629	414.8003	276.2835	184.1105	192.8686	300.7913	464.0129	619.3208	744.9162	(97)
Space heating kWh	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98a)
Space heating requirement - total per year (kWh/year)												643.3463	
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	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												643.3463	
Space heating per m2											(98c) / (4) =	10.2444	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	165.9997	100.2979	65.3984	23.6538	5.8924	0.0000	0.0000	0.0000	0.0000	19.7215	86.8012	175.5814	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	179.6533	108.5475	70.7775	25.5994	6.3770	0.0000	0.0000	0.0000	0.0000	21.3436	93.9407	190.0232	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	83.8438	83.0835	82.2490	81.2191	80.5554	80.3000	80.3000	80.3000	80.3000	81.0706	82.8026	83.9825	(217)
Fuel for water heating, kWh/month	255.1575	227.8582	245.0933	219.8336	215.9013	196.3236	194.6221	201.8548	203.4036	223.2554	230.7070	252.1800	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	696.2622	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2666.1904	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2579.5758	(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	696.2622	0.2100	146.2151	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2666.1904	0.2100	559.9000	(264)
Space and water heating			706.1150	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			607.8991	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.6800	(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	696.2622	1.1300	786.7763	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2666.1904	1.1300	3012.7951	(278)
Space and water heating			3799.5715	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3187.7759	(286)
Target Primary Energy Rate (TPER)			50.7600	(287)

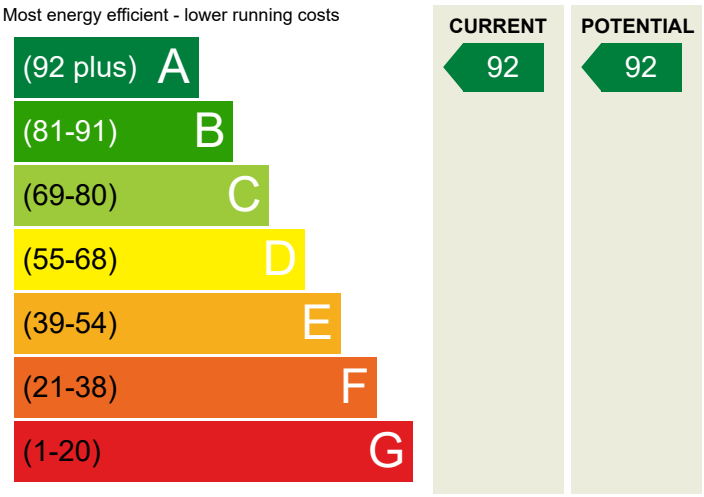
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-2B3P Apartment (1F)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	63

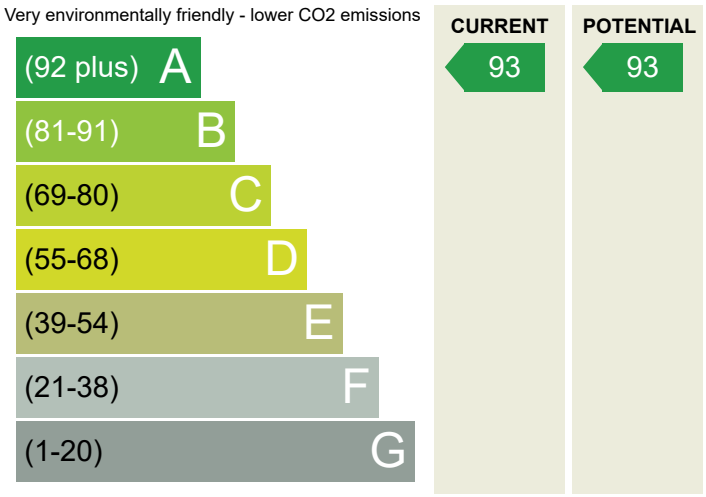
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

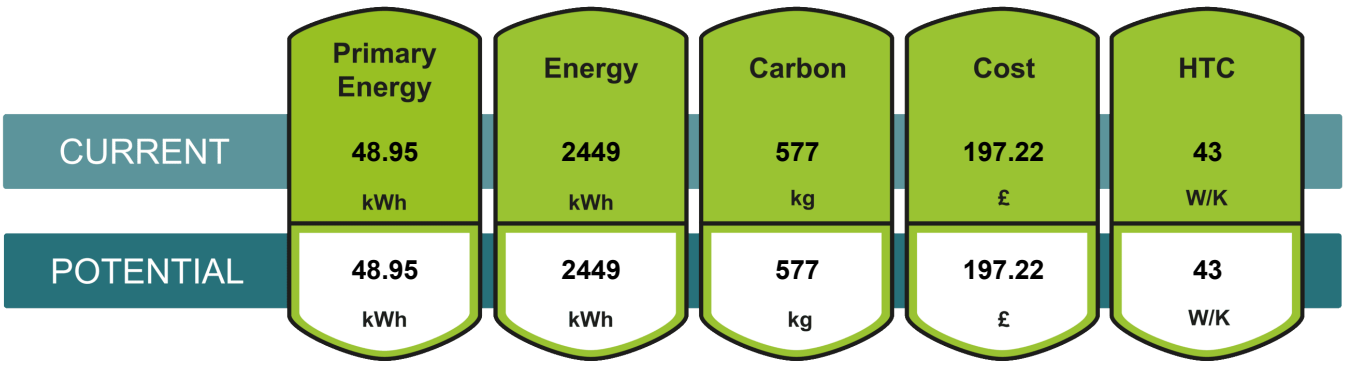
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£57	£57	
Heating	£153	£153	
Hot Water	£150	£150	
New Technologies e.g. Impact of PV	-(£163)	-(£163)	
TOTAL	£197	£197	

Estimated energy use and potential savings

Space Heating
498
kWh per year

Water Heating
2675
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.77	**TER**	10.03
Environmental	93 A	**% DER < TER**			2.59
CO_2 Emissions (t/year)	0.61	**DFEE**	16.11	**TFEE**	16.96
Compliance Check	See BREL	**% DFEE < TFEE**			4.96
% DPER < TPER	0.98	**DPER**	52.14	**TPER**	52.66

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	3	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	62.80 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	25.60	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	21.40	13.20	0.00	None	8.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	33.50	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	106.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	62.80	62.80	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

elmhurst energy

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor	Lowest occupied	Concrete floor slab, carpeted	100.00	62.80

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Window	External Wall	South	8.20	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	4.60	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	4.60	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	10.80	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	0.00	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	8.90	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.90	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	0.00	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	13.90	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

28.1 Showers

Summary for Input Data

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
1.10	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.77	**TER**	10.03
Environmental	93 A	**% DER < TER**			2.59
CO_2 Emissions (t/year)	0.61	**DFEE**	16.11	**TFEE**	16.96
Compliance Check	See BREL	**% DFEE < TFEE**			4.96
% DPER < TPER	0.98	**DPER**	52.14	**TPER**	52.66

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross (m2)	Openings (m2)	NetArea (m2)	U-value (W/m2K)	A x U (W/K)	K-value (kJ/m2K)	A x K (kJ/K)	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089	
E10 Eaves (insulation at ceiling level)	8.9000	0.0580	0.5162	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1010	1.4039	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.6032 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 21.5243 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	(39)

Average = Sum(39)m / 12 = 45.3569

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	(40)
HLP (average)												0.7222	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 130.4945 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)
Energy content (annual)										Total = Sum(45)m =		2167.5261	
Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
										Total per year (kWh/year) = Sum(64)m =		2341.4213	(64)
12Total per year (kWh/year)												2341	(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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(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	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	
alpha	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	
util living area													
	0.9575	0.9122	0.8521	0.7491	0.6099	0.4458	0.3182	0.3359	0.4973	0.7472	0.9135	0.9664	(86)
MIT	20.5188	20.6897	20.8225	20.9300	20.9826	20.9979	20.9998	20.9997	20.9958	20.9407	20.7293	20.4670	(87)
Th 2	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	(88)
util rest of house													
	0.9491	0.8973	0.8297	0.7167	0.5689	0.3992	0.2692	0.2864	0.4496	0.7093	0.8963	0.9595	(89)
MIT 2	19.8964	20.0568	20.1774	20.2695	20.3102	20.3202	20.3212	20.3211	20.3191	20.2797	20.0964	19.8468	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	20.1501	20.3148	20.4404	20.5388	20.5843	20.5965	20.5978	20.5977	20.5949	20.5491	20.3544	20.0996	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1501	20.3148	20.4404	20.5388	20.5843	20.5965	20.5978	20.5977	20.5949	20.5491	20.3544	20.0996	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9467	0.8972	0.8338	0.7273	0.5850	0.4182	0.2892	0.3066	0.4690	0.7224	0.8972	0.9570	(94)
Useful gains	528.5846	576.8905	563.0702	501.4212	396.8183	271.3446	181.2785	190.3233	293.2698	429.4655	496.0546	510.1044	(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													
	718.9107	699.1672	632.2908	527.8978	402.9626	271.9811	181.3278	190.3966	294.5899	451.2606	601.1781	721.1555	(97)
Space heating kWh													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98a)
Space heating requirement - total per year (kWh/year)												547.8338	
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													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												547.8338	
Space heating per m2											(98c) / (4) =	8.7235	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	159.1040	92.3258	57.8653	21.4193	5.1364	0.0000	0.0000	0.0000	0.0000	18.2197	85.0438	176.4293	(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													
	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.9238	87.7693	87.6140	87.4509	87.3406	87.3000	87.3000	87.3000	87.3000	87.4299	87.7457	87.9706	(217)
Fuel for water heating, kWh/month													
	272.5295	240.8318	254.4744	219.4409	209.8494	185.7324	180.6548	189.6640	193.8035	219.9341	238.1167	268.7672	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.7783	-29.1856	-43.9367	-51.7713	-57.8322	-54.7304	-54.0863	-50.0947	-43.3019	-34.4511	-22.2108	-16.9491	(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	-7.7693	-16.7834	-34.3537	-53.1533	-71.7933	-72.7121	-71.6720	-59.7810	-42.7528	-24.3141	-10.4645	-6.1035	(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												615.5436	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2673.7986	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												14.6746	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												100.6746	(231)
Electricity for lighting (calculated in Appendix L)												219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-949.9817	(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	2659.4281	(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	615.5436	0.2100	129.2641	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2673.7986	0.2100	561.4977	(264)
Space and water heating			690.7619	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	0.1336	-63.9196	
PV Unit electricity exported	-471.6531	0.1251	-59.0073	
Total			-122.9269	(269)
Total CO2, kg/year			613.4649	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.7700	(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	615.5436	1.1300	695.5642	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2673.7986	1.1300	3021.3925	(278)
Space and water heating			3716.9567	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	1.4938	-714.5388	
PV Unit electricity exported	-471.6531	0.4592	-216.5793	
Total			-931.1181	(283)
Total Primary energy kWh/year			3274.6514	(286)
Dwelling Primary energy Rate (DPER)			52.1400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000	(1b) x	2.3000	(2b) =	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300	
E3 Sill	4.6000	0.0500	0.2300	
E4 Jamb	10.8000	0.0500	0.5400	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.9000	0.0600	0.5340	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1200	1.6680	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.4780 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 22.1513 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	50.2080	50.0440	49.8832	49.1280	48.9867	48.3290	48.3290	48.2072	48.5824	48.9867	49.2726	49.5714	(39)

Average = Sum(39)m / 12 = 49.1274

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7995	0.7969	0.7943	0.7823	0.7800	0.7696	0.7696	0.7676	0.7736	0.7800	0.7846	0.7894	(40)
HLP (average)												0.7823	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
										Total per year (kWh/year) = Sum(64)m =		2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	72.4071	72.6444	72.8786	73.9988	74.2122	75.2222	75.2222	75.4123	74.8300	74.2122	73.7817	73.3370	
alpha	5.8271	5.8430	5.8586	5.9333	5.9475	6.0148	6.0148	6.0275	5.9887	5.9475	5.9188	5.8891	
util living area	0.9676	0.9325	0.8832	0.7860	0.6492	0.4727	0.3377	0.3558	0.5291	0.7826	0.9306	0.9735	(86)
MIT	20.3601	20.5563	20.7259	20.8869	20.9682	20.9960	20.9996	20.9994	20.9920	20.9057	20.6338	20.3258	(87)
Th 2	20.2538	20.2560	20.2583	20.2687	20.2707	20.2798	20.2798	20.2815	20.2763	20.2707	20.2667	20.2626	(88)
util rest of house	0.9606	0.9197	0.8625	0.7532	0.6045	0.4207	0.2826	0.3004	0.4759	0.7441	0.9153	0.9677	(89)
MIT 2	19.5242	19.7656	19.9695	20.1601	20.2446	20.2774	20.2796	20.2812	20.2710	20.1847	19.8725	19.4888	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	19.8649	20.0879	20.2778	20.4563	20.5396	20.5703	20.5731	20.5740	20.5649	20.4786	20.1828	19.8300	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8649	20.0879	20.2778	20.4563	20.5396	20.5703	20.5731	20.5740	20.5649	20.4786	20.1828	19.8300	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9564	0.9164	0.8631	0.7620	0.6213	0.4418	0.3050	0.3230	0.4973	0.7556	0.9133	0.9636	(94)
Useful gains	530.6401	586.3727	580.7440	524.7857	421.7003	287.3260	191.9096	201.0652	311.5554	449.1018	503.3466	510.5323	(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	781.4845	760.0648	687.2831	567.7405	433.0213	288.5392	192.0156	201.2158	314.0821	483.9206	644.6248	774.8023	(97)
Space heating kWh	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98a)
Space heating requirement - total per year (kWh/year)												746.2071	
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	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												746.2071	
Space heating per m2										(98c) / (4) =		11.8823	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	201.9787	126.3215	85.7847	33.4713	9.1156	0.0000	0.0000	0.0000	0.0000	28.0359	110.0870	212.7888	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.0901	83.3762	82.5539	81.4635	80.6604	80.3000	80.3000	80.3000	80.3000	81.2845	83.0930	84.2224	(217)
Fuel for water heating, kWh/month	254.4101	227.0582	244.1879	219.1740	215.6201	196.3236	194.6221	201.8548	203.4036	222.6678	229.9006	251.4616	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	807.5835	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2660.6844	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2685.3911	(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	807.5835	0.2100	169.5925	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2660.6844	0.2100	558.7437	(264)
Space and water heating			728.3362	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			630.1203	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0300	(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	807.5835	1.1300	912.5693	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2660.6844	1.1300	3006.5733	(278)
Space and water heating			3919.1426	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3307.3471	(286)
Target Primary Energy Rate (TPER)			52.6600	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.77	**TER**	10.03
Environmental	93 A	**% DER < TER**			2.59
CO_2 Emissions (t/year)	0.61	**DFEE**	16.11	**TFEE**	16.96
Compliance Check	See BREL	**% DFEE < TFEE**			4.96
% DPER < TPER	0.98	**DPER**	52.14	**TPER**	52.66

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3635	(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) =	0.3089	(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	0.3939	0.3862	0.3785	0.3398	0.3321	0.2935	0.2935	0.2858	0.3089	0.3321	0.3476	0.3630	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5776	0.5746	0.5716	0.5577	0.5552	0.5431	0.5431	0.5408	0.5477	0.5552	0.5604	0.5659	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966
E4 Jamb	10.8000	0.0160	0.1728
E5 Ground floor (normal)	0.0000	0.0740	0.0000

E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089		
E10 Eaves (insulation at ceiling level)	8.9000	0.0580	0.5162		
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000		
E16 Corner (normal)	0.0000	0.0470	0.0000		
E18 Party wall between dwellings	4.6000	0.0380	0.1748		
P1 Party wall - Ground floor	0.0000	0.1080	0.0000		
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1010	1.4039		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				2.6032	(36)
Point Thermal bridges			(36a) =	0.0000	
Total fabric heat loss			(33) + (36) + (36a) =	21.5243	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	27.5305	27.3869	27.2462	26.5851	26.4614	25.8856	25.8856	25.7789	26.1074	26.4614	26.7116	26.9732	(38)
Heat transfer coeff	49.0548	48.9112	48.7704	48.1093	47.9857	47.4099	47.4099	47.3032	47.6316	47.9857	48.2359	48.4975	(39)
Average = Sum(39)m / 12 =												48.1088	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7811	0.7788	0.7766	0.7661	0.7641	0.7549	0.7549	0.7532	0.7585	0.7641	0.7681	0.7723	(40)
HLP (average)												0.7661	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0596	(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	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)
Average daily hot water use (litres/day)												56.0140	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)
Energy content (annual)										Total = Sum(45)m =		930.2736	
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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)
										Total per year (kWh/year) = Sum(64)m =		790.7326	(64)
12Total per year (kWh/year)												791	(64)
Electric shower(s)	47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		535.1993	(64a)
Heat gains from water heating, kWh/month	32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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	74.1093	74.3269	74.5414	75.5657	75.7605	76.6806	76.6806	76.8535	76.3236	75.7605	75.3675	74.9609	
alpha	5.9406	5.9551	5.9694	6.0377	6.0507	6.1120	6.1120	6.1236	6.0882	6.0507	6.0245	5.9974	
util living area	0.9799	0.9518	0.9090	0.8166	0.6798	0.4947	0.3530	0.3733	0.5554	0.8182	0.9521	0.9842	(86)
MIT	20.2846	20.4970	20.6840	20.8674	20.9623	20.9954	20.9995	20.9993	20.9905	20.8855	20.5753	20.2464	(87)
Th 2	20.2697	20.2717	20.2737	20.2828	20.2846	20.2926	20.2926	20.2940	20.2895	20.2846	20.2811	20.2774	(88)
util rest of house	0.9753	0.9419	0.8914	0.7858	0.6352	0.4415	0.2964	0.3163	0.5010	0.7822	0.9406	0.9805	(89)
MIT 2	19.6258	19.8324	20.0102	20.1821	20.2601	20.2903	20.2924	20.2938	20.2846	20.2016	19.9183	19.5949	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.8944	20.1033	20.2849	20.4615	20.5463	20.5777	20.5806	20.5814	20.5723	20.4804	20.1861	19.8605	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8944	20.1033	20.2849	20.4615	20.5463	20.5777	20.5806	20.5814	20.5723	20.4804	20.1861	19.8605	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9725	0.9393	0.8917	0.7938	0.6518	0.4630	0.3195	0.3396	0.5229	0.7925	0.9388	0.9780	(94)
Useful gains	479.7531	544.2644	548.3964	505.6155	411.0092	281.9842	188.6012	197.6172	305.2746	431.5628	465.1381	458.7916	(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	764.9780	743.6137	672.2957	556.2155	424.4967	283.4030	188.7218	197.7934	308.2884	474.1166	631.2188	759.4938	(97)
Space heating kWh	212.2073	133.9628	92.1811	36.4319	10.0347	0.0000	0.0000	0.0000	0.0000	31.6600	119.5781	223.7224	(98a)
Space heating requirement - total per year (kWh/year)												859.7783	
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	212.2073	133.9628	92.1811	36.4319	10.0347	0.0000	0.0000	0.0000	0.0000	31.6600	119.5781	223.7224	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												859.7783	
Space heating per m2											(98c) / (4) =	13.6907	(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	445.6526	350.8329	359.5045	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9705	0.9892	0.9871	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	432.5133	347.0466	354.8793	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	170.3889	225.0526	213.3934	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	42.5972	56.2632	53.3484	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												152.2088	(107)
Energy for space heating												13.6907	(99)
Energy for space cooling												2.4237	(108)
Total												16.1144	(109)
Fabric Energy Efficiency (DFEE)												16.1	(109)

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

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		62.8000	(1b)	x 2.3000	(2b) =	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)

Infiltration rate 0.3885 (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) = 0.3302 (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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(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	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0500	0.2300
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	0.0000	0.1600	0.0000
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.9000	0.0600	0.5340
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	0.0000	0.0800	0.0000
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1200	1.6680

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.4780 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 22.1513 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	50.2080	50.0440	49.8832	49.1280	48.9867	48.3290	48.3290	48.2072	48.5824	48.9867	49.2726	49.5714	(39)

Average = Sum(39)m / 12 = 49.1274

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7995	0.7969	0.7943	0.7823	0.7800	0.7696	0.7696	0.7676	0.7736	0.7800	0.7846	0.7894	(40)
HLP (average)												0.7823	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (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

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 56.0140 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)

Energy content (annual) Total = Sum(45)m = 930.2736
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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)

Total per year (kWh/year) = Sum(64)m = 790.7326 (64)
12Total per year (kWh/year) 791 (64)
Electric shower(s)

47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 535.1993 (64a)
Heat gains from water heating, kWh/month

32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains													
	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.4071	72.6444	72.8786	73.9988	74.2122	75.2222	75.2222	75.4123	74.8300	74.2122	73.7817	73.3370	
alpha	5.8271	5.8430	5.8586	5.9333	5.9475	6.0148	6.0148	6.0275	5.9887	5.9475	5.9188	5.8891	
util living area													
	0.9808	0.9543	0.9138	0.8246	0.6901	0.5036	0.3597	0.3804	0.5652	0.8261	0.9545	0.9848	(86)
MIT	20.2477	20.4634	20.6573	20.8526	20.9565	20.9944	20.9994	20.9991	20.9888	20.8729	20.5487	20.2116	(87)
Th 2	20.2538	20.2560	20.2583	20.2687	20.2707	20.2798	20.2798	20.2815	20.2763	20.2707	20.2667	20.2626	(88)
util rest of house													
	0.9763	0.9447	0.8967	0.7941	0.6448	0.4487	0.3011	0.3213	0.5093	0.7903	0.9433	0.9813	(89)
MIT 2	19.5763	19.7868	19.9718	20.1564	20.2424	20.2771	20.2796	20.2812	20.2704	20.1782	19.8805	19.5483	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	19.8500	20.0626	20.2512	20.4402	20.5335	20.5695	20.5730	20.5738	20.5633	20.4614	20.1529	19.8187	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8500	20.0626	20.2512	20.4402	20.5335	20.5695	20.5730	20.5738	20.5633	20.4614	20.1529	19.8187	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9735	0.9419	0.8965	0.8016	0.6615	0.4709	0.3250	0.3454	0.5317	0.8002	0.9413	0.9787	(94)
Useful gains	480.2503	545.7781	551.3284	510.5613	417.1155	286.7943	191.8605	200.9910	310.4168	435.7264	466.3703	459.1321	(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													
	780.7335	758.7976	685.9557	566.9459	432.7227	288.5008	192.0114	201.2095	314.0007	483.0782	643.1506	774.2404	(97)
Space heating kWh													
	223.5595	143.1491	100.1627	40.5969	11.6118	0.0000	0.0000	0.0000	0.0000	35.2297	127.2818	234.4406	(98a)
Space heating requirement - total per year (kWh/year)												916.0322	
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													
	223.5595	143.1491	100.1627	40.5969	11.6118	0.0000	0.0000	0.0000	0.0000	35.2297	127.2818	234.4406	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												916.0322	
Space heating per m2											(98c) / (4) =	14.5865	(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	454.2927	357.6347	366.3748	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9665	0.9874	0.9851	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	439.0872	353.1276	360.9065	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	165.6557	220.5284	208.9092	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	41.4139	55.1321	52.2273	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												148.7733	(107)
Energy for space heating												14.5865	(99)
Energy for space cooling												2.3690	(108)
Total												16.9555	(109)
Fabric Energy Efficiency (TFEE)												17.0	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (2F)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	92 A	**DER**	9.77	**TER**	10.03
Environmental	93 A	**% DER < TER**			2.59
CO_2 Emissions (t/year)	0.61	**DFEE**	16.11	**TFEE**	16.96
Compliance Check	See BREL	**% DFEE < TFEE**			4.96
% DPER < TPER	0.98	**DPER**	52.14	**TPER**	52.66

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross (m2)	Openings (m2)	NetArea (m2)	U-value (W/m2K)	A x U (W/K)	K-value (kJ/m2K)	A x K (kJ/K)	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
External Roof	62.8000		62.8000	0.1000	6.2800	9.0000	565.2000	(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.9211			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Floor			62.8000			80.0000	5024.0000	(32d)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 13087.4999	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	208.3997	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	0.0000	0.0740	0.0000	
E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089	
E10 Eaves (insulation at ceiling level)	8.9000	0.0580	0.5162	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	0.0000	0.1080	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1010	1.4039	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 2.6032 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 21.5243 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	45.3569	(39)

Average = Sum(39)m / 12 = 45.3569

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	0.7222	(40)
HLP (average)												0.7222	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 130.4945 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)
Energy content (annual)										Total = Sum(45)m =		2167.5261	
Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
										Total per year (kWh/year) = Sum(64)m =		2341.4213	(64)
12Total per year (kWh/year)												2341	(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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(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	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	80.1514	
alpha	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	6.3434	
util living area													
	0.9575	0.9122	0.8521	0.7491	0.6099	0.4458	0.3182	0.3359	0.4973	0.7472	0.9135	0.9664	(86)
MIT	20.5188	20.6897	20.8225	20.9300	20.9826	20.9979	20.9998	20.9997	20.9958	20.9407	20.7293	20.4670	(87)
Th 2	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	20.3212	(88)
util rest of house													
	0.9491	0.8973	0.8297	0.7167	0.5689	0.3992	0.2692	0.2864	0.4496	0.7093	0.8963	0.9595	(89)
MIT 2	19.8964	20.0568	20.1774	20.2695	20.3102	20.3202	20.3212	20.3211	20.3191	20.2797	20.0964	19.8468	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	20.1501	20.3148	20.4404	20.5388	20.5843	20.5965	20.5978	20.5977	20.5949	20.5491	20.3544	20.0996	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1501	20.3148	20.4404	20.5388	20.5843	20.5965	20.5978	20.5977	20.5949	20.5491	20.3544	20.0996	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9467	0.8972	0.8338	0.7273	0.5850	0.4182	0.2892	0.3066	0.4690	0.7224	0.8972	0.9570	(94)
Useful gains	528.5846	576.8905	563.0702	501.4212	396.8183	271.3446	181.2785	190.3233	293.2698	429.4655	496.0546	510.1044	(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													
	718.9107	699.1672	632.2908	527.8978	402.9626	271.9811	181.3278	190.3966	294.5899	451.2606	601.1781	721.1555	(97)
Space heating kWh													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98a)
Space heating requirement - total per year (kWh/year)												547.8338	
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													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												547.8338	
Space heating per m2											(98c) / (4) =	8.7235	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	141.6026	82.1700	51.5001	19.0632	4.5714	0.0000	0.0000	0.0000	0.0000	16.2156	75.6889	157.0221	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	159.1040	92.3258	57.8653	21.4193	5.1364	0.0000	0.0000	0.0000	0.0000	18.2197	85.0438	176.4293	(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													
	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	87.9238	87.7693	87.6140	87.4509	87.3406	87.3000	87.3000	87.3000	87.3000	87.4299	87.7457	87.9706	(217)
Fuel for water heating, kWh/month													
	272.5295	240.8318	254.4744	219.4409	209.8494	185.7324	180.6548	189.6640	193.8035	219.9341	238.1167	268.7672	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.7783	-29.1856	-43.9367	-51.7713	-57.8322	-54.7304	-54.0863	-50.0947	-43.3019	-34.4511	-22.2108	-16.9491	(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	-7.7693	-16.7834	-34.3537	-53.1533	-71.7933	-72.7121	-71.6720	-59.7810	-42.7528	-24.3141	-10.4645	-6.1035	(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												615.5436	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2673.7986	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)													
mechanical ventilation fans (SFP = 0.0833)												14.6746	(230a)
central heating pump												41.0000	(230c)
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												100.6746	(231)
Electricity for lighting (calculated in Appendix L)												219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-949.9817	(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	2659.4281	(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	615.5436	0.2100	129.2641	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2673.7986	0.2100	561.4977	(264)
Space and water heating			690.7619	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	0.1336	-63.9196	
PV Unit electricity exported	-471.6531	0.1251	-59.0073	
Total			-122.9269	(269)
Total CO2, kg/year			613.4649	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.7700	(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	615.5436	1.1300	695.5642	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2673.7986	1.1300	3021.3925	(278)
Space and water heating			3716.9567	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	1.4938	-714.5388	
PV Unit electricity exported	-471.6531	0.4592	-216.5793	
Total			-931.1181	(283)
Total Primary energy kWh/year			3274.6514	(286)
Dwelling Primary energy Rate (DPER)			52.1400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000	(1b) x	2.3000	(2b) =	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
External Roof	62.8000		62.8000	0.1100	6.9080			(30)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		18.6733			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 208.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300	
E3 Sill	4.6000	0.0500	0.2300	
E4 Jamb	10.8000	0.0500	0.5400	
E5 Ground floor (normal)	0.0000	0.1600	0.0000	
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.9000	0.0600	0.5340	
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000	
E16 Corner (normal)	0.0000	0.0900	0.0000	
E18 Party wall between dwellings	4.6000	0.0600	0.2760	
P1 Party wall - Ground floor	0.0000	0.0800	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	13.9000	0.1200	1.6680	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.4780 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 22.1513 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	50.2080	50.0440	49.8832	49.1280	48.9867	48.3290	48.3290	48.2072	48.5824	48.9867	49.2726	49.5714	(39)

Average = Sum(39)m / 12 = 49.1274

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7995	0.7969	0.7943	0.7823	0.7800	0.7696	0.7696	0.7676	0.7736	0.7800	0.7846	0.7894	(40)
HLP (average)												0.7823	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
										Total per year (kWh/year) = Sum(64)m =		2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	72.4071	72.6444	72.8786	73.9988	74.2122	75.2222	75.2222	75.4123	74.8300	74.2122	73.7817	73.3370	
alpha	5.8271	5.8430	5.8586	5.9333	5.9475	6.0148	6.0148	6.0275	5.9887	5.9475	5.9188	5.8891	
util living area	0.9676	0.9325	0.8832	0.7860	0.6492	0.4727	0.3377	0.3558	0.5291	0.7826	0.9306	0.9735	(86)
MIT	20.3601	20.5563	20.7259	20.8869	20.9682	20.9960	20.9996	20.9994	20.9920	20.9057	20.6338	20.3258	(87)
Th 2	20.2538	20.2560	20.2583	20.2687	20.2707	20.2798	20.2798	20.2815	20.2763	20.2707	20.2667	20.2626	(88)
util rest of house	0.9606	0.9197	0.8625	0.7532	0.6045	0.4207	0.2826	0.3004	0.4759	0.7441	0.9153	0.9677	(89)
MIT 2	19.5242	19.7656	19.9695	20.1601	20.2446	20.2774	20.2796	20.2812	20.2710	20.1847	19.8725	19.4888	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	19.8649	20.0879	20.2778	20.4563	20.5396	20.5703	20.5731	20.5740	20.5649	20.4786	20.1828	19.8300	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8649	20.0879	20.2778	20.4563	20.5396	20.5703	20.5731	20.5740	20.5649	20.4786	20.1828	19.8300	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9564	0.9164	0.8631	0.7620	0.6213	0.4418	0.3050	0.3230	0.4973	0.7556	0.9133	0.9636	(94)
Useful gains	530.6401	586.3727	580.7440	524.7857	421.7003	287.3260	191.9096	201.0652	311.5554	449.1018	503.3466	510.5323	(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	781.4845	760.0648	687.2831	567.7405	433.0213	288.5392	192.0156	201.2158	314.0821	483.9206	644.6248	774.8023	(97)
Space heating kWh	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98a)
Space heating requirement - total per year (kWh/year)												746.2071	
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	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												746.2071	
Space heating per m2										(98c) / (4) =		11.8823	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	186.6283	116.7211	79.2650	30.9275	8.4228	0.0000	0.0000	0.0000	0.0000	25.9052	101.7203	196.6169	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	201.9787	126.3215	85.7847	33.4713	9.1156	0.0000	0.0000	0.0000	0.0000	28.0359	110.0870	212.7888	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.0901	83.3762	82.5539	81.4635	80.6604	80.3000	80.3000	80.3000	80.3000	81.2845	83.0930	84.2224	(217)
Fuel for water heating, kWh/month	254.4101	227.0582	244.1879	219.1740	215.6201	196.3236	194.6221	201.8548	203.4036	222.6678	229.9006	251.4616	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	807.5835	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2660.6844	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2685.3911	(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	807.5835	0.2100	169.5925	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2660.6844	0.2100	558.7437	(264)
Space and water heating			728.3362	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			630.1203	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0300	(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	807.5835	1.1300	912.5693	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2660.6844	1.1300	3006.5733	(278)
Space and water heating			3919.1426	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3307.3471	(286)
Target Primary Energy Rate (TPER)			52.6600	(287)

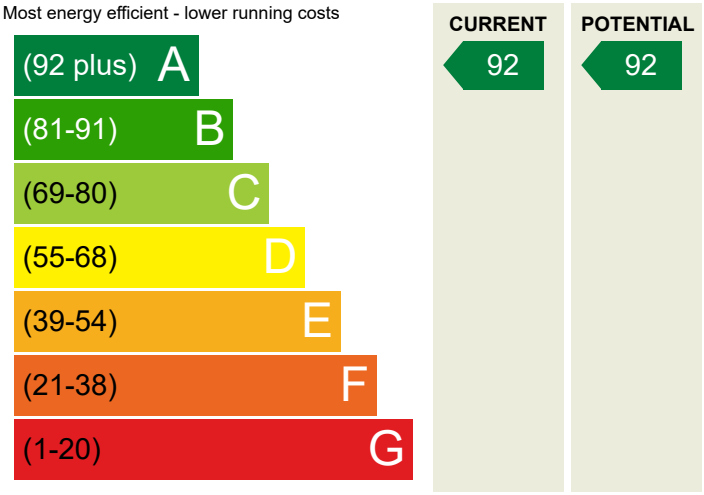
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-2B3P Apartment (2F)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	63

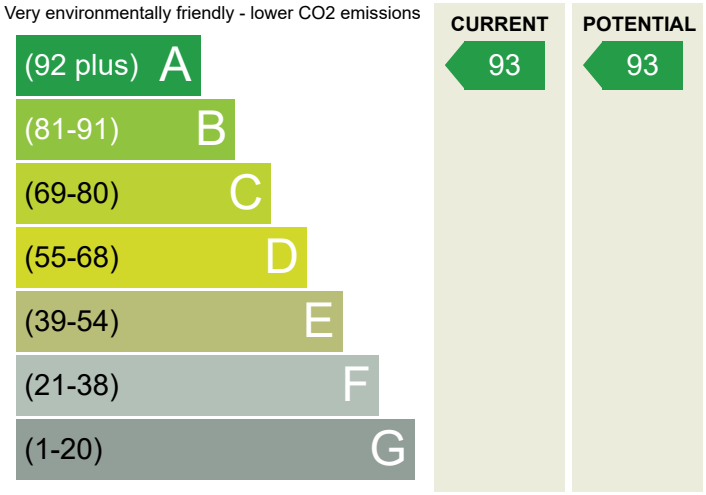
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

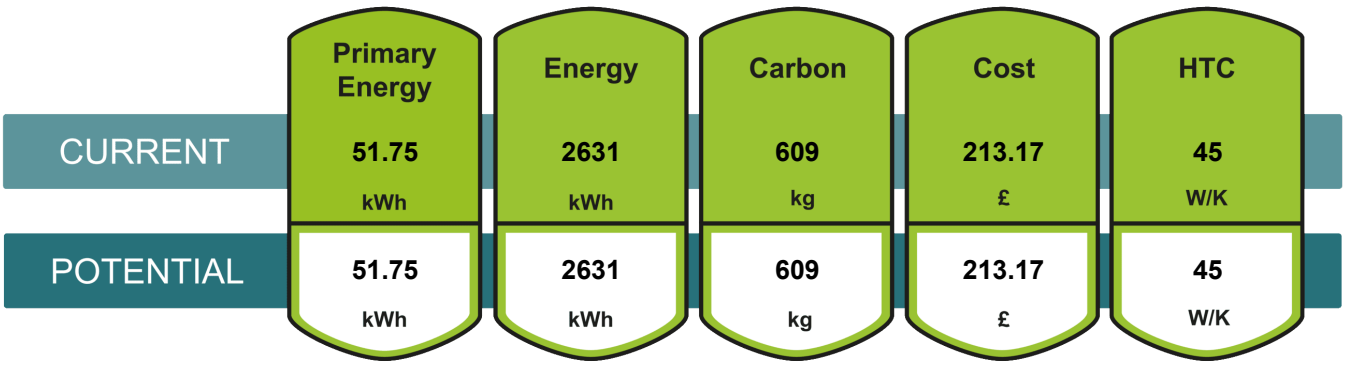
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£57	£57	
Heating	£159	£159	
Hot Water	£150	£150	
New Technologies e.g. Impact of PV	-(£152)	-(£152)	
TOTAL	£213	£213	

Estimated energy use and potential savings

Space Heating
594
kWh per year

Water Heating
2674
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.33	**TER**	10.13
Environmental	92 A	**% DER < TER**			-1.97
CO_2 Emissions (t/year)	0.65	**DFEE**	19.07	**TFEE**	17.50
Compliance Check	See BREL	**% DFEE < TFEE**			-8.95
% DPER < TPER	-3.73	**DPER**	55.14	**TPER**	53.16

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	South	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2025	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	274.40	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	62.80 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	25.60	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	21.40	13.20	0.00	None	8.20	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	33.50	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Partitions	Plasterboard on timber frame	9.00	106.70

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling	Concrete floor slab, carpeted	100.00	62.80

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	62.80

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Window	External Wall	South	8.20	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging — Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	4.60	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	4.60	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	10.80	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	8.90	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	8.90	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	4.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	13.90	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.10	0.10	RCDs	No

Y-value: 0.03 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	3
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	0
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

elmhurst energy

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

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

Summary for Input Data

elmhurst energy

Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
1.10	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

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

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.33	**TER**	10.13
Environmental	92 A	**% DER < TER**			-1.97
CO_2 Emissions (t/year)	0.65	**DFEE**	19.07	**TFEE**	17.50
Compliance Check	See BREL	**% DFEE < TFEE**			-8.95
% DPER < TPER	-3.73	**DPER**	55.14	**TPER**	53.16

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000	(1b)	x 2.3000	(2b) =	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	144.4400	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
Ground Floor			62.8000	0.1700	10.6760	75.0000	4710.0000	(28a)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.3171			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Ceiling			62.8000			100.0000	6280.0000	(32b)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18488.2999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		294.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	8.9000	0.0740	0.6586	
E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	13.9000	0.1080	1.5012	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				2.8429 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	26.1600 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	(39)
Average = Sum(39)m / 12 =												49.9926	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	(40)
HLP (average)												0.7961	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0596	(42)
Hot water usage for mixer showers	80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)
Average daily hot water use (litres/day)												130.4945	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)
Energy content (annual)										Total = Sum(45)m =		2167.5261	
Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
										Total per year (kWh/year) = Sum(64)m =		2341.4213	(64)
12Total per year (kWh/year)												2341	(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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(84)

---

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	
alpha	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	
util living area	0.9855	0.9600	0.9158	0.8212	0.6738	0.4921	0.3508	0.3704	0.5493	0.8194	0.9608	0.9895	(86)
MIT	20.5484	20.7024	20.8311	20.9385	20.9876	20.9990	20.9999	20.9999	20.9977	20.9480	20.7404	20.5043	(87)
Th 2	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	(88)
util rest of house	0.9810	0.9490	0.8949	0.7850	0.6242	0.4354	0.2916	0.3106	0.4912	0.7766	0.9480	0.9861	(89)
MIT 2	19.8601	20.0068	20.1244	20.2145	20.2499	20.2564	20.2567	20.2567	20.2558	20.2234	20.0448	19.8172	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	20.1407	20.2903	20.4125	20.5097	20.5506	20.5591	20.5597	20.5597	20.5582	20.5188	20.3284	20.0973	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1407	20.2903	20.4125	20.5097	20.5506	20.5591	20.5597	20.5597	20.5582	20.5188	20.3284	20.0973	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9801	0.9495	0.8996	0.7978	0.6441	0.4585	0.3157	0.3350	0.5149	0.7924	0.9494	0.9852	(94)
Useful gains	547.2142	610.5401	607.5158	549.9951	436.9627	297.5527	197.9396	207.9272	321.9893	471.0790	524.9399	525.1683	(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	791.9155	769.4032	695.5218	580.3969	442.4655	297.9108	197.9555	207.9531	322.8632	495.8640	661.3205	794.7458	(97)
Space heating kWh	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98a)
Space heating requirement - total per year (kWh/year)												697.4733	
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	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												697.4733	
Space heating per m2											(98c) / (4) =	11.1063	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	204.5593	119.9506	73.5690	24.5946	4.6002	0.0000	0.0000	0.0000	0.0000	20.7191	110.3304	225.3547	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.0259	87.8632	87.6802	87.4711	87.3365	87.3000	87.3000	87.3000	87.3000	87.4462	87.8364	88.0721	(217)
Fuel for water heating, kWh/month	272.2134	240.5744	254.2824	219.3904	209.8593	185.7324	180.6548	189.6640	193.8035	219.8932	237.8708	268.4575	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.7783	-29.1856	-43.9367	-51.7713	-57.8322	-54.7304	-54.0863	-50.0947	-43.3019	-34.4511	-22.2108	-16.9491	(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	-7.7693	-16.7834	-34.3537	-53.1533	-71.7933	-72.7121	-71.6720	-59.7810	-42.7528	-24.3141	-10.4645	-6.1035	(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	783.6779	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2672.3960	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)		
mechanical ventilation fans (SFP = 0.0833)	14.6746	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	100.6746	(231)
Electricity for lighting (calculated in Appendix L)	219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-949.9817	(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	2826.1597	(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	783.6779	0.2100	164.5724	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2672.3960	0.2100	561.2032	(264)
Space and water heating			725.7755	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	0.1336	-63.9196	
PV Unit electricity exported	-471.6531	0.1251	-59.0073	
Total			-122.9269	(269)
Total CO2, kg/year			648.4786	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.3300	(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	783.6779	1.1300	885.5560	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2672.3960	1.1300	3019.8074	(278)
Space and water heating			3905.3634	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	1.4938	-714.5388	
PV Unit electricity exported	-471.6531	0.4592	-216.5793	
Total			-931.1181	(283)
Total Primary energy kWh/year			3463.0581	(286)
Dwelling Primary energy Rate (DPER)			55.1400	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
Ground Floor			62.8000	0.1300	8.1640			(28a)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.9293			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0500	0.2300
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	8.9000	0.1600	1.4240
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	13.9000	0.0800	1.1120
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.8120 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 23.7413 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	51.7980	51.6340	51.4732	50.7180	50.5767	49.9190	49.9190	49.7972	50.1724	50.5767	50.8626	51.1614	(39)

Average = Sum(39)m / 12 = 50.7174

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8248	0.8222	0.8196	0.8076	0.8054	0.7949	0.7949	0.7929	0.7989	0.8054	0.8099	0.8147	(40)
HLP (average)												0.8076	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
										Total per year (kWh/year) = Sum(64)m =		2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	92.4118	92.7054	92.9950	94.3796	94.6433	95.8903	95.8903	96.1249	95.4061	94.6433	94.1114	93.5617	
alpha	7.1608	7.1804	7.1997	7.2920	7.3096	7.3927	7.3927	7.4083	7.3604	7.3096	7.2741	7.2374	
util living area	0.9847	0.9602	0.9185	0.8231	0.6777	0.4899	0.3490	0.3678	0.5494	0.8196	0.9587	0.9882	(86)
MIT	20.4656	20.6360	20.7846	20.9212	20.9825	20.9986	20.9999	20.9999	20.9967	20.9347	20.6997	20.4356	(87)
Th 2	20.2319	20.2341	20.2363	20.2467	20.2487	20.2578	20.2578	20.2594	20.2543	20.2487	20.2447	20.2406	(88)
util rest of house	0.9801	0.9496	0.8987	0.7877	0.6282	0.4337	0.2902	0.3087	0.4915	0.7779	0.9460	0.9847	(89)
MIT 2	19.6263	19.8377	20.0158	20.1756	20.2358	20.2570	20.2577	20.2594	20.2524	20.1933	19.9271	19.5961	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.9684	20.1631	20.3292	20.4795	20.5402	20.5593	20.5603	20.5612	20.5558	20.4955	20.2420	19.9383	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9684	20.1631	20.3292	20.4795	20.5402	20.5593	20.5603	20.5612	20.5558	20.4955	20.2420	19.9383	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9783	0.9485	0.9013	0.7991	0.6478	0.4566	0.3142	0.3328	0.5151	0.7922	0.9459	0.9829	(94)
Useful gains	542.7773	606.8924	606.4389	550.3729	439.6606	296.9854	197.6669	207.1782	322.6798	470.9019	521.3219	520.7510	(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	811.5947	788.0955	711.8336	587.2918	447.1096	297.4833	197.6930	207.2182	323.9027	500.4837	668.4380	805.1946	(97)
Space heating kWh	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98a)
Space heating requirement - total per year (kWh/year)												771.8645	
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	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												771.8645	
Space heating per m2											(98c) / (4) =	12.2908	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	216.4504	131.7841	84.8633	28.7680	5.9979	0.0000	0.0000	0.0000	0.0000	23.8191	114.6359	229.0325	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.2373	83.4604	82.5360	81.3194	80.5406	80.3000	80.3000	80.3000	80.3000	81.1511	83.1699	84.3798	(217)
Fuel for water heating, kWh/month	253.9655	226.8292	244.2409	219.5625	215.9409	196.3236	194.6221	201.8548	203.4036	223.0339	229.6880	250.9926	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	835.3512	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2660.4575	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2712.9319	(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	835.3512	0.2100	175.4237	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2660.4575	0.2100	558.6961	(264)
Space and water heating			734.1198	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			635.9039	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.1300	(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	835.3512	1.1300	943.9468	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2660.4575	1.1300	3006.3170	(278)
Space and water heating			3950.2638	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3338.4682	(286)
Target Primary Energy Rate (TPER)			53.1600	(287)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.33	**TER**	10.13
Environmental	92 A	**% DER < TER**			-1.97
CO_2 Emissions (t/year)	0.65	**DFEE**	19.07	**TFEE**	17.50
Compliance Check	See BREL	**% DFEE < TFEE**			-8.95
% DPER < TPER	-3.73	**DPER**	55.14	**TPER**	53.16

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3635	(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) =	0.3089	(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	0.3939	0.3862	0.3785	0.3398	0.3321	0.2935	0.2935	0.2858	0.3089	0.3321	0.3476	0.3630	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5776	0.5746	0.5716	0.5577	0.5552	0.5431	0.5431	0.5408	0.5477	0.5552	0.5604	0.5659	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
Ground Floor			62.8000	0.1700	10.6760	75.0000	4710.0000	(28a)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.3171			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Ceiling			62.8000			80.0000	5024.0000	(32b)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 17232.2999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	274.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966
E4 Jamb	10.8000	0.0160	0.1728
E5 Ground floor (normal)	8.9000	0.0740	0.6586

E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089		
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000		
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000		
E16 Corner (normal)	0.0000	0.0470	0.0000		
E18 Party wall between dwellings	4.6000	0.0380	0.1748		
P1 Party wall - Ground floor	13.9000	0.1080	1.5012		
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				2.8429	(36)
Point Thermal bridges			(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =		26.1600	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	27.5305	27.3869	27.2462	26.5851	26.4614	25.8856	25.8856	25.7789	26.1074	26.4614	26.7116	26.9732	(38)
Heat transfer coeff	53.6905	53.5469	53.4061	52.7450	52.6214	52.0456	52.0456	51.9389	52.2673	52.6214	52.8716	53.1332	(39)
Average = Sum(39)m / 12 =												52.7445	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8549	0.8527	0.8504	0.8399	0.8379	0.8288	0.8288	0.8271	0.8323	0.8379	0.8419	0.8461	(40)
HLP (average)												0.8399	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0596	(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	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)
Average daily hot water use (litres/day)												56.0140	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)
Energy content (annual)										Total = Sum(45)m =		930.2736	
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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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	82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)
									Total per year (kWh/year) = Sum(64)m =			790.7326	(64)
12Total per year (kWh/year)												791	(64)
Electric shower(s)	47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)
									Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =			535.1993	(64a)
Heat gains from water heating, kWh/month	32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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	89.1545	89.3936	89.6292	90.7526	90.9659	91.9723	91.9723	92.1611	91.5820	90.9659	90.5354	90.0897	
alpha	6.9436	6.9596	6.9753	7.0502	7.0644	7.1315	7.1315	7.1441	7.1055	7.0644	7.0357	7.0060	
util living area	0.9928	0.9784	0.9510	0.8767	0.7428	0.5436	0.3876	0.4101	0.6099	0.8782	0.9788	0.9947	(86)
MIT	20.3214	20.5075	20.6835	20.8665	20.9649	20.9966	20.9997	20.9996	20.9923	20.8845	20.5821	20.2884	(87)
Th 2	20.2060	20.2079	20.2099	20.2189	20.2206	20.2285	20.2285	20.2299	20.2254	20.2206	20.2172	20.2136	(88)
util rest of house	0.9905	0.9720	0.9369	0.8457	0.6913	0.4797	0.3198	0.3417	0.5449	0.8418	0.9713	0.9930	(89)
MIT 2	19.5966	19.7800	19.9494	20.1213	20.1998	20.2271	20.2284	20.2298	20.2220	20.1405	19.8622	19.5704	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.8921	20.0765	20.2487	20.4250	20.5117	20.5408	20.5428	20.5436	20.5360	20.4438	20.1557	19.8631	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8921	20.0765	20.2487	20.4250	20.5117	20.5408	20.5428	20.5436	20.5360	20.4438	20.1557	19.8631	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9894	0.9708	0.9377	0.8544	0.7112	0.5057	0.3475	0.3696	0.5713	0.8530	0.9706	0.9921	(94)
Useful gains	488.1042	562.4820	576.6421	544.2007	448.4104	307.9746	205.1357	215.1043	333.5255	464.5115	480.8598	465.3925	(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	837.1469	812.6560	734.2637	607.8887	463.6810	309.1903	205.2072	215.2156	336.3942	517.9940	690.2729	832.2291	(97)
Space heating kWh	259.6878	168.1169	117.2705	45.8553	11.3613	0.0000	0.0000	0.0000	0.0000	39.7910	150.7774	272.9264	(98a)
Space heating requirement - total per year (kWh/year)												1065.7866	
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	259.6878	168.1169	117.2705	45.8553	11.3613	0.0000	0.0000	0.0000	0.0000	39.7910	150.7774	272.9264	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1065.7866	
Space heating per m2											(98c) / (4) =	16.9711	(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	489.2282	385.1371	394.7358	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9687	0.9901	0.9878	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	473.9354	381.3111	389.9228	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.5650	199.5599	187.3211	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	35.1413	49.8900	46.8303	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												131.8615	(107)
Energy for space heating												16.9711	(99)
Energy for space cooling												2.0997	(108)
Total												19.0708	(109)
Fabric Energy Efficiency (DFEE)												19.1	(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		Storey height		Volume	
Main dwelling		(m2)		(m)		(m3)	
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)

Infiltration rate 0.3885 (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) = 0.3302 (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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opening Type			8.2000	1.1450	9.3893			(27)
Ground Floor			62.8000	0.1300	8.1640			(28a)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	19.9293			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.3997 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0500	0.2300
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	8.9000	0.1600	1.4240
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	13.9000	0.0800	1.1120
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.8120 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 23.7413 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	51.7980	51.6340	51.4732	50.7180	50.5767	49.9190	49.9190	49.7972	50.1724	50.5767	50.8626	51.1614	(39)

Average = Sum(39)m / 12 = 50.7174

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8248	0.8222	0.8196	0.8076	0.8054	0.7949	0.7949	0.7929	0.7989	0.8054	0.8099	0.8147	(40)
HLP (average)												0.8076	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (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

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 56.0140 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	61.1109	59.4348	57.6049	55.3269	53.2948	51.1829	50.7439	52.5701	54.4432	56.6120	58.9102	61.0251	(44)
Energy conte	96.7847	84.6344	88.5366	75.7397	71.7450	62.9354	61.3703	65.0928	67.1339	76.8219	83.9283	95.5505	(45)

Energy content (annual) Total = Sum(45)m = 930.2736
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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(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

82.2670	71.9393	75.2561	64.3788	60.9833	53.4951	52.1648	55.3289	57.0638	65.2986	71.3391	81.2179	(64)

Total per year (kWh/year) = Sum(64)m = 790.7326 (64)
12Total per year (kWh/year) 791 (64)
Electric shower(s)

47.0507	41.9226	45.7779	43.6852	44.5050	42.4534	43.8686	44.5050	43.6852	45.7779	44.9171	47.0507	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 535.1993 (64a)
Heat gains from water heating, kWh/month

32.3294	28.4655	30.2585	27.0160	26.3721	23.9871	24.0083	24.9585	25.1873	27.7691	29.0640	32.0672	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)													
	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)													
	43.4535	42.3593	40.6700	37.5222	35.4463	33.3155	32.2693	33.5463	34.9823	37.3241	40.3667	43.1010	(72)
Total internal gains													
	376.1728	387.5397	370.5510	360.6815	342.6643	331.9444	319.6625	319.0722	328.5097	337.5732	356.5571	367.8804	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	493.3347	579.4207	614.9734	636.9318	630.5343	608.9801	590.3432	581.9407	583.8377	544.5349	495.4339	469.1191	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	92.4118	92.7054	92.9950	94.3796	94.6433	95.8903	95.8903	96.1249	95.4061	94.6433	94.1114	93.5617	
alpha	7.1608	7.1804	7.1997	7.2920	7.3096	7.3927	7.3927	7.4083	7.3604	7.3096	7.2741	7.2374	
util living area													
	0.9922	0.9761	0.9451	0.8624	0.7216	0.5225	0.3719	0.3934	0.5877	0.8639	0.9762	0.9943	(86)
MIT	20.3703	20.5541	20.7228	20.8917	20.9741	20.9978	20.9998	20.9998	20.9949	20.9065	20.6245	20.3397	(87)
Th 2	20.2319	20.2341	20.2363	20.2467	20.2487	20.2578	20.2578	20.2594	20.2543	20.2487	20.2447	20.2406	(88)
util rest of house													
	0.9897	0.9691	0.9300	0.8304	0.6714	0.4629	0.3093	0.3302	0.5266	0.8263	0.9681	0.9924	(89)
MIT 2	19.6668	19.8479	20.0096	20.1684	20.2335	20.2569	20.2577	20.2594	20.2520	20.1847	19.9270	19.6441	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	19.9536	20.1358	20.3003	20.4632	20.5354	20.5589	20.5602	20.5612	20.5548	20.4789	20.2113	19.9276	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9536	20.1358	20.3003	20.4632	20.5354	20.5589	20.5602	20.5612	20.5548	20.4789	20.2113	19.9276	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9886	0.9681	0.9314	0.8401	0.6910	0.4872	0.3348	0.3560	0.5514	0.8386	0.9676	0.9915	(94)
Useful gains	487.7326	560.9171	572.8003	535.1140	435.7220	296.6998	197.6512	207.1526	321.9558	456.6459	479.3977	465.1322	(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													
	810.8245	786.6837	710.3465	586.4653	446.8672	297.4637	197.6916	207.2161	323.8539	499.6434	666.8764	804.6483	(97)
Space heating kWh													
	240.3804	151.7152	102.3344	36.9729	8.2920	0.0000	0.0000	0.0000	0.0000	31.9902	134.9847	252.6000	(98a)
Space heating requirement - total per year (kWh/year)												959.2697	
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													
	240.3804	151.7152	102.3344	36.9729	8.2920	0.0000	0.0000	0.0000	0.0000	31.9902	134.9847	252.6000	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												959.2697	
Space heating per m2											(98c) / (4) =	15.2750	(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	469.2387	369.4007	378.4588	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9772	0.9933	0.9917	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	458.5261	366.9227	375.3156	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	669.1646	649.5367	641.6984	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	151.6597	210.2648	198.1888	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	37.9149	52.5662	49.5472	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												140.0283	(107)
Energy for space heating												15.2750	(99)
Energy for space cooling												2.2298	(108)
Total												17.5047	(109)
Fabric Energy Efficiency (TFEE)												17.5	(109)

Full SAP Calculation Printout

Property Reference	Apartments	**Issued on Date**	14/04/2025
Assessment Reference	2B3P Apartment (GF)	**Prop Type Ref**	
Property	Apartments, Crabtree Lane, Openshaw		

SAP Rating	91 B	**DER**	10.33	**TER**	10.13
Environmental	92 A	**% DER < TER**			-1.97
CO_2 Emissions (t/year)	0.65	**DFEE**	19.07	**TFEE**	17.50
Compliance Check	See BREL	**% DFEE < TFEE**			-8.95
% DPER < TPER	-3.73	**DPER**	55.14	**TPER**	53.16

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	62.8000	(1b)	x 2.3000	(2b) =	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	144.4400	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			8.2000	1.2357	10.1331			(27)
Ground Floor			62.8000	0.1700	10.6760	75.0000	4710.0000	(28a)
External Wall	21.4000	8.2000	13.2000	0.1900	2.5080	140.0000	1847.9999	(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		23.3171			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000	140.0000	4690.0000	(32)
Party Ceiling			62.8000			100.0000	6280.0000	(32b)
Partitions			106.7000			9.0000	960.3000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	18488.2999 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		294.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0210	0.0966

E4 Jamb	10.8000	0.0160	0.1728	
E5 Ground floor (normal)	8.9000	0.0740	0.6586	
E6 Intermediate floor within a dwelling	8.9000	0.0010	0.0089	
E10 Eaves (insulation at ceiling level)	0.0000	0.0580	0.0000	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	4.6000	0.0380	0.1748	
P1 Party wall - Ground floor	13.9000	0.1080	1.5012	
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1010	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				2.8429 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	26.1600 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	23.8326	(38)
Heat transfer coeff	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	49.9926	(39)
Average = Sum(39)m / 12 =												49.9926	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	0.7961	(40)
HLP (average)												0.7961	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0596	(42)
Hot water usage for mixer showers	80.7843	79.5703	77.8012	74.4164	71.9184	69.1328	67.5494	69.3051	71.2297	74.2206	77.6782	80.4748	(42a)
Hot water usage for baths	25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)
Hot water usage for other uses	35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)
Average daily hot water use (litres/day)												130.4945	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	141.8952	139.0051	135.4061	129.7432	125.2132	120.3157	118.2933	121.8752	125.6729	130.8326	136.5883	141.4998	(44)
Energy conte	224.7273	197.9414	208.1141	177.6120	168.5611	147.9422	143.0655	150.9070	154.9672	177.5386	194.5951	221.5545	(45)
Energy content (annual)										Total = Sum(45)m =		2167.5261	
Distribution loss (46)m = 0.15 x (45)m	33.7091	29.6912	31.2171	26.6418	25.2842	22.1913	21.4598	22.6361	23.2451	26.6308	29.1893	33.2332	(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	14.8911	13.4349	14.8413	14.2911	14.7226	14.2021	14.6461	14.6696	14.2232	14.7495	14.3421	14.8816	(61)
Total heat required for water heating calculated for each month	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
										Total per year (kWh/year) = Sum(64)m =		2341.4213	(64)
12Total per year (kWh/year)												2341	(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	78.4446	69.1742	72.9082	62.6288	59.7272	52.7413	51.2308	53.8440	55.0824	62.7190	68.2884	77.3873	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	105.4363	102.9379	97.9949	86.9844	80.2785	73.2518	68.8586	72.3710	76.5033	84.2997	94.8450	104.0152	(72)
Total internal gains	441.1555	451.1182	430.8759	413.1436	390.4965	371.8808	356.2518	357.8969	370.0307	387.5488	414.0353	431.7945	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	558.3174	642.9993	675.2983	689.3940	678.3664	648.9165	626.9326	620.7653	625.3587	594.5105	552.9122	533.0332	(84)

---

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	102.7280	
alpha	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	7.8485	
util living area	0.9855	0.9600	0.9158	0.8212	0.6738	0.4921	0.3508	0.3704	0.5493	0.8194	0.9608	0.9895	(86)
MIT	20.5484	20.7024	20.8311	20.9385	20.9876	20.9990	20.9999	20.9999	20.9977	20.9480	20.7404	20.5043	(87)
Th 2	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	20.2567	(88)
util rest of house	0.9810	0.9490	0.8949	0.7850	0.6242	0.4354	0.2916	0.3106	0.4912	0.7766	0.9480	0.9861	(89)
MIT 2	19.8601	20.0068	20.1244	20.2145	20.2499	20.2564	20.2567	20.2567	20.2558	20.2234	20.0448	19.8172	(90)
Living area fraction									fLA = Living area / (4) =			0.4076	(91)
MIT	20.1407	20.2903	20.4125	20.5097	20.5506	20.5591	20.5597	20.5597	20.5582	20.5188	20.3284	20.0973	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.1407	20.2903	20.4125	20.5097	20.5506	20.5591	20.5597	20.5597	20.5582	20.5188	20.3284	20.0973	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9801	0.9495	0.8996	0.7978	0.6441	0.4585	0.3157	0.3350	0.5149	0.7924	0.9494	0.9852	(94)
Useful gains	547.2142	610.5401	607.5158	549.9951	436.9627	297.5527	197.9396	207.9272	321.9893	471.0790	524.9399	525.1683	(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	791.9155	769.4032	695.5218	580.3969	442.4655	297.9108	197.9555	207.9531	322.8632	495.8640	661.3205	794.7458	(97)
Space heating kWh	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98a)
Space heating requirement - total per year (kWh/year)												697.4733	
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	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												697.4733	
Space heating per m2											(98c) / (4) =	11.1063	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	182.0578	106.7560	65.4764	21.8892	4.0941	0.0000	0.0000	0.0000	0.0000	18.4400	98.1940	200.5656	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	204.5593	119.9506	73.5690	24.5946	4.6002	0.0000	0.0000	0.0000	0.0000	20.7191	110.3304	225.3547	(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	239.6184	211.3763	222.9553	191.9031	183.2837	162.1444	157.7116	165.5766	169.1904	192.2882	208.9372	236.4361	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.0259	87.8632	87.6802	87.4711	87.3365	87.3000	87.3000	87.3000	87.3000	87.4462	87.8364	88.0721	(217)
Fuel for water heating, kWh/month	272.2134	240.5744	254.2824	219.3904	209.8593	185.7324	180.6548	189.6640	193.8035	219.8932	237.8708	268.4575	(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	8.5504	7.7230	8.5504	8.2746	8.5504	8.2746	8.5504	8.5504	8.2746	8.5504	8.2746	8.5504	(231)
Lighting	27.1843	21.8083	19.6359	14.3861	11.1123	9.0788	10.1370	13.1764	17.1149	22.4556	25.3636	27.9398	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-19.7783	-29.1856	-43.9367	-51.7713	-57.8322	-54.7304	-54.0863	-50.0947	-43.3019	-34.4511	-22.2108	-16.9491	(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	-7.7693	-16.7834	-34.3537	-53.1533	-71.7933	-72.7121	-71.6720	-59.7810	-42.7528	-24.3141	-10.4645	-6.1035	(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	783.6779	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2672.3960	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(MEVDecentralised, Database: total watage = 2.4150, total flow = 29.0000, SFP = 0.0833)		
mechanical ventilation fans (SFP = 0.0833)	14.6746	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	100.6746	(231)
Electricity for lighting (calculated in Appendix L)	219.3930	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-949.9817	(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	2826.1597	(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	783.6779	0.2100	164.5724	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2672.3960	0.2100	561.2032	(264)
Space and water heating			725.7755	(265)
Pumps, fans and electric keep-hot	100.6746	0.1387	13.9648	(267)
Energy for lighting	219.3930	0.1443	31.6652	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	0.1336	-63.9196	
PV Unit electricity exported	-471.6531	0.1251	-59.0073	
Total			-122.9269	(269)
Total CO2, kg/year			648.4786	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.3300	(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	783.6779	1.1300	885.5560	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2672.3960	1.1300	3019.8074	(278)
Space and water heating			3905.3634	(279)
Pumps, fans and electric keep-hot	100.6746	1.5128	152.3005	(281)
Energy for lighting	219.3930	1.5338	336.5122	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-478.3286	1.4938	-714.5388	
PV Unit electricity exported	-471.6531	0.4592	-216.5793	
Total			-931.1181	(283)
Total Primary energy kWh/year			3463.0581	(286)
Dwelling Primary energy Rate (DPER)			55.1400	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling							
Ground floor		62.8000 (1b)	x	2.3000 (2b)	=	144.4400	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.8000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	144.4400	(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) =	0.1385	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3885	(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) =	0.3302	(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	0.4210	0.4127	0.4045	0.3632	0.3550	0.3137	0.3137	0.3054	0.3302	0.3550	0.3715	0.3880	(22b)
Effective ac	0.5886	0.5852	0.5818	0.5660	0.5630	0.5492	0.5492	0.5466	0.5545	0.5630	0.5690	0.5753	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			8.2000	1.1450	9.3893			(27)
Ground Floor			62.8000	0.1300	8.1640			(28a)
External Wall	21.4000	8.2000	13.2000	0.1800	2.3760			(29a)
Total net area of external elements Aum(A, m2)			84.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		19.9293			(33)
Main dwelling								
Party Wall			33.5000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.3997 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.6000	0.0500	0.2300
E3 Sill	4.6000	0.0500	0.2300
E4 Jamb	10.8000	0.0500	0.5400
E5 Ground floor (normal)	8.9000	0.1600	1.4240
E6 Intermediate floor within a dwelling	8.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	0.0000	0.0600	0.0000
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	4.6000	0.0600	0.2760
P1 Party wall - Ground floor	13.9000	0.0800	1.1120
P4 Party wall - Roof (insulation at ceiling level)	0.0000	0.1200	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.8120 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 23.7413 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.0567	27.8927	27.7319	26.9767	26.8354	26.1777	26.1777	26.0559	26.4311	26.8354	27.1213	27.4201	(38)
Heat transfer coeff	51.7980	51.6340	51.4732	50.7180	50.5767	49.9190	49.9190	49.7972	50.1724	50.5767	50.8626	51.1614	(39)

Average = Sum(39)m / 12 = 50.7174

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.8248	0.8222	0.8196	0.8076	0.8054	0.7949	0.7949	0.7929	0.7989	0.8054	0.8099	0.8147	(40)
HLP (average)												0.8076	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0596 (42)

Hot water usage for mixer showers

58.7522	57.8693	56.5827	54.1210	52.3043	50.2784	49.1269	50.4037	51.8034	53.9786	56.4932	58.5271	(42a)

Hot water usage for baths

25.3886	25.0115	24.4806	23.5015	22.7685	21.9556	21.5165	22.0438	22.6179	23.4877	24.4869	25.3028	(42b)

Hot water usage for other uses

35.7223	34.4233	33.1243	31.8253	30.5263	29.2273	29.2273	30.5263	31.8253	33.1243	34.4233	35.7223	(42c)

Average daily hot water use (litres/day) 110.1816 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	119.8631	117.3041	114.1875	109.4479	105.5991	101.4613	99.8707	102.9738	106.2466	110.5906	115.4034	119.5522	(44)
Energy conte	189.8339	167.0395	175.5020	149.8286	142.1567	124.7585	120.7850	127.5031	131.0127	150.0704	164.4133	187.1898	(45)
Energy content (annual)										Total = Sum(45)m =		1830.0936	
Distribution loss (46)m = 0.15 x (45)m	28.4751	25.0559	26.3253	22.4743	21.3235	18.7138	18.1177	19.1255	19.6519	22.5106	24.6620	28.0785	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.8930	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	240.7928	213.0669	226.4609	199.1437	193.1156	174.0736	171.6780	178.4620	180.3278	201.0293	213.7283	238.1487	(62)
WWHRS	-26.8591	-23.7544	-24.8742	-20.5968	-19.1955	-16.4257	-15.3965	-16.3726	-16.9947	-20.0349	-22.6971	-26.3617	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
										Total per year (kWh/year) = Sum(64)m =		2180.4646	(64)
12Total per year (kWh/year)												2180	(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	75.8595	67.0475	71.0941	62.1468	60.0068	53.8110	52.8843	55.1345	55.8905	62.6381	66.9962	74.9803	(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	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	102.9797	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	98.8760	109.4698	98.8760	102.1718	98.8760	102.1718	98.8760	98.8760	102.1718	98.8760	102.1718	98.8760	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.9493	181.8167	177.1111	167.0935	154.4481	142.5632	134.6234	132.7560	137.4616	147.4792	160.1246	172.0095	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	33.2980	(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)	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	-82.3837	(71)
Water heating gains (Table 5)	101.9617	99.7730	95.5566	86.3150	80.6543	74.7375	71.0810	74.1055	77.6257	84.1911	93.0502	100.7800	(72)
Total internal gains	437.6809	447.9534	428.4376	412.4742	390.8723	373.3664	358.4742	359.6314	371.1530	387.4401	412.2406	428.5594	(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	
South	8.2000	46.7521	0.6300	0.7000	0.7700	117.1619	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	117.1619	191.8810	244.4224	276.2504	287.8700	277.0357	270.6807	262.8685	255.3281	206.9617	138.8768	101.2387	(83)
Total gains	554.8428	639.8345	672.8600	688.7246	678.7423	650.4021	629.1550	622.4999	626.4811	594.4018	551.1174	529.7981	(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	92.4118	92.7054	92.9950	94.3796	94.6433	95.8903	95.8903	96.1249	95.4061	94.6433	94.1114	93.5617	
alpha	7.1608	7.1804	7.1997	7.2920	7.3096	7.3927	7.3927	7.4083	7.3604	7.3096	7.2741	7.2374	
util living area	0.9847	0.9602	0.9185	0.8231	0.6777	0.4899	0.3490	0.3678	0.5494	0.8196	0.9587	0.9882	(86)
MIT	20.4656	20.6360	20.7846	20.9212	20.9825	20.9986	20.9999	20.9999	20.9967	20.9347	20.6997	20.4356	(87)
Th 2	20.2319	20.2341	20.2363	20.2467	20.2487	20.2578	20.2578	20.2594	20.2543	20.2487	20.2447	20.2406	(88)
util rest of house	0.9801	0.9496	0.8987	0.7877	0.6282	0.4337	0.2902	0.3087	0.4915	0.7779	0.9460	0.9847	(89)
MIT 2	19.6263	19.8377	20.0158	20.1756	20.2358	20.2570	20.2577	20.2594	20.2524	20.1933	19.9271	19.5961	(90)
Living area fraction										fLA = Living area / (4) =		0.4076	(91)
MIT	19.9684	20.1631	20.3292	20.4795	20.5402	20.5593	20.5603	20.5612	20.5558	20.4955	20.2420	19.9383	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9684	20.1631	20.3292	20.4795	20.5402	20.5593	20.5603	20.5612	20.5558	20.4955	20.2420	19.9383	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9783	0.9485	0.9013	0.7991	0.6478	0.4566	0.3142	0.3328	0.5151	0.7922	0.9459	0.9829	(94)
Useful gains	542.7773	606.8924	606.4389	550.3729	439.6606	296.9854	197.6669	207.1782	322.6798	470.9019	521.3219	520.7510	(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	811.5947	788.0955	711.8336	587.2918	447.1096	297.4833	197.6930	207.2182	323.9027	500.4837	668.4380	805.1946	(97)
Space heating kWh	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98a)
Space heating requirement - total per year (kWh/year)												771.8645	
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	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												771.8645	
Space heating per m2											(98c) / (4) =	12.2908	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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	200.0002	121.7685	78.4136	26.5816	5.5421	0.0000	0.0000	0.0000	0.0000	22.0089	105.9235	211.6260	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	216.4504	131.7841	84.8633	28.7680	5.9979	0.0000	0.0000	0.0000	0.0000	23.8191	114.6359	229.0325	(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	213.9337	189.3125	201.5867	178.5469	173.9201	157.6479	156.2815	162.0894	163.3331	180.9945	191.0312	211.7870	(64)
Efficiency of water heater												80.3000	(216)
(217)m	84.2373	83.4604	82.5360	81.3194	80.5406	80.3000	80.3000	80.3000	80.3000	81.1511	83.1699	84.3798	(217)
Fuel for water heating, kWh/month	253.9655	226.8292	244.2409	219.5625	215.9409	196.3236	194.6221	201.8548	203.4036	223.0339	229.6880	250.9926	(219)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.5445	16.4815	14.8398	10.8723	8.3981	6.8613	7.6610	9.9580	12.9345	16.9708	19.1685	21.1155	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.4778	-31.3130	-46.5281	-54.1429	-59.9780	-56.5794	-55.9099	-52.0129	-45.3758	-36.6459	-23.9857	-18.4518	(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	-9.1727	-19.5769	-39.4324	-59.9862	-80.0523	-80.6875	-79.7148	-67.1350	-48.7527	-28.2197	-12.3202	-7.2309	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	835.3512	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2660.4575	(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)	165.8057	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1034.6824	(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	2712.9319	(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	835.3512	0.2100	175.4237	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2660.4575	0.2100	558.6961	(264)
Space and water heating			734.1198	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	165.8057	0.1443	23.9309	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	0.1339	-67.2594	
PV Unit electricity exported	-532.2812	0.1255	-66.8167	
Total			-134.0761	(269)
Total CO2, kg/year			635.9039	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.1300	(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	835.3512	1.1300	943.9468	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2660.4575	1.1300	3006.3170	(278)
Space and water heating			3950.2638	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	165.8057	1.5338	254.3183	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.4012	1.4947	-750.9605	
PV Unit electricity exported	-532.2812	0.4608	-245.2541	
Total			-996.2146	(283)
Total Primary energy kWh/year			3338.4682	(286)
Target Primary Energy Rate (TPER)			53.1600	(287)

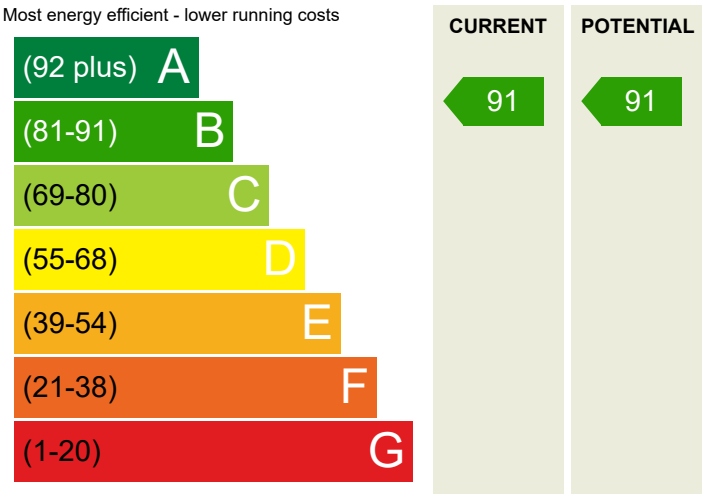
Energy Report

Dwelling Address	Apartments, Crabtree Lane, Openshaw
Reference	Apartments-2B3P Apartment (GF)
Assessment Date	04/03/2025
Submission Date	
Property Type	Flat, Mid-Terrace
Total Floor Area	63

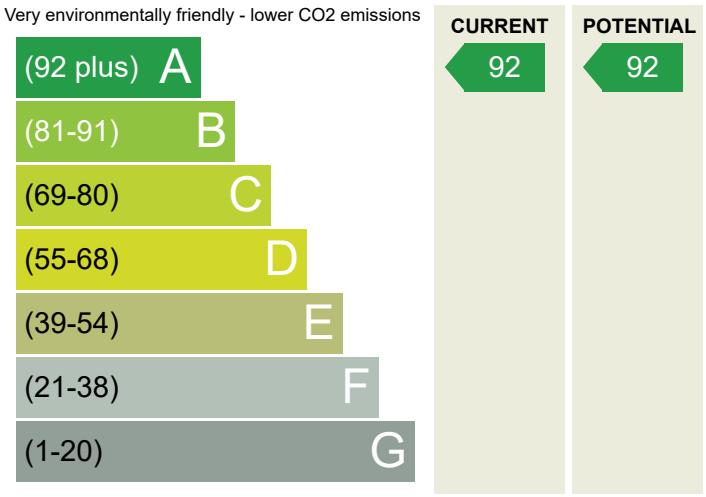
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

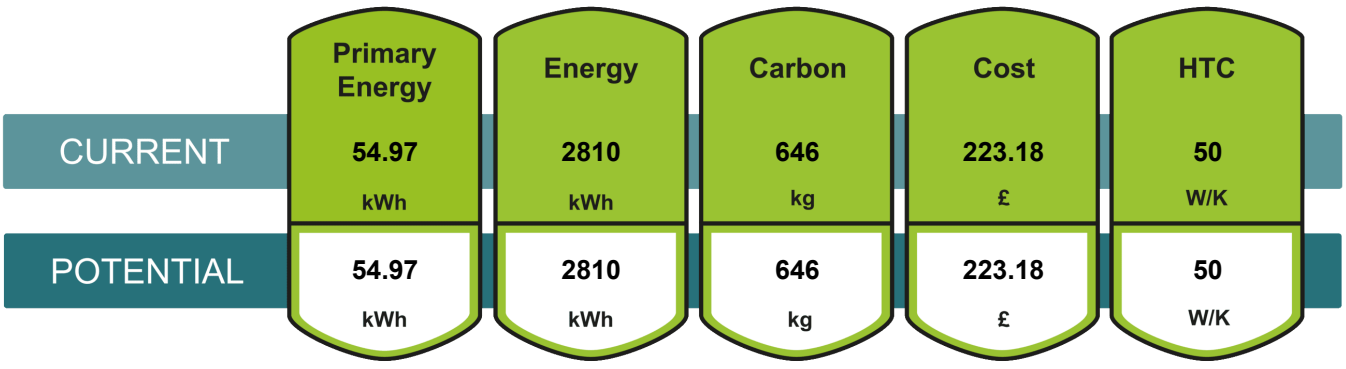
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor	Poor	Average	Good	Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Estimated energy costs of the dwelling

Energy Report

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£57	£57	
Heating	£169	£169	
Hot Water	£150	£150	
New Technologies e.g. Impact of PV	-(£152)	-(£152)	
TOTAL	£223	£223	

Estimated energy use and potential savings

Space Heating
775
kWh per year

Water Heating
2672
kWh per year

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Energy Report

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (ET)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	12.14	**TER**	12.38
Environmental	91 B	**% DER < TER**			1.94
CO_2 Emissions (t/year)	0.87	**DFEE**	35.88	**TFEE**	36.43
Compliance Check	See BREL	**% DFEE < TFEE**			1.52
% DPER < TPER	0.76	**DPER**	64.34	**TPER**	64.83

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, End-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	299.51	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	35.60 m²	2.30 m
1st Storey:	1.00 m	35.60 m²	2.60 m

8.0 Living Area	13.30	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	86.10	73.50	0.00	None	12.60	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	43.00	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	55.60
FF Partitions	Plasterboard on timber frame	9.00	62.60

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	35.60	35.60	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	35.60

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	35.60

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	35.60

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	West	2.10	0
Front	Window	External Wall	West	3.70	0
Side	Window	External Wall	South	1.00	0
Rear	Window	External Wall	East	5.80	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	9.30	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	7.10	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	23.80	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	16.90	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	16.90	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.40	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.10	0.10	RCDs	No

Y-value	0.04	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	4
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0

Summary for Input Data

Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No

Summary for Input Data

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

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
2.50	West	30°	None Or Little	No	Yes	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 94	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (ET)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	12.14	**TER**	12.38
Environmental	91 B	**% DER < TER**			1.94
CO_2 Emissions (t/year)	0.87	**DFEE**	35.88	**TFEE**	36.43
Compliance Check	See BREL	**% DFEE < TFEE**			1.52
% DPER < TPER	0.76	**DPER**	64.34	**TPER**	64.83

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(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)
		Air changes per hour	
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			10.5000	1.2357	12.9753			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	86.1000	12.6000	73.5000	0.1900	13.9650	140.0000	10289.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.8623			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21325.3998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 299.5141 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	9.3000	0.0500	0.4650
E3	Sill	7.1000	0.0210	0.1491
E4	Jamb	23.8000	0.0160	0.3808
E5	Ground floor (normal)	16.9000	0.0740	1.2506
E6	Intermediate floor within a dwelling	16.9000	0.0010	0.0169
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	8.4000	0.0570	0.4788
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8510 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.7133 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	(38)
Heat transfer coeff	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	(39)

Average = Sum(39)m / 12 = 73.4959

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	(40)
HLP (average)												1.0322	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers	85.7481	84.4595	82.5817	78.9889	76.3375	73.3807	71.7001	73.5636	75.6065	78.7812	82.4511	85.4196 (42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500 (42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273 (42c)

Average daily hot water use (litres/day) 138.5148 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.6165	147.5485	143.7281	137.7173	132.9088	127.7102	125.5637	129.3659	133.3971	138.8740	144.9834	150.1968	(44)
Energy conte	238.5396	210.1072	220.9048	188.5281	178.9208	157.0346	151.8584	160.1820	164.4920	188.4507	206.5554	235.1719	(45)

Energy content (annual) Total = Sum(45)m = 2300.7456

Distribution loss (46)m = 0.15 x (45)m	35.7809	31.5161	33.1357	28.2792	26.8381	23.5552	22.7788	24.0273	24.6738	28.2676	30.9833	35.2758 (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	14.9325	13.4714	14.8796	14.3239	14.7537	14.2294	14.6725	14.6975	14.2518	14.7823	14.3780	14.9224 (61)
Total heat required for water heating calculated for each month	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944 (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	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944 (64)

Total per year (kWh/year) = Sum(64)m = 2475.0405 (64)

12Total per year (kWh/year) 2475 (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	83.0476	73.2285	77.1708	66.2666	63.1796	55.7714	54.1610	56.9349	58.2565	66.3554	72.2742	81.9253 (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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	111.6231	108.9709	103.7241	92.0369	84.9188	77.4602	72.7971	76.5254	80.9118	89.1874	100.3808	110.1146	(72)
Total internal gains	478.8911	489.7862	467.8363	448.5795	423.8326	403.7282	386.6682	388.3203	401.5075	420.3526	449.1749	468.5545	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	550.2011	624.7335	681.3463	750.1876	787.2834	773.6323	739.6773	695.2520	646.2985	577.9520	537.2109	527.7928	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	
alpha	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	
util living area	0.9967	0.9919	0.9784	0.9260	0.7964	0.5977	0.4359	0.4837	0.7414	0.9530	0.9920	0.9975	(86)
MIT	20.0994	20.2524	20.4707	20.7418	20.9250	20.9895	20.9988	20.9977	20.9629	20.7167	20.3519	20.0606	(87)
Th 2	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	(88)
util rest of house	0.9954	0.9888	0.9701	0.8996	0.7381	0.5146	0.3432	0.3860	0.6580	0.9301	0.9885	0.9965	(89)
MIT 2	19.2470	19.3984	19.6117	19.8641	20.0127	20.0526	20.0563	20.0560	20.0400	19.8477	19.4978	19.2084	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.4062	19.5580	19.7722	20.0281	20.1831	20.2276	20.2324	20.2319	20.2124	20.0100	19.6574	19.3676	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4062	19.5580	19.7722	20.0281	20.1831	20.2276	20.2324	20.2319	20.2124	20.0100	19.6574	19.3676	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9867	0.9670	0.8987	0.7466	0.5300	0.3606	0.4043	0.6727	0.9287	0.9865	0.9955	(94)
Useful gains	547.0200	616.4400	658.8854	674.1924	587.7465	410.0141	266.7051	281.1021	434.7560	536.7300	529.9412	525.4152	(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	1110.2444	1077.2992	975.4515	817.8680	623.4757	413.6075	266.9630	281.6311	449.2340	691.5961	922.9156	1114.7549	(97)
Space heating kWh	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98a)
Space heating requirement - total per year (kWh/year)												1930.9212	
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	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1930.9212	
Space heating per m2											(98c) / (4) =	27.1197	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	470.8303	347.9746	264.6350	116.2320	29.8680	0.0000	0.0000	0.0000	0.0000	129.4611	317.9119	492.6615	(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	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3515	88.2793	88.1413	87.8668	87.5017	87.3000	87.3000	87.3000	87.3000	87.9075	88.2465	88.3749	(217)
Fuel for water heating, kWh/month	286.8905	253.2628	267.5072	230.8629	221.3379	196.1788	190.7570	200.3201	204.7466	231.1895	250.3593	282.9924	(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	9.0427	8.1676	9.0427	8.7510	9.0427	8.7510	9.0427	9.0427	8.7510	9.0427	8.7510	9.0427	(231)
Lighting	27.6751	22.2020	19.9904	14.6458	11.3129	9.2427	10.3200	13.4143	17.4238	22.8610	25.8215	28.4442	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-27.0535	-41.8597	-66.1846	-79.4282	-87.9924	-82.7831	-81.5086	-75.6768	-64.7717	-50.0684	-30.7479	-22.7605	(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	-12.5381	-30.4369	-72.1194	-125.6865	-180.9099	-187.5379	-182.7566	-145.1888	-94.1123	-46.6104	-17.4751	-9.5013	(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	2169.5744	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2816.4050	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 20.4707 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	106.4707	(231)
Electricity for lighting (calculated in Appendix L)	223.3537	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1815.7085	(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	3500.0953	(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	2169.5744	0.2100	455.6106	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2816.4050	0.2100	591.4451	(264)
Space and water heating			1047.0557	(265)
Pumps, fans and electric keep-hot	106.4707	0.1387	14.7688	(267)
Energy for lighting	223.3537	0.1443	32.2368	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-710.8354	0.1333	-94.7283	
PV Unit electricity exported	-1104.8730	0.1224	-135.2336	
Total			-229.9619	(269)
Total CO2, kg/year			864.0994	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.1400	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2169.5744	1.1300	2451.6190	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2816.4050	1.1300	3182.5377	(278)
Space and water heating			5634.1567	(279)
Pumps, fans and electric keep-hot	106.4707	1.5128	161.0688	(281)
Energy for lighting	223.3537	1.5338	342.5873	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-710.8354	1.4925	-1060.8886	
PV Unit electricity exported	-1104.8730	0.4491	-496.2162	
Total			-1557.1048	(283)
Total Primary energy kWh/year			4580.7080	(286)
Dwelling Primary energy Rate (DPER)			64.3400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000	(1b) x	2.3000	(2b) =	81.8800	(1b) - (3b)
First floor	35.6000	(1c) x	2.6000	(2c) =	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		174.4400	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4220	(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) =	0.3587	(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												
	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215 (22b)
Effective ac	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888 (25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			10.5000	1.1450	12.0229			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	86.1000	12.6000	73.5000	0.1800	13.2300			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.8969			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 299.5141 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	9.3000	0.0500	0.4650	
E3 Sill	7.1000	0.0500	0.3550	
E4 Jamb	23.8000	0.0500	1.1900	
E5 Ground floor (normal)	16.9000	0.1600	2.7040	
E6 Intermediate floor within a dwelling	16.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	8.4000	0.0600	0.5040	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.9320 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.8289 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff	79.6311	79.3974	79.1683	78.0921	77.8907	76.9534	76.9534	76.7798	77.3145	77.8907	78.2981	78.7239	(39)
Average = Sum(39)m / 12 =												78.0911	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1184	1.1151	1.1119	1.0968	1.0940	1.0808	1.0808	1.0784	1.0859	1.0940	1.0997	1.1057	(40)
HLP (average)												1.0968	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers

62.3623	61.4251	60.0594	57.4465	55.5182	53.3678	52.1455	53.5008	54.9865	57.2954	59.9645	62.1233	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day) 116.9539 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	127.2306	124.5141	121.2058	116.1748	112.0895	107.6973	106.0091	109.3031	112.7772	117.3882	122.4967	126.9006	(44)
Energy conte	201.5022	177.3065	186.2889	159.0376	150.8940	132.4264	128.2088	135.3401	139.0655	159.2947	174.5191	198.6956	(45)
Energy content (annual)										Total = Sum(45)m =		1942.5793	
Distribution loss (46)m = 0.15 x (45)m													
	30.2253	26.5960	27.9433	23.8556	22.6341	19.8640	19.2313	20.3010	20.8598	23.8942	26.1779	29.8043	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	252.4611	223.3339	237.2478	208.3526	201.8529	181.7415	179.1677	186.2990	188.3806	210.2536	223.8341	249.6545	(62)
WWHRS	-28.5094	-25.2140	-26.4026	-21.8624	-20.3750	-17.4350	-16.3426	-17.3787	-18.0389	-21.2659	-24.0917	-27.9815	(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													
	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
										Total per year (kWh/year) = Sum(64)m =		2277.6816	(64)
12Total per year (kWh/year)												2278	(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													
	79.7392	70.4612	74.6808	65.2088	62.9120	56.3606	55.3692	57.7403	58.5681	65.7052	70.3564	78.8060	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)													
	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)													
	107.1763	104.8530	100.3774	90.5677	84.5591	78.2785	74.4209	77.6079	81.3445	88.3135	97.7172	105.9221	(72)
Total internal gains													
	474.4443	485.6683	464.4896	447.1104	423.4729	404.5465	388.2920	389.4028	401.9402	419.4787	446.5113	464.3620	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	545.7544	620.6156	677.9996	748.7184	786.9237	774.4506	741.3011	696.3346	646.7312	577.0781	534.5472	523.6003	(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	74.3895	74.6085	74.8245	75.8556	76.0517	76.9780	76.9780	77.1520	76.6186	76.0517	75.6561	75.2468	
alpha	5.9593	5.9739	5.9883	6.0570	6.0701	6.1319	6.1319	6.1435	6.1079	6.0701	6.0437	6.0165	
util living area													
	0.9971	0.9931	0.9821	0.9371	0.8207	0.6209	0.4547	0.5033	0.7651	0.9596	0.9930	0.9977	(86)
MIT	19.9721	20.1335	20.3686	20.6806	20.8968	20.9847	20.9980	20.9964	20.9492	20.6634	20.2684	19.9511	(87)
Th 2	19.9858	19.9885	19.9911	20.0034	20.0058	20.0165	20.0165	20.0185	20.0124	20.0058	20.0011	19.9962	(88)
util rest of house													
	0.9959	0.9904	0.9749	0.9130	0.7627	0.5326	0.3543	0.3981	0.6796	0.9388	0.9898	0.9968	(89)
MIT 2	18.8014	19.0087	19.3070	19.6943	19.9270	20.0092	20.0160	20.0175	19.9827	19.6841	19.1912	18.7824	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.0201	19.2189	19.5054	19.8786	20.1081	20.1914	20.1995	20.2004	20.1632	19.8670	19.3924	19.0007	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0201	19.2189	19.5054	19.8786	20.1081	20.1914	20.1995	20.2004	20.1632	19.8670	19.3924	19.0007	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9944	0.9876	0.9704	0.9094	0.7693	0.5488	0.3731	0.4179	0.6937	0.9351	0.9871	0.9955	(94)
Useful gains	542.6745	612.9259	657.9471	680.8869	605.3422	424.9922	276.5765	290.9819	448.6654	539.6381	527.6395	521.2485	(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													
	1172.1767	1136.8793	1029.6110	857.3398	654.9157	430.2769	276.9916	291.7937	468.7757	721.8170	962.4715	1165.1663	(97)
Space heating kWh													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98a)
Space heating requirement - total per year (kWh/year)												2188.5881	
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													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2188.5881	
Space heating per m2											(98c) / (4) =	30.7386	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	506.8719	381.0571	299.2618	137.4958	39.9164	0.0000	0.0000	0.0000	0.0000	146.6896	338.8302	518.4793	(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													
	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.9232	85.5990	84.9634	83.5761	81.6339	80.3000	80.3000	80.3000	80.3000	83.6810	85.3401	85.9868	(217)
Fuel for water heating, kWh/month													
	260.6417	231.4512	248.1601	223.1383	222.3071	204.6158	202.7711	210.3615	212.1316	225.8431	234.0546	257.7989	(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	22.2456	17.8462	16.0686	11.7725	9.0934	7.4294	8.2953	10.7826	14.0055	18.3760	20.7556	22.8639	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.4302	-47.1894	-67.9173	-76.4724	-82.5640	-77.1154	-76.1796	-71.8802	-64.2871	-54.0301	-36.7807	-28.8968	(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	-18.6952	-39.3558	-78.2702	-117.6199	-155.5766	-156.3256	-154.4688	-130.7472	-95.7913	-56.2827	-24.9624	-14.7801	(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	2368.6019	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2733.2749	(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)	179.5347	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1759.6191	(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	3607.7924	(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	2368.6019	0.2100	497.4064	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2733.2749	0.2100	573.9877	(264)
Space and water heating			1071.3941	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.5347	0.1443	25.9124	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-716.7432	0.1346	-96.4403	
PV Unit electricity exported	-1042.8759	0.1259	-131.2799	
Total			-227.7202	(269)
Total CO2, kg/year			881.5156	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3800	(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	2368.6019	1.1300	2676.5201	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2733.2749	1.1300	3088.6007	(278)
Space and water heating			5765.1208	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.5347	1.5338	275.3763	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-716.7432	1.4973	-1073.1690	
PV Unit electricity exported	-1042.8759	0.4621	-481.8871	
Total			-1555.0561	(283)
Total Primary energy kWh/year			4615.5418	(286)
Target Primary Energy Rate (TPER)			64.8300	(287)

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (ET)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	12.14	**TER**	12.38
Environmental	91 B	**% DER < TER**			1.94
CO_2 Emissions (t/year)	0.87	**DFEE**	35.88	**TFEE**	36.43
Compliance Check	See BREL	**% DFEE < TFEE**			1.52
% DPER < TPER	0.76	**DPER**	64.34	**TPER**	64.83

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(5)

2. Ventilation rate

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

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3970	(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) =	0.3374	(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	0.4302	0.4218	0.4134	0.3712	0.3627	0.3206	0.3206	0.3121	0.3374	0.3627	0.3796	0.3965	(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	0.5925	0.5890	0.5854	0.5689	0.5658	0.5514	0.5514	0.5487	0.5569	0.5658	0.5721	0.5786	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			10.5000	1.2357	12.9753			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	86.1000	12.6000	73.5000	0.1900	13.9650	140.0000	10289.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.8623			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21325.3998	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							299.5141	(35)
List of Thermal Bridges								

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	9.3000	0.0500	0.4650	
E3 Sill	7.1000	0.0210	0.1491	
E4 Jamb	23.8000	0.0160	0.3808	
E5 Ground floor (normal)	16.9000	0.0740	1.2506	
E6 Intermediate floor within a dwelling	16.9000	0.0010	0.0169	
E10 Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872	
E12 Gable (insulation at ceiling level)	8.4000	0.0570	0.4788	
E16 Corner (normal)	10.2000	0.0470	0.4794	
E18 Party wall between dwellings	10.2000	0.0380	0.3876	
P1 Party wall - Ground floor	8.4000	0.1080	0.9072	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.8510	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	44.7133	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.1101	33.9032	33.7004	32.7480	32.5698	31.7403	31.7403	31.5867	32.0598	32.5698	32.9303	33.3072	(38)
Heat transfer coeff	78.8234	78.6165	78.4137	77.4613	77.2831	76.4536	76.4536	76.2999	76.7731	77.2831	77.6436	78.0205	(39)
Average = Sum(39)m / 12 =												77.4604	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1071	1.1042	1.1013	1.0879	1.0854	1.0738	1.0738	1.0716	1.0783	1.0854	1.0905	1.0958	(40)
HLP (average)												1.0879	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2749	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)
Average daily hot water use (litres/day)												59.4579	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.8683	63.0890	61.1464	58.7284	56.5713	54.3295	53.8636	55.8023	57.7907	60.0928	62.5323	64.7772	(44)
Energy conte	102.7356	89.8379	93.9798	80.3962	76.1558	66.8045	65.1434	69.0949	71.2617	81.5454	89.0887	101.4255	(45)
Energy content (annual)										Total = Sum(45)m =		987.4692	
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	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(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	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(64)
										Total per year (kWh/year) = Sum(64)m =		839.3488	(64)
12Total per year (kWh/year)												839	(64)
Electric shower(s)	49.9418	44.4985	48.5907	46.3695	47.2396	45.0620	46.5641	47.2396	46.3695	48.5907	47.6770	49.9418	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		568.0850	(64a)
Heat gains from water heating, kWh/month	34.3168	30.2152	32.1184	28.6766	27.9930	25.4615	25.4840	26.4926	26.7355	29.4761	30.8506	34.0384	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	46.1247	44.9631	43.1699	39.8286	37.6250	35.3631	34.2527	35.6083	37.1326	39.6184	42.8481	45.7505	(72)
Total internal gains	410.3927	422.7784	404.2821	393.3712	373.5388	361.6311	348.1238	347.4032	357.7283	367.7836	388.6422	401.1904	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	481.7027	557.7257	617.7920	694.9792	736.9896	731.5352	701.1329	654.3349	602.5193	525.3830	476.6781	460.4287	(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	75.1518	75.3496	75.5445	76.4733	76.6496	77.4813	77.4813	77.6373	77.1588	76.6496	76.2938	75.9252	
alpha	6.0101	6.0233	6.0363	6.0982	6.1100	6.1654	6.1654	6.1758	6.1439	6.1100	6.0863	6.0617	
util living area	0.9985	0.9960	0.9883	0.9526	0.8483	0.6492	0.4771	0.5310	0.7991	0.9729	0.9961	0.9989	(86)
MIT	19.9051	20.0687	20.3095	20.6382	20.8770	20.9811	20.9975	20.9954	20.9365	20.6152	20.2058	19.8829	(87)
Th 2	19.9951	19.9974	19.9998	20.0107	20.0127	20.0223	20.0223	20.0241	20.0186	20.0127	20.0086	20.0043	(88)
util rest of house	0.9979	0.9944	0.9835	0.9331	0.7942	0.5592	0.3726	0.4214	0.7164	0.9578	0.9943	0.9984	(89)
MIT 2	19.0036	19.1683	19.4082	19.7318	19.9376	20.0150	20.0218	20.0230	19.9886	19.7178	19.3143	18.9889	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.1720	19.3365	19.5765	19.9011	20.1131	20.1955	20.2041	20.2047	20.1657	19.8855	19.4809	19.1559	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1720	19.3365	19.5765	19.9011	20.1131	20.1955	20.2041	20.2047	20.1657	19.8855	19.4809	19.1559	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9972	0.9929	0.9808	0.9304	0.8003	0.5757	0.3922	0.4420	0.7300	0.9553	0.9929	0.9978	(94)
Useful gains	480.3463	553.7699	605.9233	646.6376	589.8037	421.1521	275.0146	289.2252	439.8589	501.8794	473.2918	459.4338	(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	1172.2645	1134.9476	1025.3789	852.1570	650.1881	427.7950	275.5432	290.2959	465.6820	717.6093	961.2946	1166.8636	(97)
Space heating kWh	514.7872	390.5514	312.0750	147.9739	44.9260	0.0000	0.0000	0.0000	0.0000	160.5031	351.3620	526.3278	(98a)
Space heating requirement - total per year (kWh/year)												2448.5063	
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	514.7872	390.5514	312.0750	147.9739	44.9260	0.0000	0.0000	0.0000	0.0000	160.5031	351.3620	526.3278	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2448.5063	
Space heating per m2										(98c) / (4) =		34.3891	(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	718.6634	565.7563	579.8795	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9064	0.9571	0.9366	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	651.3709	541.4856	543.1423	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	810.0945	776.8148	724.2499	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	114.2810	175.0849	134.7441	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	28.5703	43.7712	33.6860	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												106.0275	(107)
Energy for space heating												34.3891	(99)
Energy for space cooling												1.4892	(108)
Total												35.8783	(109)
Fabric Energy Efficiency (DFEE)												35.9	(109)

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000	(1b)	x 2.3000	(2b) =	81.8800	(1b) - (3b)
First floor	35.6000	(1c)	x 2.6000	(2c) =	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		174.4400	(5)

---

2. Ventilation rate

---

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

Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4220 (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) =	0.3587 (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	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			10.5000	1.1450	12.0229			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	86.1000	12.6000	73.5000	0.1800	13.2300			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.8969			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	299.5141 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	9.3000	0.0500	0.4650
E3 Sill	7.1000	0.0500	0.3550
E4 Jamb	23.8000	0.0500	1.1900
E5 Ground floor (normal)	16.9000	0.1600	2.7040
E6 Intermediate floor within a dwelling	16.9000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	8.4000	0.0600	0.5040
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.4000	0.0800	0.6720
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	8.9320 (36)
Point Thermal bridges (36a) =	0.0000
Total fabric heat loss (33) + (36) + (36a) =	44.8289 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff	79.6311	79.3974	79.1683	78.0921	77.8907	76.9534	76.9534	76.7798	77.3145	77.8907	78.2981	78.7239	(39)
Average = Sum(39)m / 12 =												78.0911	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1184	1.1151	1.1119	1.0968	1.0940	1.0808	1.0808	1.0784	1.0859	1.0940	1.0997	1.1057	(40)
HLP (average)												1.0968	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.2749 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day)	59.4579 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.8683	63.0890	61.1464	58.7284	56.5713	54.3295	53.8636	55.8023	57.7907	60.0928	62.5323	64.7772	(44)
Energy conte	102.7356	89.8379	93.9798	80.3962	76.1558	66.8045	65.1434	69.0949	71.2617	81.5454	89.0887	101.4255	(45)

Energy content (annual) Total = Sum(45)m =	987.4692

Distribution loss (46)m = 0.15 x (45)m

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

87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(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

87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(64)

Total per year (kWh/year) = Sum(64)m =	839.3488 (64)
12Total per year (kWh/year)	839 (64)
Electric shower(s)	

	49.9418	44.4985	48.5907	46.3695	47.2396	45.0620	46.5641	47.2396	46.3695	48.5907	47.6770	49.9418	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												568.0850	(64a)
Heat gains from water heating, kWh/month													
	34.3168	30.2152	32.1184	28.6766	27.9930	25.4615	25.4840	26.4926	26.7355	29.4761	30.8506	34.0384	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)													
	46.1247	44.9631	43.1699	39.8286	37.6250	35.3631	34.2527	35.6083	37.1326	39.6184	42.8481	45.7505	(72)
Total internal gains													
	410.3927	422.7784	404.2821	393.3712	373.5388	361.6311	348.1238	347.4032	357.7283	367.7836	388.6422	401.1904	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	481.7027	557.7257	617.7920	694.9792	736.9896	731.5352	701.1329	654.3349	602.5193	525.3830	476.6781	460.4287	(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	74.3895	74.6085	74.8245	75.8556	76.0517	76.9780	76.9780	77.1520	76.6186	76.0517	75.6561	75.2468	
alpha	5.9593	5.9739	5.9883	6.0570	6.0701	6.1319	6.1319	6.1435	6.1079	6.0701	6.0437	6.0165	
util living area													
	0.9985	0.9960	0.9885	0.9535	0.8510	0.6526	0.4800	0.5341	0.8021	0.9734	0.9962	0.9989	(86)
MIT	19.8895	20.0539	20.2964	20.6295	20.8724	20.9801	20.9973	20.9951	20.9340	20.6077	20.1950	19.8691	(87)
Th 2	19.9858	19.9885	19.9911	20.0034	20.0058	20.0165	20.0165	20.0185	20.0124	20.0058	20.0011	19.9962	(88)
util rest of house													
	0.9979	0.9944	0.9838	0.9342	0.7970	0.5619	0.3744	0.4233	0.7192	0.9585	0.9943	0.9984	(89)
MIT 2	18.9806	19.1464	19.3883	19.7175	19.9276	20.0089	20.0160	20.0174	19.9811	19.7049	19.2976	18.9687	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.1503	19.3159	19.5579	19.8879	20.1041	20.1903	20.1993	20.2001	20.1591	19.8736	19.4652	19.1369	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1503	19.3159	19.5579	19.8879	20.1041	20.1903	20.1993	20.2001	20.1591	19.8736	19.4652	19.1369	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9972	0.9930	0.9810	0.9315	0.8030	0.5785	0.3942	0.4442	0.7328	0.9559	0.9929	0.9978	(94)
Useful gains	480.3474	553.7993	606.0790	647.3839	591.8074	423.2018	276.4156	290.6334	441.5530	502.1994	473.3136	459.4332	(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													
	1182.5496	1144.5832	1033.7734	858.0655	654.5989	430.1941	276.9799	291.7686	468.4587	722.3246	968.1715	1175.8879	(97)
Space heating kWh													
	522.4385	397.0068	318.2046	151.6907	46.7169	0.0000	0.0000	0.0000	0.0000	163.7732	356.2978	533.0423	(98a)
Space heating requirement - total per year (kWh/year)												2489.1707	
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													
	522.4385	397.0068	318.2046	151.6907	46.7169	0.0000	0.0000	0.0000	0.0000	163.7732	356.2978	533.0423	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2489.1707	
Space heating per m2											(98c) / (4) =	34.9603	(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	723.3622	569.4553	583.5268	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9035	0.9554	0.9345	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	653.5610	544.0366	545.2879	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	810.0945	776.8148	724.2499	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	112.7042	173.1870	133.1478	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	28.1760	43.2967	33.2869	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												104.7597	(107)

Energy for space heating	34.9603 (99)
Energy for space cooling	1.4713 (108)
Total	36.4316 (109)
Fabric Energy Efficiency (TFEE)	36.4 (109)

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (ET)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	12.14	**TER**	12.38
Environmental	91 B	**% DER < TER**			1.94
CO_2 Emissions (t/year)	0.87	**DFEE**	35.88	**TFEE**	36.43
Compliance Check	See BREL	**% DFEE < TFEE**			1.52
% DPER < TPER	0.76	**DPER**	64.34	**TPER**	64.83

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(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)
		Air changes per hour	
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			10.5000	1.2357	12.9753			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	86.1000	12.6000	73.5000	0.1900	13.9650	140.0000	10289.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	38.8623			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21325.3998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 299.5141 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	9.3000	0.0500	0.4650
E3	Sill	7.1000	0.0210	0.1491
E4	Jamb	23.8000	0.0160	0.3808
E5	Ground floor (normal)	16.9000	0.0740	1.2506
E6	Intermediate floor within a dwelling	16.9000	0.0010	0.0169
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	8.4000	0.0570	0.4788
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.8510 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.7133 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	(38)
Heat transfer coeff	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	73.4959	(39)

Average = Sum(39)m / 12 = 73.4959

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	1.0322	(40)
HLP (average)												1.0322	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers	85.7481	84.4595	82.5817	78.9889	76.3375	73.3807	71.7001	73.5636	75.6065	78.7812	82.4511	85.4196 (42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500 (42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273 (42c)

Average daily hot water use (litres/day) 138.5148 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.6165	147.5485	143.7281	137.7173	132.9088	127.7102	125.5637	129.3659	133.3971	138.8740	144.9834	150.1968	(44)
Energy conte	238.5396	210.1072	220.9048	188.5281	178.9208	157.0346	151.8584	160.1820	164.4920	188.4507	206.5554	235.1719	(45)

Energy content (annual) Total = Sum(45)m = 2300.7456

Distribution loss (46)m = 0.15 x (45)m	35.7809	31.5161	33.1357	28.2792	26.8381	23.5552	22.7788	24.0273	24.6738	28.2676	30.9833	35.2758 (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	14.9325	13.4714	14.8796	14.3239	14.7537	14.2294	14.6725	14.6975	14.2518	14.7823	14.3780	14.9224 (61)
Total heat required for water heating calculated for each month	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944 (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	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944 (64)

Total per year (kWh/year) = Sum(64)m = 2475.0405 (64)

12Total per year (kWh/year) 2475 (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	83.0476	73.2285	77.1708	66.2666	63.1796	55.7714	54.1610	56.9349	58.2565	66.3554	72.2742	81.9253 (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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	111.6231	108.9709	103.7241	92.0369	84.9188	77.4602	72.7971	76.5254	80.9118	89.1874	100.3808	110.1146	(72)
Total internal gains	478.8911	489.7862	467.8363	448.5795	423.8326	403.7282	386.6682	388.3203	401.5075	420.3526	449.1749	468.5545	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	550.2011	624.7335	681.3463	750.1876	787.2834	773.6323	739.6773	695.2520	646.2985	577.9520	537.2109	527.7928	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	80.5994	
alpha	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	6.3733	
util living area	0.9967	0.9919	0.9784	0.9260	0.7964	0.5977	0.4359	0.4837	0.7414	0.9530	0.9920	0.9975	(86)
MIT	20.0994	20.2524	20.4707	20.7418	20.9250	20.9895	20.9988	20.9977	20.9629	20.7167	20.3519	20.0606	(87)
Th 2	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	20.0565	(88)
util rest of house	0.9954	0.9888	0.9701	0.8996	0.7381	0.5146	0.3432	0.3860	0.6580	0.9301	0.9885	0.9965	(89)
MIT 2	19.2470	19.3984	19.6117	19.8641	20.0127	20.0526	20.0563	20.0560	20.0400	19.8477	19.4978	19.2084	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.4062	19.5580	19.7722	20.0281	20.1831	20.2276	20.2324	20.2319	20.2124	20.0100	19.6574	19.3676	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4062	19.5580	19.7722	20.0281	20.1831	20.2276	20.2324	20.2319	20.2124	20.0100	19.6574	19.3676	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9867	0.9670	0.8987	0.7466	0.5300	0.3606	0.4043	0.6727	0.9287	0.9865	0.9955	(94)
Useful gains	547.0200	616.4400	658.8854	674.1924	587.7465	410.0141	266.7051	281.1021	434.7560	536.7300	529.9412	525.4152	(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	1110.2444	1077.2992	975.4515	817.8680	623.4757	413.6075	266.9630	281.6311	449.2340	691.5961	922.9156	1114.7549	(97)
Space heating kWh	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98a)
Space heating requirement - total per year (kWh/year)												1930.9212	
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	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1930.9212	
Space heating per m2											(98c) / (4) =	27.1197	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	419.0390	309.6974	235.5251	103.4465	26.5825	0.0000	0.0000	0.0000	0.0000	115.2203	282.9415	438.4687	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	470.8303	347.9746	264.6350	116.2320	29.8680	0.0000	0.0000	0.0000	0.0000	129.4611	317.9119	492.6615	(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	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3515	88.2793	88.1413	87.8668	87.5017	87.3000	87.3000	87.3000	87.3000	87.9075	88.2465	88.3749	(217)
Fuel for water heating, kWh/month	286.8905	253.2628	267.5072	230.8629	221.3379	196.1788	190.7570	200.3201	204.7466	231.1895	250.3593	282.9924	(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	9.0427	8.1676	9.0427	8.7510	9.0427	8.7510	9.0427	9.0427	8.7510	9.0427	8.7510	9.0427	(231)
Lighting	27.6751	22.2020	19.9904	14.6458	11.3129	9.2427	10.3200	13.4143	17.4238	22.8610	25.8215	28.4442	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-27.0535	-41.8597	-66.1846	-79.4282	-87.9924	-82.7831	-81.5086	-75.6768	-64.7717	-50.0684	-30.7479	-22.7605	(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	-12.5381	-30.4369	-72.1194	-125.6865	-180.9099	-187.5379	-182.7566	-145.1888	-94.1123	-46.6104	-17.4751	-9.5013	(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	2169.5744	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	2816.4050	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 20.4707 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	106.4707	(231)
Electricity for lighting (calculated in Appendix L)	223.3537	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1815.7085	(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	3500.0953	(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	2169.5744	0.2100	455.6106	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2816.4050	0.2100	591.4451	(264)
Space and water heating			1047.0557	(265)
Pumps, fans and electric keep-hot	106.4707	0.1387	14.7688	(267)
Energy for lighting	223.3537	0.1443	32.2368	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-710.8354	0.1333	-94.7283	
PV Unit electricity exported	-1104.8730	0.1224	-135.2336	
Total			-229.9619	(269)
Total CO2, kg/year			864.0994	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.1400	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2169.5744	1.1300	2451.6190	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2816.4050	1.1300	3182.5377	(278)
Space and water heating			5634.1567	(279)
Pumps, fans and electric keep-hot	106.4707	1.5128	161.0688	(281)
Energy for lighting	223.3537	1.5338	342.5873	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-710.8354	1.4925	-1060.8886	
PV Unit electricity exported	-1104.8730	0.4491	-496.2162	
Total			-1557.1048	(283)
Total Primary energy kWh/year			4580.7080	(286)
Dwelling Primary energy Rate (DPER)			64.3400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000	(1b) x	2.3000	(2b) =	81.8800	(1b) - (3b)
First floor	35.6000	(1c) x	2.6000	(2c) =	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		174.4400	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4220	(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) =	0.3587	(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												
	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215 (22b)
Effective ac	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888 (25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			10.5000	1.1450	12.0229			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	86.1000	12.6000	73.5000	0.1800	13.2300			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			157.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.8969			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 299.5141 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	9.3000	0.0500	0.4650	
E3 Sill	7.1000	0.0500	0.3550	
E4 Jamb	23.8000	0.0500	1.1900	
E5 Ground floor (normal)	16.9000	0.1600	2.7040	
E6 Intermediate floor within a dwelling	16.9000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	8.4000	0.0600	0.5040	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.9320 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.8289 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff	79.6311	79.3974	79.1683	78.0921	77.8907	76.9534	76.9534	76.7798	77.3145	77.8907	78.2981	78.7239	(39)
Average = Sum(39)m / 12 =												78.0911	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1184	1.1151	1.1119	1.0968	1.0940	1.0808	1.0808	1.0784	1.0859	1.0940	1.0997	1.1057	(40)
HLP (average)												1.0968	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers

62.3623	61.4251	60.0594	57.4465	55.5182	53.3678	52.1455	53.5008	54.9865	57.2954	59.9645	62.1233	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day) 116.9539 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	127.2306	124.5141	121.2058	116.1748	112.0895	107.6973	106.0091	109.3031	112.7772	117.3882	122.4967	126.9006	(44)
Energy conte	201.5022	177.3065	186.2889	159.0376	150.8940	132.4264	128.2088	135.3401	139.0655	159.2947	174.5191	198.6956	(45)
Energy content (annual)										Total = Sum(45)m =		1942.5793	
Distribution loss (46)m = 0.15 x (45)m													
	30.2253	26.5960	27.9433	23.8556	22.6341	19.8640	19.2313	20.3010	20.8598	23.8942	26.1779	29.8043	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	252.4611	223.3339	237.2478	208.3526	201.8529	181.7415	179.1677	186.2990	188.3806	210.2536	223.8341	249.6545	(62)
WWHRS	-28.5094	-25.2140	-26.4026	-21.8624	-20.3750	-17.4350	-16.3426	-17.3787	-18.0389	-21.2659	-24.0917	-27.9815	(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													
	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
										Total per year (kWh/year) = Sum(64)m =		2277.6816	(64)
12Total per year (kWh/year)												2278	(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													
	79.7392	70.4612	74.6808	65.2088	62.9120	56.3606	55.3692	57.7403	58.5681	65.7052	70.3564	78.8060	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	107.0631	118.5341	107.0631	110.6318	107.0631	110.6318	107.0631	107.0631	110.6318	107.0631	110.6318	107.0631	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)													
	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)													
	107.1763	104.8530	100.3774	90.5677	84.5591	78.2785	74.4209	77.6079	81.3445	88.3135	97.7172	105.9221	(72)
Total internal gains													
	474.4443	485.6683	464.4896	447.1104	423.4729	404.5465	388.2920	389.4028	401.9402	419.4787	446.5113	464.3620	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	71.3101	134.9473	213.5100	301.6080	363.4508	369.9041	353.0091	306.9317	244.7910	157.5994	88.0360	59.2383	(83)
Total gains	545.7544	620.6156	677.9996	748.7184	786.9237	774.4506	741.3011	696.3346	646.7312	577.0781	534.5472	523.6003	(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	74.3895	74.6085	74.8245	75.8556	76.0517	76.9780	76.9780	77.1520	76.6186	76.0517	75.6561	75.2468	
alpha	5.9593	5.9739	5.9883	6.0570	6.0701	6.1319	6.1319	6.1435	6.1079	6.0701	6.0437	6.0165	
util living area													
	0.9971	0.9931	0.9821	0.9371	0.8207	0.6209	0.4547	0.5033	0.7651	0.9596	0.9930	0.9977	(86)
MIT	19.9721	20.1335	20.3686	20.6806	20.8968	20.9847	20.9980	20.9964	20.9492	20.6634	20.2684	19.9511	(87)
Th 2	19.9858	19.9885	19.9911	20.0034	20.0058	20.0165	20.0165	20.0185	20.0124	20.0058	20.0011	19.9962	(88)
util rest of house													
	0.9959	0.9904	0.9749	0.9130	0.7627	0.5326	0.3543	0.3981	0.6796	0.9388	0.9898	0.9968	(89)
MIT 2	18.8014	19.0087	19.3070	19.6943	19.9270	20.0092	20.0160	20.0175	19.9827	19.6841	19.1912	18.7824	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.0201	19.2189	19.5054	19.8786	20.1081	20.1914	20.1995	20.2004	20.1632	19.8670	19.3924	19.0007	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0201	19.2189	19.5054	19.8786	20.1081	20.1914	20.1995	20.2004	20.1632	19.8670	19.3924	19.0007	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9944	0.9876	0.9704	0.9094	0.7693	0.5488	0.3731	0.4179	0.6937	0.9351	0.9871	0.9955	(94)
Useful gains	542.6745	612.9259	657.9471	680.8869	605.3422	424.9922	276.5765	290.9819	448.6654	539.6381	527.6395	521.2485	(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													
	1172.1767	1136.8793	1029.6110	857.3398	654.9157	430.2769	276.9916	291.7937	468.7757	721.8170	962.4715	1165.1663	(97)
Space heating kWh													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98a)
Space heating requirement - total per year (kWh/year)												2188.5881	
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													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2188.5881	
Space heating per m2											(98c) / (4) =	30.7386	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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													
	468.3496	352.0967	276.5179	127.0461	36.8827	0.0000	0.0000	0.0000	0.0000	135.5411	313.0791	479.0749	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	506.8719	381.0571	299.2618	137.4958	39.9164	0.0000	0.0000	0.0000	0.0000	146.6896	338.8302	518.4793	(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													
	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.9232	85.5990	84.9634	83.5761	81.6339	80.3000	80.3000	80.3000	80.3000	83.6810	85.3401	85.9868	(217)
Fuel for water heating, kWh/month													
	260.6417	231.4512	248.1601	223.1383	222.3071	204.6158	202.7711	210.3615	212.1316	225.8431	234.0546	257.7989	(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	22.2456	17.8462	16.0686	11.7725	9.0934	7.4294	8.2953	10.7826	14.0055	18.3760	20.7556	22.8639	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.4302	-47.1894	-67.9173	-76.4724	-82.5640	-77.1154	-76.1796	-71.8802	-64.2871	-54.0301	-36.7807	-28.8968	(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	-18.6952	-39.3558	-78.2702	-117.6199	-155.5766	-156.3256	-154.4688	-130.7472	-95.7913	-56.2827	-24.9624	-14.7801	(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	2368.6019	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2733.2749	(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)	179.5347	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1759.6191	(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	3607.7924	(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	2368.6019	0.2100	497.4064	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2733.2749	0.2100	573.9877	(264)
Space and water heating			1071.3941	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	179.5347	0.1443	25.9124	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-716.7432	0.1346	-96.4403	
PV Unit electricity exported	-1042.8759	0.1259	-131.2799	
Total			-227.7202	(269)
Total CO2, kg/year			881.5156	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.3800	(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	2368.6019	1.1300	2676.5201	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2733.2749	1.1300	3088.6007	(278)
Space and water heating			5765.1208	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	179.5347	1.5338	275.3763	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-716.7432	1.4973	-1073.1690	
PV Unit electricity exported	-1042.8759	0.4621	-481.8871	
Total			-1555.0561	(283)
Total Primary energy kWh/year			4615.5418	(286)
Target Primary Energy Rate (TPER)			64.8300	(287)

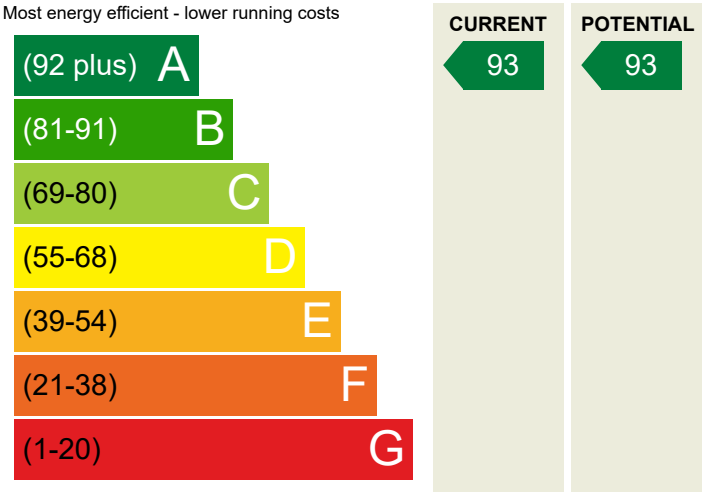
Energy Report

Dwelling Address	Ashburton, Crabtree Lane, Openshaw
Reference	Ashburton-Ashburton (ET)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, End-Terrace
Total Floor Area	71

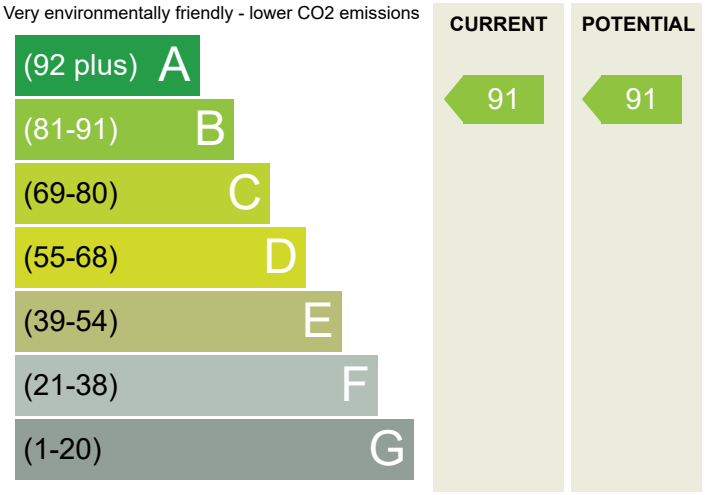
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

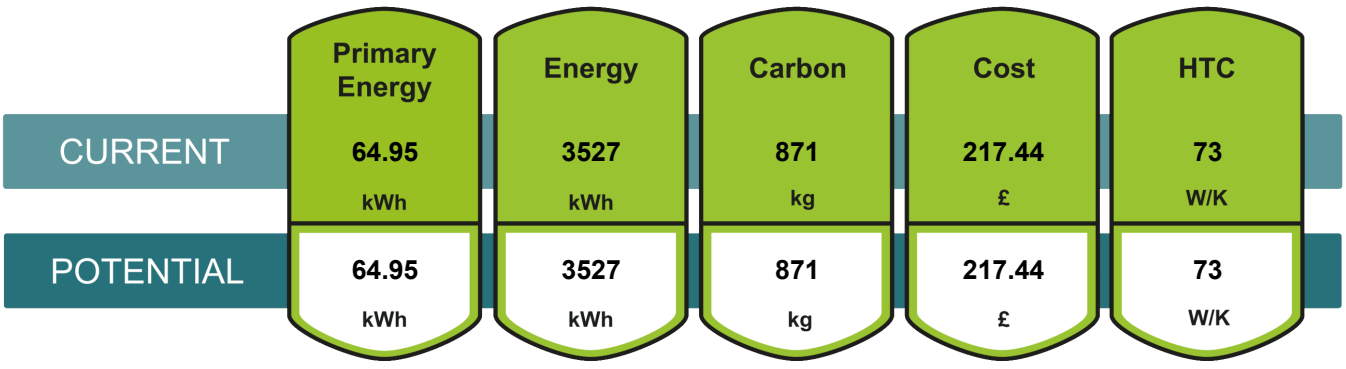
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£20	A 94			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£58	£58	
Heating	£250	£250	
Hot Water	£158	£158	
New Technologies e.g. Impact of PV	-(£249)	-(£249)	
TOTAL	£217	£217	

Estimated energy use and potential savings

Space Heating
2204
kWh per year

Water Heating
2816
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (MT)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	11.01	**TER**	11.01
Environmental	91 B	**% DER < TER**			0.00
CO_2 Emissions (t/year)	0.79	**DFEE**	30.03	**TFEE**	30.05
Compliance Check	See BREL	**% DFEE < TFEE**			0.07
% DPER < TPER	-1.52	**DPER**	58.34	**TPER**	57.47

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	301.48	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	35.60 m²	2.30 m
1st Storey:	1.00 m	35.60 m²	2.60 m

8.0 Living Area	13.30	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	43.10	31.50	0.00	None	11.60	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	86.00	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	55.60
FF Partitions	Plasterboard on timber frame	9.00	62.60

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	35.60	35.60	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	35.60

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	35.60

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	35.60

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	West	2.10	0
Front	Window	External Wall	West	3.70	0
Rear	Window	External Wall	East	5.80	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	8.30	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	6.10	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	19.60	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	8.40	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	8.40	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	0.00	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	0.00	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	20.40	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	16.80	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	16.80	0.10	0.10	RCDs	No

Y-value	0.05	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	4
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0

Summary for Input Data

Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No

Summary for Input Data

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

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
2.30	West	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 94	A 93
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (MT)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	11.01	**TER**	11.01
Environmental	91 B	**% DER < TER**			0.00
CO_2 Emissions (t/year)	0.79	**DFEE**	30.03	**TFEE**	30.05
Compliance Check	See BREL	**% DFEE < TFEE**			0.07
% DPER < TPER	-1.52	**DPER**	58.34	**TPER**	57.47

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(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)
		Air changes per hour		
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			4.5000	(17)
Infiltration rate			0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			9.5000	1.2357	11.7395			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	43.1000	11.6000	31.5000	0.1900	5.9850	140.0000	4409.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.6465			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000	140.0000	12040.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21465.3998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 301.4803 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	8.3000	0.0500	0.4150
E3	Sill	6.1000	0.0210	0.1281
E4	Jamb	19.6000	0.0160	0.3136
E5	Ground floor (normal)	8.4000	0.0740	0.6216
E6	Intermediate floor within a dwelling	8.4000	0.0010	0.0084
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	0.0000	0.0570	0.0000
E16	Corner (normal)	0.0000	0.0470	0.0000
E18	Party wall between dwellings	20.4000	0.0380	0.7752
P1	Party wall - Ground floor	16.8000	0.1080	1.8144
P4	Party wall - Roof (insulation at ceiling level)	16.8000	0.1010	1.6968

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.2603 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 35.9068 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	(38)
Heat transfer coeff	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	(39)

Average = Sum(39)m / 12 = 64.6894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	(40)
HLP (average)												0.9086	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers

85.7481	84.4595	82.5817	78.9889	76.3375	73.3807	71.7001	73.5636	75.6065	78.7812	82.4511	85.4196	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day) 138.5148 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.6165	147.5485	143.7281	137.7173	132.9088	127.7102	125.5637	129.3659	133.3971	138.8740	144.9834	150.1968	(44)
Energy conte	238.5396	210.1072	220.9048	188.5281	178.9208	157.0346	151.8584	160.1820	164.4920	188.4507	206.5554	235.1719	(45)

Energy content (annual) Total = Sum(45)m = 2300.7456

Distribution loss (46)m = 0.15 x (45)m

35.7809	31.5161	33.1357	28.2792	26.8381	23.5552	22.7788	24.0273	24.6738	28.2676	30.9833	35.2758	(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)
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)
14.9325	13.4714	14.8796	14.3239	14.7537	14.2294	14.6725	14.6975	14.2518	14.7823	14.3780	14.9224	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(62)
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)
-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)
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)
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)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)

Total per year (kWh/year) = Sum(64)m = 2475.0405 (64)

12Total per year (kWh/year) 2475 (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

83.0476	73.2285	77.1708	66.2666	63.1796	55.7714	54.1610	56.9349	58.2565	66.3554	72.2742	81.9253	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	111.6231	108.9709	103.7241	92.0369	84.9188	77.4602	72.7971	76.5254	80.9118	89.1874	100.3808	110.1146	(72)
Total internal gains	481.2419	492.3889	470.1872	451.0087	426.1834	406.1574	389.0190	390.6711	403.9367	422.7034	451.6041	470.9053	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)

Total gains	538.2639	603.9361	653.8895	718.9277	754.5281	742.2767	709.0182	665.5457	617.5901	555.0636	522.7039	517.7975	(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	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	
alpha	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	
util living area													
	0.9965	0.9913	0.9757	0.9112	0.7593	0.5539	0.4011	0.4463	0.7015	0.9440	0.9912	0.9974	(86)
MIT	20.2681	20.4041	20.5963	20.8282	20.9614	20.9962	20.9997	20.9993	20.9824	20.7998	20.4872	20.2325	(87)
Th 2	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	(88)
util rest of house													
	0.9952	0.9882	0.9669	0.8829	0.7037	0.4832	0.3248	0.3653	0.6255	0.9192	0.9874	0.9964	(89)
MIT 2	19.5005	19.6349	19.8219	20.0342	20.1382	20.1588	20.1602	20.1601	20.1525	20.0146	19.7179	19.4651	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.6438	19.7786	19.9666	20.1825	20.2920	20.3152	20.3170	20.3168	20.3076	20.1612	19.8616	19.6085	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6438	19.7786	19.9666	20.1825	20.2920	20.3152	20.3170	20.3168	20.3076	20.1612	19.8616	19.6085	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9864	0.9644	0.8837	0.7128	0.4964	0.3390	0.3805	0.6394	0.9192	0.9856	0.9955	(94)
Useful gains	535.1330	595.6973	630.6414	635.3438	537.8377	368.4350	240.3792	253.2199	394.8787	510.2120	515.2010	515.4761	(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													
	992.5844	962.4882	871.1441	729.8577	555.8107	369.7152	240.4493	253.3781	401.5636	618.5111	825.5383	996.7658	(97)
Space heating kWh													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98a)
Space heating requirement - total per year (kWh/year)												1509.2802	
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													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1509.2802	
Space heating per m2											(98c) / (4) =	21.1978	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	382.4088	276.9477	201.0494	76.4607	15.0247	0.0000	0.0000	0.0000	0.0000	90.5332	251.0594	402.3366	(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													
	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.2663	88.1832	88.0254	87.7209	87.4078	87.3000	87.3000	87.3000	87.3000	87.7760	88.1466	88.2930	(217)
Fuel for water heating, kWh/month													
	287.1675	253.5386	267.8594	231.2470	221.5757	196.1788	190.7570	200.3201	204.7466	231.5359	250.6431	283.2551	(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	9.0427	8.1676	9.0427	8.7510	9.0427	8.7510	9.0427	9.0427	8.7510	9.0427	8.7510	9.0427	(231)
Lighting	28.2827	22.6895	20.4293	14.9674	11.5613	9.4457	10.5466	13.7088	17.8064	23.3630	26.3884	29.0688	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-25.2981	-39.4195	-62.8284	-76.0711	-84.8649	-80.0602	-78.8096	-72.8591	-61.9128	-47.3779	-28.8390	-21.2551	(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	-11.1261	-27.0934	-64.4113	-112.6344	-162.5251	-168.6351	-164.3144	-130.3373	-84.2605	-41.5666	-15.5263	-8.4258	(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												1695.8205	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2818.8248	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)		
mechanical ventilation fans (SFP = 0.0962)	20.4707	(230a)
central heating pump	41.0000	(230c)

main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	106.4707	(231)
Electricity for lighting (calculated in Appendix L)	228.2579	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1670.4518	(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	3178.9221	(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	1695.8205	0.2100	356.1223	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2818.8248	0.2100	591.9532	(264)
Space and water heating			948.0755	(265)
Pumps, fans and electric keep-hot	106.4707	0.1387	14.7688	(267)
Energy for lighting	228.2579	0.1443	32.9447	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-679.5955	0.1331	-90.4551	
PV Unit electricity exported	-990.8563	0.1223	-121.2015	
Total			-211.6566	(269)
Total CO2, kg/year			784.1324	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.0100	(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	1695.8205	1.1300	1916.2772	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2818.8248	1.1300	3185.2720	(278)
Space and water heating			5101.5492	(279)
Pumps, fans and electric keep-hot	106.4707	1.5128	161.0688	(281)
Energy for lighting	228.2579	1.5338	350.1096	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-679.5955	1.4918	-1013.8509	
PV Unit electricity exported	-990.8563	0.4488	-444.7232	
Total			-1458.5740	(283)
Total Primary energy kWh/year			4154.1536	(286)
Dwelling Primary energy Rate (DPER)			58.3400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000	(1b)	x 2.3000	(2b) =	81.8800	(1b) - (3b)
First floor	35.6000	(1c)	x 2.6000	(2c) =	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		174.4400	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4220	(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) =	0.3587	(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	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215 (22b)
Effective ac	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			9.5000	1.1450	10.8779			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	43.1000	11.6000	31.5000	0.1800	5.6700			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.1919			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 301.4803 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.3000	0.0500	0.4150
E3 Sill	6.1000	0.0500	0.3050
E4 Jamb	19.6000	0.0500	0.9800
E5 Ground floor (normal)	8.4000	0.1600	1.3440
E6 Intermediate floor within a dwelling	8.4000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	20.4000	0.0600	1.2240
P1 Party wall - Ground floor	16.8000	0.0800	1.3440
P4 Party wall - Roof (insulation at ceiling level)	16.8000	0.1200	2.0160

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.1320 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 35.3239 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff	70.1261	69.8923	69.6632	68.5870	68.3857	67.4484	67.4484	67.2748	67.8094	68.3857	68.7930	69.2189	(39)
Average = Sum(39)m / 12 =												68.5861	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9849	0.9816	0.9784	0.9633	0.9605	0.9473	0.9473	0.9449	0.9524	0.9605	0.9662	0.9722	(40)
HLP (average)												0.9633	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	62.3623	61.4251	60.0594	57.4465	55.5182	53.3678	52.1455	53.5008	54.9865	57.2954	59.9645	62.1233	(42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)
Average daily hot water use (litres/day)												116.9539	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.2306	124.5141	121.2058	116.1748	112.0895	107.6973	106.0091	109.3031	112.7772	117.3882	122.4967	126.9006	(44)
Energy conte	201.5022	177.3065	186.2889	159.0376	150.8940	132.4264	128.2088	135.3401	139.0655	159.2947	174.5191	198.6956	(45)
Energy content (annual)										Total = Sum(45)m =		1942.5793	
Distribution loss (46)m = 0.15 x (45)m	30.2253	26.5960	27.9433	23.8556	22.6341	19.8640	19.2313	20.3010	20.8598	23.8942	26.1779	29.8043	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	252.4611	223.3339	237.2478	208.3526	201.8529	181.7415	179.1677	186.2990	188.3806	210.2536	223.8341	249.6545	(62)
WWHRS	-28.5094	-25.2140	-26.4026	-21.8624	-20.3750	-17.4350	-16.3426	-17.3787	-18.0389	-21.2659	-24.0917	-27.9815	(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	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
										Total per year (kWh/year) = Sum(64)m =		2277.6816	(64)
12Total per year (kWh/year)												2278	(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	79.7392	70.4612	74.6808	65.2088	62.9120	56.3606	55.3692	57.7403	58.5681	65.7052	70.3564	78.8060	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	107.1763	104.8530	100.3774	90.5677	84.5591	78.2785	74.4209	77.6079	81.3445	88.3135	97.7172	105.9221	(72)
Total internal gains	476.7952	488.2710	466.8404	449.5396	425.8237	406.9757	390.6428	391.7536	404.3694	421.8295	448.9404	466.7128	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)
Total gains	533.8172	599.8182	650.5428	717.4585	754.1684	743.0950	710.6421	666.6282	618.0228	554.1896	520.0402	513.6049	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	85.0270	85.3114	85.5920	86.9349	87.1909	88.4026	88.4026	88.6307	87.9319	87.1909	86.6746	86.1414	
alpha	6.6685	6.6874	6.7061	6.7957	6.8127	6.8935	6.8935	6.9087	6.8621	6.8127	6.7783	6.7428	
util living area	0.9971	0.9930	0.9807	0.9258	0.7871	0.5751	0.4170	0.4630	0.7264	0.9529	0.9926	0.9977	(86)
MIT	20.1509	20.2956	20.5049	20.7790	20.9434	20.9942	20.9994	20.9989	20.9747	20.7557	20.4134	20.1337	(87)
Th 2	20.0959	20.0987	20.1014	20.1140	20.1164	20.1275	20.1275	20.1295	20.1232	20.1164	20.1116	20.1066	(88)
util rest of house	0.9960	0.9904	0.9734	0.8999	0.7306	0.4995	0.3347	0.3761	0.6473	0.9305	0.9893	0.9969	(89)
MIT 2	19.1135	19.2996	19.5647	19.9027	20.0743	20.1247	20.1273	20.1292	20.1088	19.8851	19.4604	19.0999	(90)
Living area fraction									fLA = Living area / (4) =			0.1868	(91)
MIT	19.3073	19.4857	19.7403	20.0664	20.2366	20.2871	20.2902	20.2917	20.2705	20.0477	19.6384	19.2930	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3073	19.4857	19.7403	20.0664	20.2366	20.2871	20.2902	20.2917	20.2705	20.0477	19.6384	19.2930	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9946	0.9879	0.9696	0.8983	0.7387	0.5136	0.3501	0.3924	0.6613	0.9284	0.9869	0.9957	(94)
Useful gains	530.9554	592.5809	630.7576	644.5151	557.1378	381.6327	248.7836	261.5615	408.6689	514.5062	513.2175	511.4205	(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	1052.4004	1019.4275	922.3654	765.8697	583.7837	383.5880	248.9006	261.8112	418.4213	646.0875	862.5568	1044.7197	(97)
Space heating kWh	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98a)
Space heating requirement - total per year (kWh/year)												1745.1474	
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	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1745.1474	
Space heating per m2										(98c) / (4) =		24.5105	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	419.8647	310.4339	234.8011	94.5620	21.4552	0.0000	0.0000	0.0000	0.0000	105.9486	272.2124	429.4097	(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	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.5468	85.1734	84.4428	82.8573	81.0724	80.3000	80.3000	80.3000	80.3000	83.0413	84.8765	85.6135	(217)
Fuel for water heating, kWh/month	261.7884	232.6076	249.6901	225.0740	223.8468	204.6158	202.7711	210.3615	212.1316	227.5828	235.3331	258.9231	(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	22.7340	18.2381	16.4214	12.0310	9.2931	7.5925	8.4775	11.0193	14.3130	18.7795	21.2114	23.3659	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.4439	-47.2129	-67.9535	-76.5124	-82.6038	-77.1508	-76.2191	-71.9254	-64.3327	-54.0655	-36.7995	-28.9086	(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	-18.6815	-39.3323	-78.2340	-117.5799	-155.5368	-156.2902	-154.4293	-130.7020	-95.7457	-56.2474	-24.9436	-14.7683	(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	1888.6876	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2744.7258	(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)	183.4768	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1759.6191	(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	3143.2711	(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	1888.6876	0.2100	396.6244	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2744.7258	0.2100	576.3924	(264)
Space and water heating			973.0168	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	183.4768	0.1443	26.4814	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-717.1281	0.1346	-96.4917	
PV Unit electricity exported	-1042.4910	0.1259	-131.2282	
Total			-227.7198	(269)
Total CO2, kg/year			783.7076	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0100	(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	1888.6876	1.1300	2134.2170	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2744.7258	1.1300	3101.5402	(278)
Space and water heating			5235.7572	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	183.4768	1.5338	281.4228	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-717.1281	1.4973	-1073.7436	
PV Unit electricity exported	-1042.4910	0.4621	-481.6971	
Total			-1555.4407	(283)
Total Primary energy kWh/year			4091.8401	(286)
Target Primary Energy Rate (TPER)			57.4700	(287)

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (MT)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	11.01	**TER**	11.01
Environmental	91 B	**% DER < TER**			0.00
CO_2 Emissions (t/year)	0.79	**DFEE**	30.03	**TFEE**	30.05
Compliance Check	See BREL	**% DFEE < TFEE**			0.07
% DPER < TPER	-1.52	**DPER**	58.34	**TPER**	57.47

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(5)

---

2. Ventilation rate

---

			m3 per hour	
Number of open chimneys		0 * 80 =	0.0000	(6a)
Number of open flues		0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000	(6d)
Number of flues attached to other heater		0 * 35 =	0.0000	(6e)
Number of blocked chimneys		0 * 20 =	0.0000	(6f)
Number of intermittent extract fans		3 * 10 =	30.0000	(7a)
Number of passive vents		0 * 10 =	0.0000	(7b)
Number of flueless gas fires		0 * 40 =	0.0000	(7c)
			Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		30.0000 / (5) =	0.1720	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3970	(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) =	0.3374	(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	0.4302	0.4218	0.4134	0.3712	0.3627	0.3206	0.3206	0.3121	0.3374	0.3627	0.3796	0.3965	(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	0.5925	0.5890	0.5854	0.5689	0.5658	0.5514	0.5514	0.5487	0.5569	0.5658	0.5721	0.5786	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			9.5000	1.2357	11.7395			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	43.1000	11.6000	31.5000	0.1900	5.9850	140.0000	4409.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.6465			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000	140.0000	12040.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21465.3998	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							301.4803	(35)
List of Thermal Bridges								

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	8.3000	0.0500	0.4150	
E3 Sill	6.1000	0.0210	0.1281	
E4 Jamb	19.6000	0.0160	0.3136	
E5 Ground floor (normal)	8.4000	0.0740	0.6216	
E6 Intermediate floor within a dwelling	8.4000	0.0010	0.0084	
E10 Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872	
E12 Gable (insulation at ceiling level)	0.0000	0.0570	0.0000	
E16 Corner (normal)	0.0000	0.0470	0.0000	
E18 Party wall between dwellings	20.4000	0.0380	0.7752	
P1 Party wall - Ground floor	16.8000	0.1080	1.8144	
P4 Party wall - Roof (insulation at ceiling level)	16.8000	0.1010	1.6968	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.2603	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	35.9068	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.1101	33.9032	33.7004	32.7480	32.5698	31.7403	31.7403	31.5867	32.0598	32.5698	32.9303	33.3072	(38)
Heat transfer coeff	70.0169	69.8101	69.6073	68.6549	68.4767	67.6471	67.6471	67.4935	67.9666	68.4767	68.8371	69.2140	(39)
Average = Sum(39)m / 12 =												68.6540	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9834	0.9805	0.9776	0.9643	0.9618	0.9501	0.9501	0.9479	0.9546	0.9618	0.9668	0.9721	(40)
HLP (average)												0.9642	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2749	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)
Average daily hot water use (litres/day)												59.4579	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.8683	63.0890	61.1464	58.7284	56.5713	54.3295	53.8636	55.8023	57.7907	60.0928	62.5323	64.7772	(44)
Energy conte	102.7356	89.8379	93.9798	80.3962	76.1558	66.8045	65.1434	69.0949	71.2617	81.5454	89.0887	101.4255	(45)
Energy content (annual)										Total = Sum(45)m =		987.4692	
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	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(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	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(64)
										Total per year (kWh/year) = Sum(64)m =		839.3488	(64)
12Total per year (kWh/year)												839	(64)
Electric shower(s)	49.9418	44.4985	48.5907	46.3695	47.2396	45.0620	46.5641	47.2396	46.3695	48.5907	47.6770	49.9418	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		568.0850	(64a)
Heat gains from water heating, kWh/month	34.3168	30.2152	32.1184	28.6766	27.9930	25.4615	25.4840	26.4926	26.7355	29.4761	30.8506	34.0384	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	46.1247	44.9631	43.1699	39.8286	37.6250	35.3631	34.2527	35.6083	37.1326	39.6184	42.8481	45.7505	(72)
Total internal gains	412.7435	425.3810	406.6329	395.8004	375.8896	364.0603	350.4746	349.7540	360.1575	370.1344	391.0713	403.5412	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)
Total gains	469.7655	536.9283	590.3353	663.7193	704.2343	700.1796	670.4738	624.6286	573.8109	502.4946	462.1711	450.4333	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	85.1596	85.4119	85.6607	86.8491	87.0751	88.1429	88.1429	88.3435	87.7285	87.0751	86.6191	86.1474	
alpha	6.6773	6.6941	6.7107	6.7899	6.8050	6.8762	6.8762	6.8896	6.8486	6.8050	6.7746	6.7432	
util living area	0.9986	0.9963	0.9885	0.9470	0.8241	0.6095	0.4430	0.4950	0.7701	0.9706	0.9963	0.9990	(86)
MIT	20.0691	20.2165	20.4334	20.7303	20.9246	20.9917	20.9992	20.9983	20.9638	20.7006	20.3383	20.0506	(87)
Th 2	20.0972	20.0996	20.1020	20.1132	20.1153	20.1251	20.1251	20.1269	20.1213	20.1153	20.1111	20.1066	(88)
util rest of house	0.9981	0.9948	0.9838	0.9265	0.7703	0.5305	0.3555	0.4023	0.6915	0.9550	0.9945	0.9986	(89)
MIT 2	19.2501	19.3987	19.6149	19.9066	20.0702	20.1220	20.1250	20.1266	20.1047	19.8863	19.5298	19.2393	(90)
Living area fraction									fLA = Living area / (4) =			0.1868	(91)
MIT	19.4031	19.5515	19.7678	20.0605	20.2298	20.2845	20.2883	20.2894	20.2652	20.0384	19.6809	19.3909	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4031	19.5515	19.7678	20.0605	20.2298	20.2845	20.2883	20.2894	20.2652	20.0384	19.6809	19.3909	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9975	0.9936	0.9815	0.9251	0.7778	0.5451	0.3719	0.4196	0.7053	0.9533	0.9933	0.9981	(94)
Useful gains	468.6051	533.4916	579.4186	613.9846	547.7491	381.6981	249.3249	262.1209	404.6821	479.0381	459.0868	449.5844	(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	1057.4699	1022.8217	923.5354	766.2233	584.0931	384.5369	249.4999	262.5091	419.0261	646.3097	866.0304	1051.4217	(97)
Space heating kWh	438.1154	328.8299	256.0229	109.6119	27.0400	0.0000	0.0000	0.0000	0.0000	124.4501	292.9994	447.7669	(98a)
Space heating requirement - total per year (kWh/year)												2024.8364	
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	438.1154	328.8299	256.0229	109.6119	27.0400	0.0000	0.0000	0.0000	0.0000	124.4501	292.9994	447.7669	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2024.8364	
Space heating per m2										(98c) / (4) =		28.4387	(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	635.8829	500.5886	512.9506	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9403	0.9767	0.9624	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	597.8984	488.9123	493.6724	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	770.8115	738.4541	687.0694	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	124.4974	185.6591	143.8874	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	31.1244	46.4148	35.9718	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												113.5110	(107)
Energy for space heating												28.4387	(99)
Energy for space cooling												1.5943	(108)
Total												30.0330	(109)
Fabric Energy Efficiency (DFEE)												30.0	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)			Volume (m3)	
Main dwelling							
Ground floor	35.6000	(1b)	x 2.3000	(2b)	=	81.8800	(1b) - (3b)
First floor	35.6000	(1c)	x 2.6000	(2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(5)

---

2. Ventilation rate

---

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

Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4220 (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) =	0.3587 (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													
	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215	(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	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			9.5000	1.1450	10.8779			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	43.1000	11.6000	31.5000	0.1800	5.6700			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		27.1919			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	301.4803 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	8.3000	0.0500	0.4150
E3 Sill	6.1000	0.0500	0.3050
E4 Jamb	19.6000	0.0500	0.9800
E5 Ground floor (normal)	8.4000	0.1600	1.3440
E6 Intermediate floor within a dwelling	8.4000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	20.4000	0.0600	1.2240
P1 Party wall - Ground floor	16.8000	0.0800	1.3440
P4 Party wall - Roof (insulation at ceiling level)	16.8000	0.1200	2.0160

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		8.1320 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	35.3239 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff													
	70.1261	69.8923	69.6632	68.5870	68.3857	67.4484	67.4484	67.2748	67.8094	68.3857	68.7930	69.2189	(39)
Average = Sum(39)m / 12 =												68.5861	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9849	0.9816	0.9784	0.9633	0.9605	0.9473	0.9473	0.9449	0.9524	0.9605	0.9662	0.9722	(40)
HLP (average)												0.9633	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.2749 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day)	59.4579 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	64.8683	63.0890	61.1464	58.7284	56.5713	54.3295	53.8636	55.8023	57.7907	60.0928	62.5323	64.7772	(44)
Energy conte	102.7356	89.8379	93.9798	80.3962	76.1558	66.8045	65.1434	69.0949	71.2617	81.5454	89.0887	101.4255	(45)
Energy content (annual)										Total = Sum(45)m =		987.4692	
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													
	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(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													
	87.3252	76.3622	79.8828	68.3368	64.7324	56.7838	55.3719	58.7307	60.5724	69.3136	75.7254	86.2117	(64)
										Total per year (kWh/year) = Sum(64)m =		839.3488	(64)
12Total per year (kWh/year)												839	(64)
Electric shower(s)													
	49.9418	44.4985	48.5907	46.3695	47.2396	45.0620	46.5641	47.2396	46.3695	48.5907	47.6770	49.9418	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 568.0850 (64a)

Heat gains from water heating, kWh/month

	34.3168	30.2152	32.1184	28.6766	27.9930	25.4615	25.4840	26.4926	26.7355	29.4761	30.8506	34.0384 (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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533 (68)

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

	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)

Losses e.g. evaporation (negative values) (Table 5)

	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961 (71)

Water heating gains (Table 5)

	46.1247	44.9631	43.1699	39.8286	37.6250	35.3631	34.2527	35.6083	37.1326	39.6184	42.8481	45.7505 (72)

Total internal gains

	412.7435	425.3810	406.6329	395.8004	375.8896	364.0603	350.4746	349.7540	360.1575	370.1344	391.0713	403.5412 (73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)
Total gains	469.7655	536.9283	590.3353	663.7193	704.2343	700.1796	670.4738	624.6286	573.8109	502.4946	462.1711	450.4333	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	85.0270	85.3114	85.5920	86.9349	87.1909	88.4026	88.4026	88.6307	87.9319	87.1909	86.6746	86.1414	
alpha	6.6685	6.6874	6.7061	6.7957	6.8127	6.8935	6.8935	6.9087	6.8621	6.8127	6.7783	6.7428	
util living area	0.9986	0.9963	0.9885	0.9468	0.8235	0.6079	0.4417	0.4935	0.7690	0.9705	0.9962	0.9990	(86)
MIT	20.0670	20.2149	20.4324	20.7313	20.9252	20.9919	20.9992	20.9984	20.9644	20.7017	20.3390	20.0505	(87)
Th 2	20.0959	20.0987	20.1014	20.1140	20.1164	20.1275	20.1275	20.1295	20.1232	20.1164	20.1116	20.1066	(88)
util rest of house	0.9981	0.9948	0.9838	0.9263	0.7697	0.5292	0.3547	0.4012	0.6904	0.9549	0.9945	0.9986	(89)
MIT 2	19.2468	19.3963	19.6134	19.9082	20.0717	20.1244	20.1273	20.1292	20.1068	19.8883	19.5310	19.2392	(90)
Living area fraction									fLA = Living area / (4) =			0.1868	(91)
MIT	19.4000	19.5492	19.7664	20.0619	20.2311	20.2865	20.2902	20.2915	20.2670	20.0402	19.6820	19.3907	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4000	19.5492	19.7664	20.0619	20.2311	20.2865	20.2902	20.2915	20.2670	20.0402	19.6820	19.3907	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9975	0.9936	0.9815	0.9249	0.7772	0.5438	0.3710	0.4185	0.7042	0.9532	0.9933	0.9981	(94)
Useful gains	468.6060	533.4964	579.4348	613.8699	547.3557	380.7830	248.7275	261.4271	404.0726	478.9688	459.0843	449.5845	(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	1058.9047	1023.8696	924.1782	765.5644	583.4049	383.5436	248.8965	261.8015	418.1814	645.5759	865.5507	1051.4858	(97)
Space heating kWh	439.1823	329.5307	256.4891	109.2200	26.8206	0.0000	0.0000	0.0000	0.0000	123.9557	292.6558	447.8146	(98a)
Space heating requirement - total per year (kWh/year)												2025.6688	
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	439.1823	329.5307	256.4891	109.2200	26.8206	0.0000	0.0000	0.0000	0.0000	123.9557	292.6558	447.8146	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2025.6688	
Space heating per m2											(98c) / (4) =	28.4504	(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	634.0148	499.1180	511.2885	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9413	0.9772	0.9632	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	596.7882	487.7327	492.4894	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	770.8115	738.4541	687.0694	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.2967	186.5367	144.7675	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	31.3242	46.6342	36.1919	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.1502	(107)
Energy for space heating												28.4504	(99)
Energy for space cooling												1.6032	(108)

Total	30.0536 (109)
Fabric Energy Efficiency (TFEE)	30.1 (109)

Full SAP Calculation Printout

Property Reference	Ashburton	**Issued on Date**	14/04/2025
Assessment Reference	Ashburton (MT)	**Prop Type Ref**	
Property	Ashburton, Crabtree Lane, Openshaw		

SAP Rating	93 A	**DER**	11.01	**TER**	11.01
Environmental	91 B	**% DER < TER**			0.00
CO_2 Emissions (t/year)	0.79	**DFEE**	30.03	**TFEE**	30.05
Compliance Check	See BREL	**% DFEE < TFEE**			0.07
% DPER < TPER	-1.52	**DPER**	58.34	**TPER**	57.47

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000 (1b)	x	2.3000 (2b)	=	81.8800	(1b) - (3b)
First floor	35.6000 (1c)	x	2.6000 (2c)	=	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	174.4400	(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)
		Air changes per hour		
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			4.5000	(17)
Infiltration rate			0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			9.5000	1.2357	11.7395			(27)
Ground Floor			35.6000	0.1700	6.0520	75.0000	2670.0000	(28a)
External Wall	43.1000	11.6000	31.5000	0.1900	5.9850	140.0000	4409.9998	(29a)
External Roof	35.6000		35.6000	0.1000	3.5600	9.0000	320.4000	(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.6465			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000	140.0000	12040.0000	(32)
GF Partitions			55.6000			9.0000	500.4000	(32c)
FF Partitions			62.6000			9.0000	563.4000	(32c)
Internal Floor			35.6000			18.0000	640.8000	(32d)
Internal Ceiling			35.6000			9.0000	320.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		21465.3998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 301.4803 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	8.3000	0.0500	0.4150
E3	Sill	6.1000	0.0210	0.1281
E4	Jamb	19.6000	0.0160	0.3136
E5	Ground floor (normal)	8.4000	0.0740	0.6216
E6	Intermediate floor within a dwelling	8.4000	0.0010	0.0084
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	0.0000	0.0570	0.0000
E16	Corner (normal)	0.0000	0.0470	0.0000
E18	Party wall between dwellings	20.4000	0.0380	0.7752
P1	Party wall - Ground floor	16.8000	0.1080	1.8144
P4	Party wall - Roof (insulation at ceiling level)	16.8000	0.1010	1.6968

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.2603 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 35.9068 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	28.7826	(38)
Heat transfer coeff	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	64.6894	(39)

Average = Sum(39)m / 12 = 64.6894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	0.9086	(40)
HLP (average)												0.9086	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

Hot water usage for mixer showers

85.7481	84.4595	82.5817	78.9889	76.3375	73.3807	71.7001	73.5636	75.6065	78.7812	82.4511	85.4196	(42a)

Hot water usage for baths

26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)

Hot water usage for other uses

37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)

Average daily hot water use (litres/day) 138.5148 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	150.6165	147.5485	143.7281	137.7173	132.9088	127.7102	125.5637	129.3659	133.3971	138.8740	144.9834	150.1968	(44)
Energy conte	238.5396	210.1072	220.9048	188.5281	178.9208	157.0346	151.8584	160.1820	164.4920	188.4507	206.5554	235.1719	(45)

Energy content (annual) Total = Sum(45)m = 2300.7456

Distribution loss (46)m = 0.15 x (45)m

35.7809	31.5161	33.1357	28.2792	26.8381	23.5552	22.7788	24.0273	24.6738	28.2676	30.9833	35.2758	(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)
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)
14.9325	13.4714	14.8796	14.3239	14.7537	14.2294	14.6725	14.6975	14.2518	14.7823	14.3780	14.9224	(61)

Primary loss

Combi loss

Total heat required for water heating calculated for each month

253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(62)
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)
-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)
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)
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)

WWHRS

PV diverter

Solar input

FGHRS

Output from w/h

253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)

Total per year (kWh/year) = Sum(64)m = 2475.0405 (64)

12Total per year (kWh/year) 2475 (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

83.0476	73.2285	77.1708	66.2666	63.1796	55.7714	54.1610	56.9349	58.2565	66.3554	72.2742	81.9253	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	111.6231	108.9709	103.7241	92.0369	84.9188	77.4602	72.7971	76.5254	80.9118	89.1874	100.3808	110.1146	(72)
Total internal gains	481.2419	492.3889	470.1872	451.0087	426.1834	406.1574	389.0190	390.6711	403.9367	422.7034	451.6041	470.9053	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)

Total gains	538.2639	603.9361	653.8895	718.9277	754.5281	742.2767	709.0182	665.5457	617.5901	555.0636	522.7039	517.7975	(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	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	92.1729	
alpha	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	7.1449	
util living area													
	0.9965	0.9913	0.9757	0.9112	0.7593	0.5539	0.4011	0.4463	0.7015	0.9440	0.9912	0.9974	(86)
MIT	20.2681	20.4041	20.5963	20.8282	20.9614	20.9962	20.9997	20.9993	20.9824	20.7998	20.4872	20.2325	(87)
Th 2	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	20.1602	(88)
util rest of house													
	0.9952	0.9882	0.9669	0.8829	0.7037	0.4832	0.3248	0.3653	0.6255	0.9192	0.9874	0.9964	(89)
MIT 2	19.5005	19.6349	19.8219	20.0342	20.1382	20.1588	20.1602	20.1601	20.1525	20.0146	19.7179	19.4651	(90)
Living area fraction										fLA = Living area / (4) =		0.1868	(91)
MIT	19.6438	19.7786	19.9666	20.1825	20.2920	20.3152	20.3170	20.3168	20.3076	20.1612	19.8616	19.6085	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.6438	19.7786	19.9666	20.1825	20.2920	20.3152	20.3170	20.3168	20.3076	20.1612	19.8616	19.6085	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9864	0.9644	0.8837	0.7128	0.4964	0.3390	0.3805	0.6394	0.9192	0.9856	0.9955	(94)
Useful gains	535.1330	595.6973	630.6414	635.3438	537.8377	368.4350	240.3792	253.2199	394.8787	510.2120	515.2010	515.4761	(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													
	992.5844	962.4882	871.1441	729.8577	555.8107	369.7152	240.4493	253.3781	401.5636	618.5111	825.5383	996.7658	(97)
Space heating kWh													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98a)
Space heating requirement - total per year (kWh/year)												1509.2802	
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													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1509.2802	
Space heating per m2											(98c) / (4) =	21.1978	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	340.3438	246.4835	178.9340	68.0500	13.3720	0.0000	0.0000	0.0000	0.0000	80.5745	223.4429	358.0795	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	382.4088	276.9477	201.0494	76.4607	15.0247	0.0000	0.0000	0.0000	0.0000	90.5332	251.0594	402.3366	(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													
	253.4722	223.5786	235.7844	202.8520	193.6745	171.2641	166.5309	174.8795	178.7438	203.2329	220.9334	250.0944	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.2663	88.1832	88.0254	87.7209	87.4078	87.3000	87.3000	87.3000	87.3000	87.7760	88.1466	88.2930	(217)
Fuel for water heating, kWh/month													
	287.1675	253.5386	267.8594	231.2470	221.5757	196.1788	190.7570	200.3201	204.7466	231.5359	250.6431	283.2551	(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	9.0427	8.1676	9.0427	8.7510	9.0427	8.7510	9.0427	9.0427	8.7510	9.0427	8.7510	9.0427	(231)
Lighting	28.2827	22.6895	20.4293	14.9674	11.5613	9.4457	10.5466	13.7088	17.8064	23.3630	26.3884	29.0688	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-25.2981	-39.4195	-62.8284	-76.0711	-84.8649	-80.0602	-78.8096	-72.8591	-61.9128	-47.3779	-28.8390	-21.2551	(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	-11.1261	-27.0934	-64.4113	-112.6344	-162.5251	-168.6351	-164.3144	-130.3373	-84.2605	-41.5666	-15.5263	-8.4258	(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												1695.8205	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												2818.8248	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)		
mechanical ventilation fans (SFP = 0.0962)	20.4707	(230a)
central heating pump	41.0000	(230c)

main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	106.4707	(231)
Electricity for lighting (calculated in Appendix L)	228.2579	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1670.4518	(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	3178.9221	(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	1695.8205	0.2100	356.1223	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2818.8248	0.2100	591.9532	(264)
Space and water heating			948.0755	(265)
Pumps, fans and electric keep-hot	106.4707	0.1387	14.7688	(267)
Energy for lighting	228.2579	0.1443	32.9447	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-679.5955	0.1331	-90.4551	
PV Unit electricity exported	-990.8563	0.1223	-121.2015	
Total			-211.6566	(269)
Total CO2, kg/year			784.1324	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.0100	(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	1695.8205	1.1300	1916.2772	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2818.8248	1.1300	3185.2720	(278)
Space and water heating			5101.5492	(279)
Pumps, fans and electric keep-hot	106.4707	1.5128	161.0688	(281)
Energy for lighting	228.2579	1.5338	350.1096	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-679.5955	1.4918	-1013.8509	
PV Unit electricity exported	-990.8563	0.4488	-444.7232	
Total			-1458.5740	(283)
Total Primary energy kWh/year			4154.1536	(286)
Dwelling Primary energy Rate (DPER)			58.3400	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	35.6000	(1b)	x 2.3000	(2b) =	81.8800	(1b) - (3b)
First floor	35.6000	(1c)	x 2.6000	(2c) =	92.5600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		174.4400	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1720	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4220	(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) =	0.3587	(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	0.4573	0.4484	0.4394	0.3946	0.3856	0.3407	0.3407	0.3318	0.3587	0.3856	0.4035	0.4215 (22b)
Effective ac	0.6046	0.6005	0.5965	0.5778	0.5743	0.5581	0.5581	0.5550	0.5643	0.5743	0.5814	0.5888 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			9.5000	1.1450	10.8779			(27)
Ground Floor			35.6000	0.1300	4.6280			(28a)
External Wall	43.1000	11.6000	31.5000	0.1800	5.6700			(29a)
External Roof	35.6000		35.6000	0.1100	3.9160			(30)
Total net area of external elements Aum(A, m2)			114.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.1919			(33)
Main dwelling								
Party Wall			86.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 301.4803 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.3000	0.0500	0.4150
E3 Sill	6.1000	0.0500	0.3050
E4 Jamb	19.6000	0.0500	0.9800
E5 Ground floor (normal)	8.4000	0.1600	1.3440
E6 Intermediate floor within a dwelling	8.4000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	0.0000	0.0600	0.0000
E16 Corner (normal)	0.0000	0.0900	0.0000
E18 Party wall between dwellings	20.4000	0.0600	1.2240
P1 Party wall - Ground floor	16.8000	0.0800	1.3440
P4 Party wall - Roof (insulation at ceiling level)	16.8000	0.1200	2.0160

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 8.1320 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 35.3239 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.8022	34.5685	34.3394	33.2632	33.0618	32.1245	32.1245	31.9509	32.4856	33.0618	33.4692	33.8950	(38)
Heat transfer coeff	70.1261	69.8923	69.6632	68.5870	68.3857	67.4484	67.4484	67.2748	67.8094	68.3857	68.7930	69.2189	(39)
Average = Sum(39)m / 12 =												68.5861	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9849	0.9816	0.9784	0.9633	0.9605	0.9473	0.9473	0.9449	0.9524	0.9605	0.9662	0.9722	(40)
HLP (average)												0.9633	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2749 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	62.3623	61.4251	60.0594	57.4465	55.5182	53.3678	52.1455	53.5008	54.9865	57.2954	59.9645	62.1233	(42a)
Hot water usage for baths	26.9410	26.5409	25.9775	24.9386	24.1607	23.2981	22.8322	23.3917	24.0009	24.9239	25.9842	26.8500	(42b)
Hot water usage for other uses	37.9273	36.5481	35.1689	33.7897	32.4106	31.0314	31.0314	32.4106	33.7897	35.1689	36.5481	37.9273	(42c)
Average daily hot water use (litres/day)												116.9539	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	127.2306	124.5141	121.2058	116.1748	112.0895	107.6973	106.0091	109.3031	112.7772	117.3882	122.4967	126.9006	(44)
Energy conte	201.5022	177.3065	186.2889	159.0376	150.8940	132.4264	128.2088	135.3401	139.0655	159.2947	174.5191	198.6956	(45)
Energy content (annual)										Total = Sum(45)m =		1942.5793	
Distribution loss (46)m = 0.15 x (45)m	30.2253	26.5960	27.9433	23.8556	22.6341	19.8640	19.2313	20.3010	20.8598	23.8942	26.1779	29.8043	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	252.4611	223.3339	237.2478	208.3526	201.8529	181.7415	179.1677	186.2990	188.3806	210.2536	223.8341	249.6545	(62)
WWHRS	-28.5094	-25.2140	-26.4026	-21.8624	-20.3750	-17.4350	-16.3426	-17.3787	-18.0389	-21.2659	-24.0917	-27.9815	(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	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
										Total per year (kWh/year) = Sum(64)m =		2277.6816	(64)
12Total per year (kWh/year)												2278	(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	79.7392	70.4612	74.6808	65.2088	62.9120	56.3606	55.3692	57.7403	58.5681	65.7052	70.3564	78.8060	(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	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	113.7451	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	109.4139	121.1368	109.4139	113.0610	109.4139	113.0610	109.4139	109.4139	113.0610	109.4139	113.0610	109.4139	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	200.0814	202.1576	196.9256	185.7873	171.7272	158.5126	149.6845	147.6083	152.8403	163.9786	178.0387	191.2533	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	34.3745	(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)	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	-90.9961	(71)
Water heating gains (Table 5)	107.1763	104.8530	100.3774	90.5677	84.5591	78.2785	74.4209	77.6079	81.3445	88.3135	97.7172	105.9221	(72)
Total internal gains	476.7952	488.2710	466.8404	449.5396	425.8237	406.9757	390.6428	391.7536	404.3694	421.8295	448.9404	466.7128	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	57.0220	111.5472	183.7024	267.9189	328.3447	336.1192	319.9992	274.8746	213.6534	132.3602	71.0998	46.8922	(83)
Total gains	533.8172	599.8182	650.5428	717.4585	754.1684	743.0950	710.6421	666.6282	618.0228	554.1896	520.0402	513.6049	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	85.0270	85.3114	85.5920	86.9349	87.1909	88.4026	88.4026	88.6307	87.9319	87.1909	86.6746	86.1414	
alpha	6.6685	6.6874	6.7061	6.7957	6.8127	6.8935	6.8935	6.9087	6.8621	6.8127	6.7783	6.7428	
util living area	0.9971	0.9930	0.9807	0.9258	0.7871	0.5751	0.4170	0.4630	0.7264	0.9529	0.9926	0.9977	(86)
MIT	20.1509	20.2956	20.5049	20.7790	20.9434	20.9942	20.9994	20.9989	20.9747	20.7557	20.4134	20.1337	(87)
Th 2	20.0959	20.0987	20.1014	20.1140	20.1164	20.1275	20.1275	20.1295	20.1232	20.1164	20.1116	20.1066	(88)
util rest of house	0.9960	0.9904	0.9734	0.8999	0.7306	0.4995	0.3347	0.3761	0.6473	0.9305	0.9893	0.9969	(89)
MIT 2	19.1135	19.2996	19.5647	19.9027	20.0743	20.1247	20.1273	20.1292	20.1088	19.8851	19.4604	19.0999	(90)
Living area fraction									fLA = Living area / (4) =			0.1868	(91)
MIT	19.3073	19.4857	19.7403	20.0664	20.2366	20.2871	20.2902	20.2917	20.2705	20.0477	19.6384	19.2930	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3073	19.4857	19.7403	20.0664	20.2366	20.2871	20.2902	20.2917	20.2705	20.0477	19.6384	19.2930	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9946	0.9879	0.9696	0.8983	0.7387	0.5136	0.3501	0.3924	0.6613	0.9284	0.9869	0.9957	(94)
Useful gains	530.9554	592.5809	630.7576	644.5151	557.1378	381.6327	248.7836	261.5615	408.6689	514.5062	513.2175	511.4205	(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	1052.4004	1019.4275	922.3654	765.8697	583.7837	383.5880	248.9006	261.8112	418.4213	646.0875	862.5568	1044.7197	(97)
Space heating kWh	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98a)
Space heating requirement - total per year (kWh/year)												1745.1474	
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	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1745.1474	
Space heating per m2										(98c) / (4) =		24.5105	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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	387.9550	286.8409	216.9562	87.3753	19.8246	0.0000	0.0000	0.0000	0.0000	97.8965	251.5243	396.7746	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	419.8647	310.4339	234.8011	94.5620	21.4552	0.0000	0.0000	0.0000	0.0000	105.9486	272.2124	429.4097	(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	223.9516	198.1199	210.8452	186.4902	181.4779	164.3065	162.8252	168.9203	170.3417	188.9877	199.7424	221.6731	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.5468	85.1734	84.4428	82.8573	81.0724	80.3000	80.3000	80.3000	80.3000	83.0413	84.8765	85.6135	(217)
Fuel for water heating, kWh/month	261.7884	232.6076	249.6901	225.0740	223.8468	204.6158	202.7711	210.3615	212.1316	227.5828	235.3331	258.9231	(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	22.7340	18.2381	16.4214	12.0310	9.2931	7.5925	8.4775	11.0193	14.3130	18.7795	21.2114	23.3659	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.4439	-47.2129	-67.9535	-76.5124	-82.6038	-77.1508	-76.2191	-71.9254	-64.3327	-54.0655	-36.7995	-28.9086	(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	-18.6815	-39.3323	-78.2340	-117.5799	-155.5368	-156.2902	-154.4293	-130.7020	-95.7457	-56.2474	-24.9436	-14.7683	(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	1888.6876	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2744.7258	(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)	183.4768	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1759.6191	(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	3143.2711	(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	1888.6876	0.2100	396.6244	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2744.7258	0.2100	576.3924	(264)
Space and water heating			973.0168	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	183.4768	0.1443	26.4814	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-717.1281	0.1346	-96.4917	
PV Unit electricity exported	-1042.4910	0.1259	-131.2282	
Total			-227.7198	(269)
Total CO2, kg/year			783.7076	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0100	(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	1888.6876	1.1300	2134.2170	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2744.7258	1.1300	3101.5402	(278)
Space and water heating			5235.7572	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	183.4768	1.5338	281.4228	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-717.1281	1.4973	-1073.7436	
PV Unit electricity exported	-1042.4910	0.4621	-481.6971	
Total			-1555.4407	(283)
Total Primary energy kWh/year			4091.8401	(286)
Target Primary Energy Rate (TPER)			57.4700	(287)

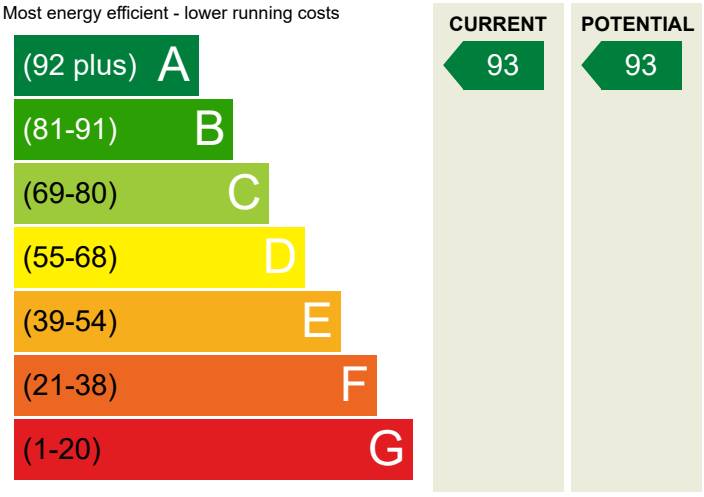
Energy Report

Dwelling Address	Ashburton, Crabtree Lane, Openshaw
Reference	Ashburton-Ashburton (MT)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Mid-Terrace
Total Floor Area	71

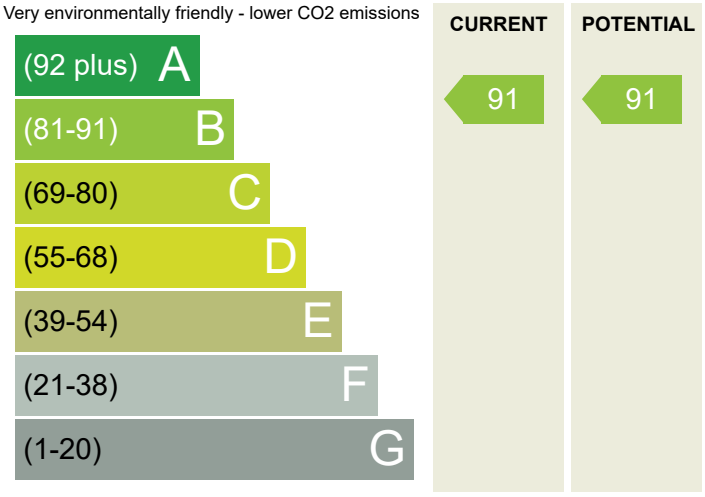
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

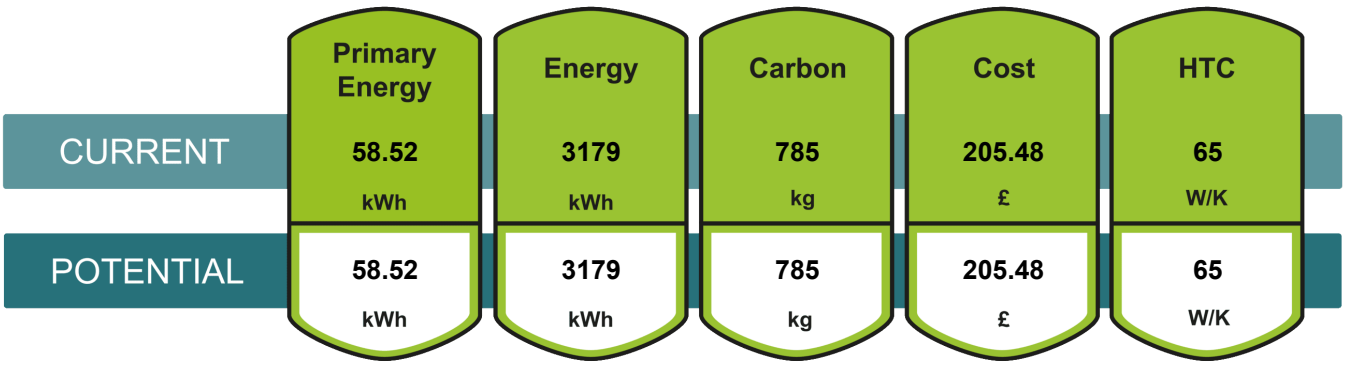
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£20	A 94			A 93

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£59	£59	
Heating	£222	£222	
Hot Water	£158	£158	
New Technologies e.g. Impact of PV	-(£234)	-(£234)	
TOTAL	£205	£205	

Estimated energy use and potential savings

Space Heating
1703
kWh per year

Water Heating
2819
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Devoke	**Issued on Date**	14/04/2025
Assessment Reference	Devoke (SD)	**Prop Type Ref**	
Property	Devoke, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	10.20	**TER**	10.32
Environmental	90 B	**% DER < TER**			1.16
CO_2 Emissions (t/year)	1.29	**DFEE**	34.00	**TFEE**	34.34
Compliance Check	See BREL	**% DFEE < TFEE**			1.01
% DPER < TPER	0.66	**DPER**	53.62	**TPER**	53.97

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	3	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	278.61	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	40.90 m²	2.30 m
1st Storey:	1.00 m	40.90 m²	2.60 m
2nd Storey:	1.00 m	40.90 m²	2.60 m

8.0 Living Area	15.50	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	141.60	120.10	0.00	None	21.50	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	70.70	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	70.80
FF Partitions	Plasterboard on timber frame	9.00	67.20
2F Partitions	Plasterboard on timber frame	9.00	65.30

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings

Summary for Input Data

elmhurst energy

External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	40.90	40.90	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling (GF)	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	40.90
Internal Ceiling (1F)	+1	Plasterboard ceiling, carpeted chipboard floor	40.90

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	40.90

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor (1F)		Plasterboard ceiling, carpeted chipboard floor	9.00	40.90
Internal Floor (2F)		Plasterboard ceiling, carpeted chipboard floor	9.00	40.90

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	North	2.10	0
Front	Window	External Wall	North	7.90	0
Side	Window	External Wall	West	1.80	0
Rear	Window	External Wall	South	9.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	16.10	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	13.50	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	38.90	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	18.10	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	36.30	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	9.10	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	9.10	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	15.60	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	15.60	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	9.10	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	9.10	0.10	0.10	RCDs	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes	
Approved Installation	No	
Mechanical Ventilation data Type	Database	
Type	Mechanical extract ventilation - decentralised	
MV Reference Number	500787	
Duct Type	Rigid	
Wet Rooms	4	
SFP from Installer Commissioning Certificate	No	

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1

Summary for Input Data

elmhurst energy

0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	m³/(h.m²) @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Summary for Input Data

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

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
3.00	West	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 94	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Devoke	**Issued on Date**	14/04/2025
Assessment Reference	Devoke (SD)	**Prop Type Ref**	
Property	Devoke, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	10.20	**TER**	10.32
Environmental	90 B	**% DER < TER**			1.16
CO_2 Emissions (t/year)	1.29	**DFEE**	34.00	**TFEE**	34.34
Compliance Check	See BREL	**% DFEE < TFEE**			1.01
% DPER < TPER	0.66	**DPER**	53.62	**TPER**	53.97

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000 (1b)	x	2.3000 (2b)	=	94.0700	(1b) - (3b)
First floor	40.9000 (1c)	x	2.6000 (2c)	=	106.3400	(1c) - (3c)
Second floor	40.9000 (1d)	x	2.6000 (2d)	=	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	306.7500	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			19.4000	1.2357	23.9734			(27)
Ground Floor			40.9000	0.1700	6.9530	75.0000	3067.5000	(28a)
External Wall	141.6000	21.5000	120.1000	0.1900	22.8190	140.0000	16814.0009	(29a)
External Roof	40.9000		40.9000	0.1000	4.0900	9.0000	368.1000	(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.1454			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000	140.0000	9897.9996	(32)
GF Partitions			70.8000			9.0000	637.2000	(32c)
FF Partitions			67.2000			9.0000	604.8000	(32c)
2F Partitions			65.3000			9.0000	587.7000	(32c)
Internal Floor (1F)			40.9000			18.0000	736.2000	(32d)
Internal Floor (2F)			40.9000			18.0000	736.2000	(32d)

Internal Ceiling (GF)	40.9000	9.0000	368.1000 (32e)
Internal Ceiling (1F)	40.9000	9.0000	368.1000 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 34185.9005 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.6137 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050
E3 Sill	13.5000	0.0210	0.2835
E4 Jamb	38.9000	0.0160	0.6224
E5 Ground floor (normal)	18.1000	0.0740	1.3394
E6 Intermediate floor within a dwelling	36.3000	0.0010	0.0363
E10 Eaves (insulation at ceiling level)	9.1000	0.0580	0.5278
E12 Gable (insulation at ceiling level)	9.1000	0.0570	0.5187
E16 Corner (normal)	15.6000	0.0470	0.7332
E18 Party wall between dwellings	15.6000	0.0380	0.5928
P1 Party wall - Ground floor	9.1000	0.1080	0.9828
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1010	0.9191

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.3610 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 67.5064 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	(38)
Heat transfer coeff	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	(39)
Average = Sum(39)m / 12 =												118.1201	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	(40)
HLP (average)												0.9627	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8732 (42)
Hot water usage for mixer showers

99.5410	98.0451	95.8652	91.6945	88.6166	85.1842	83.2332	85.3966	87.7680	91.4534	95.7137	99.1596	(42a)

Hot water usage for baths

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day) 160.8008 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	174.8499	171.2878	166.8524	159.8745	154.2922	148.2571	145.7656	150.1799	154.8601	161.2182	168.3105	174.3628	(44)
Energy conte	276.9195	243.9116	256.4459	218.8601	207.7069	182.2994	176.2908	185.9541	190.9580	218.7716	239.7892	273.0101	(45)
Energy content (annual)										Total = Sum(45)m =		2670.9171	
Distribution loss (46)m = 0.15 x (45)m	41.5379	36.5867	38.4669	32.8290	31.1560	27.3449	26.4436	27.8931	28.6437	32.8157	35.9684	40.9515	(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	15.0477	13.5728	14.9862	14.4149	14.8400	14.3052	14.7458	14.7748	14.3312	14.8732	14.4777	15.0359	(61)
Total heat required for water heating calculated for each month	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(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	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(64)
										Total per year (kWh/year) = Sum(64)m =		2846.3225	(64)
12Total per year (kWh/year)												2846	(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	95.8376	84.4938	89.0148	76.3747	72.7725	64.1908	62.3031	65.5234	67.0763	76.4598	83.3493	94.5348	(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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	152.2709	168.5857	152.2709	157.3466	152.2709	157.3466	152.2709	152.2709	157.3466	152.2709	157.3466	152.2709	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	288.6877	291.6834	284.1344	268.0635	247.7768	228.7102	215.9725	212.9768	220.5258	236.5968	256.8835	275.9501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	(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)	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	(71)
Water heating gains (Table 5)	128.8140	125.7348	119.6436	106.0760	97.8126	89.1539	83.7408	88.0691	93.1615	102.7686	115.7629	127.0629	(72)
Total internal gains	638.8703	655.1015	625.1465	600.5836	566.9578	541.3083	518.0818	519.4145	537.1316	560.7339	599.0906	624.3815	(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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)

South				9.7000	46.7521	0.6300	0.7000	0.7700				138.5940	(78)
West				1.8000	19.6403	0.6300	0.7000	0.7700				10.8042	(80)
Solar gains	175.0708	297.1782	407.3085	511.4578	583.1312	584.5108	561.1218	506.0767	442.7514	328.3009	209.4232	150.0448	(83)
Total gains	813.9411	952.2797	1032.4549	1112.0415	1150.0890	1125.8192	1079.2036	1025.4911	979.8829	889.0348	808.5138	774.4263	(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	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	
alpha	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	
util living area	0.9979	0.9938	0.9837	0.9466	0.8435	0.6530	0.4792	0.5254	0.7733	0.9611	0.9944	0.9985	(86)
MIT	20.0403	20.2099	20.4235	20.6885	20.8938	20.9828	20.9979	20.9962	20.9527	20.6907	20.3070	19.9983	(87)
Th 2	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	(88)
util rest of house	0.9971	0.9916	0.9778	0.9271	0.7938	0.5709	0.3841	0.4267	0.6966	0.9427	0.9920	0.9979	(89)
MIT 2	19.2409	19.4092	19.6194	19.8717	20.0475	20.1074	20.1141	20.1136	20.0915	19.8782	19.5065	19.1990	(90)
Living area fraction									fLA = Living area / (4) =			0.1263	(91)
MIT	19.3419	19.5104	19.7210	19.9749	20.1544	20.2180	20.2257	20.2251	20.2003	19.9809	19.6076	19.3000	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3419	19.5104	19.7210	19.9749	20.1544	20.2180	20.2257	20.2251	20.2003	19.9809	19.6076	19.3000	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9897	0.9744	0.9235	0.7962	0.5809	0.3962	0.4392	0.7046	0.9393	0.9901	0.9972	(94)
Useful gains	810.8522	942.4268	1006.0214	1026.9511	915.7390	653.9540	427.5451	450.4424	690.4301	835.0511	800.5023	772.2466	(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	1776.7455	1725.7798	1561.6684	1308.1667	998.6393	663.5998	428.2696	451.8227	720.5649	1108.0693	1477.3984	1783.6110	(97)
Space heating kWh	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98a)
Space heating requirement - total per year (kWh/year)												3365.5382	
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	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3365.5382	
Space heating per m2										(98c) / (4) =		27.4290	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	807.4434	591.4755	464.4959	227.5002	69.3009	0.0000	0.0000	0.0000	0.0000	228.2310	547.6014	845.4552	(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	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.5021	88.4344	88.3183	88.0818	87.6634	87.3000	87.3000	87.3000	87.3000	88.0825	88.4097	88.5228	(217)
Fuel for water heating, kWh/month	329.8986	291.1588	307.3338	264.8392	253.8654	225.2057	218.8277	229.9300	235.1536	265.2569	287.6004	325.3919	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m													
Pumps and Fa	10.3614	9.3587	10.3614	10.0272	10.3614	10.0272	10.3614	10.3614	10.0272	10.3614	10.0272	10.3614	(231)
Lighting	31.6389	25.3819	22.8536	16.7435	12.9332	10.5665	11.7981	15.3356	19.9194	26.1353	29.5198	32.5182	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.3309	-52.1984	-83.7048	-102.0468	-114.4458	-108.1132	-106.2400	-97.7564	-82.5892	-62.7974	-38.0341	-27.9699	(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	-14.1790	-34.5575	-82.2600	-144.0907	-208.2369	-216.2720	-210.8782	-167.2824	-108.0716	-53.2172	-19.8336	-10.7443	(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												3781.5035	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3234.4620	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:
(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962)	35.9974	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	121.9974	(231)
Electricity for lighting (calculated in Appendix L)	255.3440	(232)

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

PV generation	-2178.8502	(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	5214.4568	(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	3781.5035	0.2100	794.1157	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3234.4620	0.2100	679.2370	(264)
Space and water heating			1473.3528	(265)
Pumps, fans and electric keep-hot	121.9974	0.1387	16.9225	(267)
Energy for lighting	255.3440	0.1443	36.8540	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2269	0.1330	-120.9246	
PV Unit electricity exported	-1269.6233	0.1223	-155.2322	
Total			-276.1567	(269)
Total CO2, kg/year			1250.9726	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.2000	(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	3781.5035	1.1300	4273.0990	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3234.4620	1.1300	3654.9421	(278)
Space and water heating			7928.0411	(279)
Pumps, fans and electric keep-hot	121.9974	1.5128	184.5576	(281)
Energy for lighting	255.3440	1.5338	391.6551	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2269	1.4915	-1356.0690	
PV Unit electricity exported	-1269.6233	0.4486	-569.5855	
Total			-1925.6545	(283)
Total Primary energy kWh/year			6578.5993	(286)
Dwelling Primary energy Rate (DPER)			53.6200	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000 (1b)	x	2.3000 (2b)	=	94.0700	(1b) - (3b)
First floor	40.9000 (1c)	x	2.6000 (2c)	=	106.3400	(1c) - (3c)
Second floor	40.9000 (1d)	x	2.6000 (2d)	=	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	306.7500	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1304	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3804	(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) = 0.3233 (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	0.4123	0.4042	0.3961	0.3557	0.3476	0.3072	0.3072	0.2991	0.3233	0.3476	0.3638	0.3799	(22b)
Effective ac	0.5850	0.5817	0.5784	0.5633	0.5604	0.5472	0.5472	0.5447	0.5523	0.5604	0.5662	0.5722	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			19.4000	1.1450	22.2137			(27)
Ground Floor			40.9000	0.1300	5.3170			(28a)
External Wall	141.6000	21.5000	120.1000	0.1800	21.6180			(29a)
External Roof	40.9000		40.9000	0.1100	4.4990			(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		55.7477			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.6137 (35)
List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050	
E3 Sill	13.5000	0.0500	0.6750	
E4 Jamb	38.9000	0.0500	1.9450	
E5 Ground floor (normal)	18.1000	0.1600	2.8960	
E6 Intermediate floor within a dwelling	36.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.1000	0.0600	0.5460	
E12 Gable (insulation at ceiling level)	9.1000	0.0600	0.5460	
E16 Corner (normal)	15.6000	0.0900	1.4040	
E18 Party wall between dwellings	15.6000	0.0600	0.9360	
P1 Party wall - Ground floor	9.1000	0.0800	0.7280	
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1200	1.0920	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.5730 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 67.3207 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	59.2159	58.8819	58.5544	57.0166	56.7288	55.3894	55.3894	55.1414	55.9053	56.7288	57.3109	57.9194	(38)
Heat transfer coeff	126.5366	126.2026	125.8752	124.3373	124.0496	122.7101	122.7101	122.4621	123.2261	124.0496	124.6317	125.2402	(39)
Average = Sum(39)m / 12 =												124.3359	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0313	1.0285	1.0259	1.0133	1.0110	1.0001	1.0001	0.9981	1.0043	1.0110	1.0157	1.0207	(40)
HLP (average)												1.0133	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8732 (42)
Hot water usage for mixer showers

72.3934	71.3055	69.7202	66.6869	64.4485	61.9522	60.5333	62.1066	63.8313	66.5115	69.6099	72.1161	(42a)

Hot water usage for baths

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day) 135.7716 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	147.7023	144.5483	140.7073	134.8669	130.1240	125.0250	123.0656	126.8900	130.9233	136.2764	142.2068	147.3193	(44)
Energy conte	233.9244	205.8348	216.2619	184.6260	175.1719	153.7328	148.8372	157.1163	161.4416	184.9257	202.5996	230.6664	(45)
Energy content (annual)										Total = Sum(45)m =		2255.1387	
Distribution loss (46)m = 0.15 x (45)m	35.0887	30.8752	32.4393	27.6939	26.2758	23.0599	22.3256	23.5674	24.2162	27.7389	30.3899	34.6000	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	284.8833	251.8622	267.2208	233.9411	226.1308	203.0479	199.7961	208.0752	210.7566	235.8846	251.9147	281.6253	(62)
WWHRS	-33.0953	-29.2697	-30.6496	-25.3790	-23.6524	-20.2395	-18.9713	-20.1741	-20.9406	-24.6866	-27.9669	-32.4824	(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	251.7881	222.5925	236.5712	208.5620	202.4784	182.8084	180.8248	187.9011	189.8161	211.1980	223.9478	249.1430	(64)
										Total per year (kWh/year) = Sum(64)m =		2547.6314	(64)
12Total per year (kWh/year)												2548	(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	90.5196	79.9469	84.6468	73.7169	70.9844	63.4449	62.2281	64.9809	66.0081	74.2275	79.6931	89.4363	(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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
152.2709 168.5857 152.2709 157.3466 152.2709 157.3466 152.2709 152.2709 157.3466 152.2709 157.3466 152.2709 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
288.6877 291.6834 284.1344 268.0635 247.7768 228.7102 215.9725 212.9768 220.5258 236.5968 256.8835 275.9501 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 (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)
-114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 (71)
Water heating gains (Table 5)
121.6661 118.9686 113.7726 102.3846 95.4091 88.1180 83.6399 87.3399 91.6779 99.7682 110.6849 120.2101 (72)
Total internal gains
631.7223 648.3353 619.2755 596.8922 564.5544 540.2723 517.9809 518.6852 535.6479 557.7335 594.0126 617.5287 (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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)
South	9.7000	46.7521	0.6300	0.7000	0.7700	138.5940	(78)
West	1.8000	19.6403	0.6300	0.7000	0.7700	10.8042	(80)

Solar gains 175.0708 297.1782 407.3085 511.4578 583.1312 584.5108 561.1218 506.0767 442.7514 328.3009 209.4232 150.0448 (83)
Total gains 806.7931 945.5135 1026.5840 1108.3501 1147.6855 1124.7832 1079.1027 1024.7619 978.3993 886.0344 803.4357 767.5734 (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	75.0461	75.2448	75.4405	76.3736	76.5507	77.3863	77.3863	77.5430	77.0623	76.5507	76.1932	75.8230	
alpha	6.0031	6.0163	6.0294	6.0916	6.1034	6.1591	6.1591	6.1695	6.1375	6.1034	6.0795	6.0549	
util living area	0.9981	0.9946	0.9861	0.9538	0.8614	0.6733	0.4968	0.5435	0.7930	0.9660	0.9950	0.9986	(86)
MIT	19.9310	20.1075	20.3350	20.6332	20.8647	20.9769	20.9969	20.9947	20.9390	20.6439	20.2354	19.9048	(87)
Th 2	20.0574	20.0596	20.0618	20.0722	20.0742	20.0833	20.0833	20.0849	20.0798	20.0742	20.0702	20.0661	(88)
util rest of house	0.9974	0.9927	0.9809	0.9360	0.8130	0.5878	0.3953	0.4388	0.7155	0.9493	0.9928	0.9981	(89)
MIT 2	18.8101	19.0369	19.3268	19.7022	19.9629	20.0709	20.0824	20.0833	20.0410	19.7225	19.2091	18.7832	(90)
Living area fraction										fLA = Living area / (4) =		0.1263	(91)
MIT	18.9517	19.1722	19.4542	19.8198	20.0768	20.1854	20.1979	20.1984	20.1544	19.8389	19.3387	18.9249	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9517	19.1722	19.4542	19.8198	20.0768	20.1854	20.1979	20.1984	20.1544	19.8389	19.3387	18.9249	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9901	0.9763	0.9301	0.8132	0.5977	0.4081	0.4520	0.7225	0.9438	0.9903	0.9971	(94)
Useful gains	803.6971	936.1108	1002.2846	1030.8389	933.2806	672.3379	440.4333	463.2093	706.8457	836.2327	795.6356	765.3484	(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	1853.9736	1801.1846	1630.6099	1357.7435	1039.1424	685.3811	441.4965	465.1595	746.0638	1146.0794	1525.3342	1844.1451	(97)
Space heating kWh	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98a)
Space heating requirement - total per year (kWh/year)												3702.8754	
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	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3702.8754	
Space heating per m2											(98c) / (4) =	30.1783	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 92.4000 (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	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	845.6771	629.1446	505.9242	254.7309	85.2394	0.0000	0.0000	0.0000	0.0000	249.4870	568.5963	868.6414	(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	251.7881	222.5925	236.5712	208.5620	202.4784	182.8084	180.8248	187.9011	189.8161	211.1980	223.9478	249.1430	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.6388	86.3397	85.8119	84.6412	82.5360	80.3000	80.3000	80.3000	80.3000	84.5695	86.1428	86.7005	(217)
Fuel for water heating, kWh/month	290.6183	257.8101	275.6858	246.4071	245.3213	227.6568	225.1865	233.9989	236.3837	249.7330	259.9728	287.3606	(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	31.6389	25.3819	22.8536	16.7435	12.9332	10.5665	11.7981	15.3356	19.9194	26.1353	29.5198	32.5182	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.1181	-57.5409	-84.1056	-96.1748	-105.0225	-98.4345	-97.1636	-91.0574	-80.5363	-66.4708	-44.4315	-34.5658	(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	-19.7676	-41.8889	-83.8458	-126.8133	-168.5717	-169.7604	-167.8229	-141.7364	-103.3740	-60.2651	-26.5037	-15.6136	(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	4007.4409	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	3036.1349	(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)	255.3440	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2021.5850	(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	5363.3348	(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	4007.4409	0.2100	841.5626	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3036.1349	0.2100	637.5883	(264)
Space and water heating			1479.1509	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	255.3440	0.1443	36.8540	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-895.6218	0.1342	-120.2345	
PV Unit electricity exported	-1125.9633	0.1257	-141.5130	
Total			-261.7475	(269)
Total CO2, kg/year			1266.1867	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3200	(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	4007.4409	1.1300	4528.4082	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3036.1349	1.1300	3430.8325	(278)
Space and water heating			7959.2407	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	255.3440	1.5338	391.6551	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-895.6218	1.4961	-1339.9712	
PV Unit electricity exported	-1125.9633	0.4613	-519.4379	
Total			-1859.4091	(283)
Total Primary energy kWh/year			6621.5875	(286)
Target Primary Energy Rate (TPER)			53.9700	(287)

Full SAP Calculation Printout

Property Reference	Devoke	**Issued on Date**	14/04/2025
Assessment Reference	Devoke (SD)	**Prop Type Ref**	
Property	Devoke, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	10.20	**TER**	10.32
Environmental	90 B	**% DER < TER**			1.16
CO_2 Emissions (t/year)	1.29	**DFEE**	34.00	**TFEE**	34.34
Compliance Check	See BREL	**% DFEE < TFEE**			1.01
% DPER < TPER	0.66	**DPER**	53.62	**TPER**	53.97

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000 (1b)	x	2.3000 (2b)	=	94.0700	(1b) - (3b)
First floor	40.9000 (1c)	x	2.6000 (2c)	=	106.3400	(1c) - (3c)
Second floor	40.9000 (1d)	x	2.6000 (2d)	=	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	306.7500	(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		4 * 10 =	40.0000	(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) =		40.0000 / (5) =	0.1304	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3554	(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) =	0.3021	(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	0.3852	0.3776	0.3701	0.3323	0.3247	0.2870	0.2870	0.2794	0.3021	0.3247	0.3399	0.3550	(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	0.5742	0.5713	0.5685	0.5552	0.5527	0.5412	0.5412	0.5390	0.5456	0.5527	0.5577	0.5630	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			19.4000	1.2357	23.9734			(27)
Ground Floor			40.9000	0.1700	6.9530	75.0000	3067.5000	(28a)
External Wall	141.6000	21.5000	120.1000	0.1900	22.8190	140.0000	16814.0009	(29a)
External Roof	40.9000		40.9000	0.1000	4.0900	9.0000	368.1000	(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.1454			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000	140.0000	9897.9996	(32)
GF Partitions			70.8000			9.0000	637.2000	(32c)
FF Partitions			67.2000			9.0000	604.8000	(32c)
2F Partitions			65.3000			9.0000	587.7000	(32c)
Internal Floor (1F)			40.9000			18.0000	736.2000	(32d)
Internal Floor (2F)			40.9000			18.0000	736.2000	(32d)
Internal Ceiling (GF)			40.9000			9.0000	368.1000	(32e)
Internal Ceiling (1F)			40.9000			9.0000	368.1000	(32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 34185.9005 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.6137 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050
E3 Sill	13.5000	0.0210	0.2835
E4 Jamb	38.9000	0.0160	0.6224
E5 Ground floor (normal)	18.1000	0.0740	1.3394
E6 Intermediate floor within a dwelling	36.3000	0.0010	0.0363
E10 Eaves (insulation at ceiling level)	9.1000	0.0580	0.5278
E12 Gable (insulation at ceiling level)	9.1000	0.0570	0.5187
E16 Corner (normal)	15.6000	0.0470	0.7332
E18 Party wall between dwellings	15.6000	0.0380	0.5928
P1 Party wall - Ground floor	9.1000	0.1080	0.9828
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1010	0.9191

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.3610 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 67.5064 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	58.1224	57.8308	57.5450	56.2026	55.9515	54.7823	54.7823	54.5658	55.2327	55.9515	56.4596	56.9907	(38)
Heat transfer coeff	125.6288	125.3372	125.0514	123.7090	123.4579	122.2887	122.2887	122.0722	122.7390	123.4579	123.9659	124.4971	(39)

Average = Sum(39)m / 12 = 123.7078

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0239	1.0215	1.0192	1.0082	1.0062	0.9966	0.9966	0.9949	1.0003	1.0062	1.0103	1.0146	(40)
HLP (average)												1.0082	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---
4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8732 (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

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day) 69.0273 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	75.3089	73.2428	70.9871	68.1799	65.6755	63.0728	62.5323	64.7834	67.0921	69.7648	72.5968	75.2032	(44)
Energy conte	119.2709	104.2967	109.1046	93.3349	88.4119	77.5554	75.6274	80.2154	82.7313	94.6702	103.4275	117.7501	(45)

Energy content (annual) Total = Sum(45)m = 1146.3962
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

101.3803	88.6522	92.7389	79.3347	75.1501	65.9221	64.2833	68.1831	70.3216	80.4697	87.9134	100.0876	(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

101.3803	88.6522	92.7389	79.3347	75.1501	65.9221	64.2833	68.1831	70.3216	80.4697	87.9134	100.0876	(64)

Total per year (kWh/year) = Sum(64)m = 974.4368 (64)
12Total per year (kWh/year) 974 (64)
Electric shower(s)

57.9751	51.6563	56.4067	53.8282	54.8383	52.3104	54.0541	54.8383	53.8282	56.4067	55.3460	57.9751	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 659.4632 (64a)
Heat gains from water heating, kWh/month

39.8388	35.0771	37.2864	33.2907	32.4971	29.5581	29.5843	30.7553	31.0374	34.2191	35.8148	39.5157	(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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	152.2709	168.5857	152.2709	157.3466	152.2709	157.3466	152.2709	152.2709	157.3466	152.2709	157.3466	152.2709	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	288.6877	291.6834	284.1344	268.0635	247.7768	228.7102	215.9725	212.9768	220.5258	236.5968	256.8835	275.9501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	(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)	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	(71)
Water heating gains (Table 5)	53.5468	52.1981	50.1161	46.2371	43.6789	41.0529	39.7639	41.3378	43.1076	45.9934	49.7428	53.1125	(72)
Total internal gains	560.6030	578.5647	552.6190	537.7448	509.8242	493.2073	474.1049	472.6831	487.0776	500.9587	530.0705	547.4310	(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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)
South	9.7000	46.7521	0.6300	0.7000	0.7700	138.5940	(78)
West	1.8000	19.6403	0.6300	0.7000	0.7700	10.8042	(80)

Solar gains	175.0708	297.1782	407.3085	511.4578	583.1312	584.5108	561.1218	506.0767	442.7514	328.3009	209.4232	150.0448	(83)
Total gains	735.6738	875.7430	959.9275	1049.2026	1092.9553	1077.7182	1035.2267	978.7598	929.8289	829.2596	739.4937	697.4758	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	75.5885	75.7643	75.9374	76.7614	76.9176	77.6530	77.6530	77.7907	77.3681	76.9176	76.6024	76.2755	
alpha	6.0392	6.0510	6.0625	6.1174	6.1278	6.1769	6.1769	6.1860	6.1579	6.1278	6.1068	6.0850	
util living area	0.9988	0.9964	0.9899	0.9630	0.8800	0.6956	0.5153	0.5657	0.8171	0.9746	0.9967	0.9992	(86)
MIT	19.8844	20.0622	20.2932	20.6008	20.8470	20.9728	20.9962	20.9935	20.9284	20.6094	20.1911	19.8568	(87)
Th 2	20.0635	20.0655	20.0674	20.0765	20.0782	20.0861	20.0861	20.0876	20.0831	20.0782	20.0747	20.0711	(88)
util rest of house	0.9984	0.9950	0.9860	0.9481	0.8349	0.6095	0.4108	0.4579	0.7422	0.9614	0.9953	0.9989	(89)
MIT 2	19.0439	19.2226	19.4530	19.7582	19.9782	20.0746	20.0853	20.0860	20.0467	19.7721	19.3591	19.0226	(90)
Living area fraction									fLA = Living area / (4) =			0.1263	(91)
MIT	19.1501	19.3287	19.5591	19.8647	20.0880	20.1881	20.2003	20.2006	20.1581	19.8778	19.4642	19.1280	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1501	19.3287	19.5591	19.8647	20.0880	20.1881	20.2003	20.2006	20.1581	19.8778	19.4642	19.1280	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9978	0.9936	0.9832	0.9439	0.8355	0.6196	0.4241	0.4715	0.7490	0.9576	0.9939	0.9984	(94)
Useful gains	734.0562	870.0961	943.7602	990.3584	913.1489	667.7719	438.9913	461.5278	696.4499	794.1176	735.0030	696.3547	(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	1865.5946	1808.4534	1633.0619	1356.4286	1035.5591	683.3579	440.2814	463.9484	743.5622	1145.4218	1532.7405	1858.4868	(97)
Space heating kWh	841.8646	630.5761	512.8405	263.5705	91.0732	0.0000	0.0000	0.0000	0.0000	261.3703	574.3710	864.6263	(98a)
Space heating requirement - total per year (kWh/year)												4040.2925	
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	841.8646	630.5761	512.8405	263.5705	91.0732	0.0000	0.0000	0.0000	0.0000	261.3703	574.3710	864.6263	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4040.2925	
Space heating per m2											(98c) / (4) =	32.9282	(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	1149.5138	904.9364	927.7487	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8756	0.9399	0.9177	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1006.5319	850.5175	851.3916	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1191.5046	1144.9393	1082.0200	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	133.1803	219.0498	171.5875	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	33.2951	54.7624	42.8969	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												130.9544	(107)
Energy for space heating												32.9282	(99)
Energy for space cooling												1.0673	(108)
Total												33.9955	(109)
Fabric Energy Efficiency (DFEE)												34.0	(109)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000	(1b) x	2.3000	(2b) =	94.0700	(1b) - (3b)
First floor	40.9000	(1c) x	2.6000	(2c) =	106.3400	(1c) - (3c)
Second floor	40.9000	(1d) x	2.6000	(2d) =	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		306.7500	(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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1304	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3804	(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) =	0.3233	(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	0.4123	0.4042	0.3961	0.3557	0.3476	0.3072	0.3072	0.2991	0.3233	0.3476	0.3638	0.3799	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5850	0.5817	0.5784	0.5633	0.5604	0.5472	0.5472	0.5447	0.5523	0.5604	0.5662	0.5722	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			19.4000	1.1450	22.2137			(27)
Ground Floor			40.9000	0.1300	5.3170			(28a)
External Wall	141.6000	21.5000	120.1000	0.1800	21.6180			(29a)
External Roof	40.9000		40.9000	0.1100	4.4990			(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.7477			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	278.6137 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050
E3 Sill	13.5000	0.0500	0.6750
E4 Jamb	38.9000	0.0500	1.9450
E5 Ground floor (normal)	18.1000	0.1600	2.8960
E6 Intermediate floor within a dwelling	36.3000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	9.1000	0.0600	0.5460
E12 Gable (insulation at ceiling level)	9.1000	0.0600	0.5460
E16 Corner (normal)	15.6000	0.0900	1.4040
E18 Party wall between dwellings	15.6000	0.0600	0.9360
P1 Party wall - Ground floor	9.1000	0.0800	0.7280
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1200	1.0920

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		11.5730 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	67.3207 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	59.2159	58.8819	58.5544	57.0166	56.7288	55.3894	55.3894	55.1414	55.9053	56.7288	57.3109	57.9194	(38)
Heat transfer coeff	126.5366	126.2026	125.8752	124.3373	124.0496	122.7101	122.7101	122.4621	123.2261	124.0496	124.6317	125.2402	(39)

Average = Sum(39)m / 12 =	124.3359

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0313	1.0285	1.0259	1.0133	1.0110	1.0001	1.0001	0.9981	1.0043	1.0110	1.0157	1.0207	(40)
HLP (average)												1.0133	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.8732 (42)

Hot water usage for mixer showers

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

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day)	69.0273 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	75.3089	73.2428	70.9871	68.1799	65.6755	63.0728	62.5323	64.7834	67.0921	69.7648	72.5968	75.2032	(44)
Energy conte	119.2709	104.2967	109.1046	93.3349	88.4119	77.5554	75.6274	80.2154	82.7313	94.6702	103.4275	117.7501	(45)
Energy content (annual)										Total = Sum(45)m =		1146.3962	
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	101.3803	88.6522	92.7389	79.3347	75.1501	65.9221	64.2833	68.1831	70.3216	80.4697	87.9134	100.0876	(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

	101.3803	88.6522	92.7389	79.3347	75.1501	65.9221	64.2833	68.1831	70.3216	80.4697	87.9134	100.0876 (64)
										Total per year (kWh/year) = Sum(64)m =		974.4368 (64)
12Total per year (kWh/year)												974 (64)

Electric shower(s)

	57.9751	51.6563	56.4067	53.8282	54.8383	52.3104	54.0541	54.8383	53.8282	56.4067	55.3460	57.9751 (64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		659.4632 (64a)

Heat gains from water heating, kWh/month

	39.8388	35.0771	37.2864	33.2907	32.4971	29.5581	29.5843	30.7553	31.0374	34.2191	35.8148	39.5157 (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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	152.2709	168.5857	152.2709	157.3466	152.2709	157.3466	152.2709	152.2709	157.3466	152.2709	157.3466	152.2709	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	288.6877	291.6834	284.1344	268.0635	247.7768	228.7102	215.9725	212.9768	220.5258	236.5968	256.8835	275.9501	(68)

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

	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	(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)

	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	(71)

Water heating gains (Table 5)

	53.5468	52.1981	50.1161	46.2371	43.6789	41.0529	39.7639	41.3378	43.1076	45.9934	49.7428	53.1125	(72)

Total internal gains

	560.6030	578.5647	552.6190	537.7448	509.8242	493.2073	474.1049	472.6831	487.0776	500.9587	530.0705	547.4310	(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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)
South	9.7000	46.7521	0.6300	0.7000	0.7700	138.5940	(78)
West	1.8000	19.6403	0.6300	0.7000	0.7700	10.8042	(80)

Solar gains	175.0708	297.1782	407.3085	511.4578	583.1312	584.5108	561.1218	506.0767	442.7514	328.3009	209.4232	150.0448	(83)
Total gains	735.6738	875.7430	959.9275	1049.2026	1092.9553	1077.7182	1035.2267	978.7598	929.8289	829.2596	739.4937	697.4758	(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	75.0461	75.2448	75.4405	76.3736	76.5507	77.3863	77.3863	77.5430	77.0623	76.5507	76.1932	75.8230	
alpha	6.0031	6.0163	6.0294	6.0916	6.1034	6.1591	6.1591	6.1695	6.1375	6.1034	6.0795	6.0549	
util living area	0.9988	0.9964	0.9900	0.9635	0.8813	0.6973	0.5170	0.5673	0.8187	0.9748	0.9968	0.9992	(86)
MIT	19.8734	20.0520	20.2843	20.5953	20.8438	20.9722	20.9961	20.9934	20.9269	20.6049	20.1843	19.8478	(87)
Th 2	20.0574	20.0596	20.0618	20.0722	20.0742	20.0833	20.0833	20.0849	20.0798	20.0742	20.0702	20.0661	(88)
util rest of house	0.9984	0.9951	0.9862	0.9487	0.8365	0.6110	0.4118	0.4590	0.7438	0.9617	0.9953	0.9989	(89)
MIT 2	19.0280	19.2077	19.4397	19.7494	19.9720	20.0714	20.0824	20.0833	20.0426	19.7644	19.3486	19.0095	(90)
Living area fraction									fLA = Living area / (4) =			0.1263	(91)
MIT	19.1348	19.3144	19.5464	19.8563	20.0821	20.1852	20.1978	20.1982	20.1543	19.8705	19.4542	19.1154	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1348	19.3144	19.5464	19.8563	20.0821	20.1852	20.1978	20.1982	20.1543	19.8705	19.4542	19.1154	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9978	0.9936	0.9833	0.9444	0.8369	0.6211	0.4252	0.4727	0.7505	0.9580	0.9939	0.9984	(94)
Useful gains	734.0552	870.1237	943.9001	990.9153	914.7209	669.3815	440.1538	462.6483	697.8737	794.4091	735.0192	696.3528	(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	1877.1422	1819.1296	1642.2140	1362.2737	1039.8004	685.3646	441.4869	465.1389	746.0451	1150.0064	1539.7262	1868.0044	(97)
Space heating kWh	850.4567	637.7319	519.5456	267.3780	93.0592	0.0000	0.0000	0.0000	0.0000	264.5644	579.3890	871.7088	(98a)
Space heating requirement - total per year (kWh/year)												4083.8337	
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	850.4567	637.7319	519.5456	267.3780	93.0592	0.0000	0.0000	0.0000	0.0000	264.5644	579.3890	871.7088	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4083.8337	
Space heating per m2											(98c) / (4) =	33.2831	(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	1153.4754	908.0551	930.7120	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8739	0.9387	0.9164	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1007.9926	852.4044	852.9039	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1191.5046	1144.9393	1082.0200	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	132.1287	217.6459	170.4624	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	33.0322	54.4115	42.6156	0.0000	0.0000	0.0000	0.0000	(107)

Space cooling requirement	130.0592 (107)
Energy for space heating	33.2831 (99)
Energy for space cooling	1.0600 (108)
Total	34.3431 (109)
Fabric Energy Efficiency (TFEE)	34.3 (109)

Full SAP Calculation Printout

Property Reference	Devoke	**Issued on Date**	14/04/2025
Assessment Reference	Devoke (SD)	**Prop Type Ref**	
Property	Devoke, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	10.20	**TER**	10.32
Environmental	90 B	**% DER < TER**			1.16
CO_2 Emissions (t/year)	1.29	**DFEE**	34.00	**TFEE**	34.34
Compliance Check	See BREL	**% DFEE < TFEE**			1.01
% DPER < TPER	0.66	**DPER**	53.62	**TPER**	53.97

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000 (1b)	x	2.3000 (2b)	=	94.0700	(1b) - (3b)
First floor	40.9000 (1c)	x	2.6000 (2c)	=	106.3400	(1c) - (3c)
Second floor	40.9000 (1d)	x	2.6000 (2d)	=	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	306.7500	(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)
	Air changes per hour		
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			19.4000	1.2357	23.9734			(27)
Ground Floor			40.9000	0.1700	6.9530	75.0000	3067.5000	(28a)
External Wall	141.6000	21.5000	120.1000	0.1900	22.8190	140.0000	16814.0009	(29a)
External Roof	40.9000		40.9000	0.1000	4.0900	9.0000	368.1000	(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.1454			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000	140.0000	9897.9996	(32)
GF Partitions			70.8000			9.0000	637.2000	(32c)
FF Partitions			67.2000			9.0000	604.8000	(32c)
2F Partitions			65.3000			9.0000	587.7000	(32c)
Internal Floor (1F)			40.9000			18.0000	736.2000	(32d)
Internal Floor (2F)			40.9000			18.0000	736.2000	(32d)

Internal Ceiling (GF)	40.9000	9.0000	368.1000 (32e)
Internal Ceiling (1F)	40.9000	9.0000	368.1000 (32e)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 34185.9005 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.6137 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050
E3 Sill	13.5000	0.0210	0.2835
E4 Jamb	38.9000	0.0160	0.6224
E5 Ground floor (normal)	18.1000	0.0740	1.3394
E6 Intermediate floor within a dwelling	36.3000	0.0010	0.0363
E10 Eaves (insulation at ceiling level)	9.1000	0.0580	0.5278
E12 Gable (insulation at ceiling level)	9.1000	0.0570	0.5187
E16 Corner (normal)	15.6000	0.0470	0.7332
E18 Party wall between dwellings	15.6000	0.0380	0.5928
P1 Party wall - Ground floor	9.1000	0.1080	0.9828
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1010	0.9191

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.3610 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 67.5064 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	50.6138	(38)
Heat transfer coeff	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	118.1201	(39)
Average = Sum(39)m / 12 =												118.1201	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	0.9627	(40)
HLP (average)												0.9627	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8732 (42)
Hot water usage for mixer showers

99.5410	98.0451	95.8652	91.6945	88.6166	85.1842	83.2332	85.3966	87.7680	91.4534	95.7137	99.1596	(42a)

Hot water usage for baths

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day) 160.8008 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	174.8499	171.2878	166.8524	159.8745	154.2922	148.2571	145.7656	150.1799	154.8601	161.2182	168.3105	174.3628	(44)
Energy conte	276.9195	243.9116	256.4459	218.8601	207.7069	182.2994	176.2908	185.9541	190.9580	218.7716	239.7892	273.0101	(45)
Energy content (annual)										Total = Sum(45)m =		2670.9171	
Distribution loss (46)m = 0.15 x (45)m	41.5379	36.5867	38.4669	32.8290	31.1560	27.3449	26.4436	27.8931	28.6437	32.8157	35.9684	40.9515	(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	15.0477	13.5728	14.9862	14.4149	14.8400	14.3052	14.7458	14.7748	14.3312	14.8732	14.4777	15.0359	(61)
Total heat required for water heating calculated for each month	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(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	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(64)
										Total per year (kWh/year) = Sum(64)m =		2846.3225	(64)
12Total per year (kWh/year)												2846	(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	95.8376	84.4938	89.0148	76.3747	72.7725	64.1908	62.3031	65.5234	67.0763	76.4598	83.3493	94.5348	(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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	152.2709	168.5857	152.2709	157.3466	152.2709	157.3466	152.2709	152.2709	157.3466	152.2709	157.3466	152.2709	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	288.6877	291.6834	284.1344	268.0635	247.7768	228.7102	215.9725	212.9768	220.5258	236.5968	256.8835	275.9501	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	37.3658	(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)	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	-114.9268	(71)
Water heating gains (Table 5)	128.8140	125.7348	119.6436	106.0760	97.8126	89.1539	83.7408	88.0691	93.1615	102.7686	115.7629	127.0629	(72)
Total internal gains	638.8703	655.1015	625.1465	600.5836	566.9578	541.3083	518.0818	519.4145	537.1316	560.7339	599.0906	624.3815	(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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)

South				9.7000	46.7521	0.6300	0.7000	0.7700				138.5940	(78)
West				1.8000	19.6403	0.6300	0.7000	0.7700				10.8042	(80)
Solar gains	175.0708	297.1782	407.3085	511.4578	583.1312	584.5108	561.1218	506.0767	442.7514	328.3009	209.4232	150.0448	(83)
Total gains	813.9411	952.2797	1032.4549	1112.0415	1150.0890	1125.8192	1079.2036	1025.4911	979.8829	889.0348	808.5138	774.4263	(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	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	80.3934	
alpha	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	6.3596	
util living area	0.9979	0.9938	0.9837	0.9466	0.8435	0.6530	0.4792	0.5254	0.7733	0.9611	0.9944	0.9985	(86)
MIT	20.0403	20.2099	20.4235	20.6885	20.8938	20.9828	20.9979	20.9962	20.9527	20.6907	20.3070	19.9983	(87)
Th 2	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	20.1146	(88)
util rest of house	0.9971	0.9916	0.9778	0.9271	0.7938	0.5709	0.3841	0.4267	0.6966	0.9427	0.9920	0.9979	(89)
MIT 2	19.2409	19.4092	19.6194	19.8717	20.0475	20.1074	20.1141	20.1136	20.0915	19.8782	19.5065	19.1990	(90)
Living area fraction									fLA = Living area / (4) =			0.1263	(91)
MIT	19.3419	19.5104	19.7210	19.9749	20.1544	20.2180	20.2257	20.2251	20.2003	19.9809	19.6076	19.3000	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3419	19.5104	19.7210	19.9749	20.1544	20.2180	20.2257	20.2251	20.2003	19.9809	19.6076	19.3000	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9897	0.9744	0.9235	0.7962	0.5809	0.3962	0.4392	0.7046	0.9393	0.9901	0.9972	(94)
Useful gains	810.8522	942.4268	1006.0214	1026.9511	915.7390	653.9540	427.5451	450.4424	690.4301	835.0511	800.5023	772.2466	(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	1776.7455	1725.7798	1561.6684	1308.1667	998.6393	663.5998	428.2696	451.8227	720.5649	1108.0693	1477.3984	1783.6110	(97)
Space heating kWh	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98a)
Space heating requirement - total per year (kWh/year)												3365.5382	
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	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3365.5382	
Space heating per m2										(98c) / (4) =		27.4290	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	718.6246	526.4132	413.4013	202.4752	61.6778	0.0000	0.0000	0.0000	0.0000	203.1256	487.3652	752.4551	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	807.4434	591.4755	464.4959	227.5002	69.3009	0.0000	0.0000	0.0000	0.0000	228.2310	547.6014	845.4552	(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	291.9671	257.4844	271.4321	233.2750	222.5469	196.6046	191.0366	200.7289	205.2891	233.6448	254.2668	288.0460	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.5021	88.4344	88.3183	88.0818	87.6634	87.3000	87.3000	87.3000	87.3000	88.0825	88.4097	88.5228	(217)
Fuel for water heating, kWh/month	329.8986	291.1588	307.3338	264.8392	253.8654	225.2057	218.8277	229.9300	235.1536	265.2569	287.6004	325.3919	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
(221)m													
Pumps and Fa	10.3614	9.3587	10.3614	10.0272	10.3614	10.0272	10.3614	10.3614	10.0272	10.3614	10.0272	10.3614	(231)
Lighting	31.6389	25.3819	22.8536	16.7435	12.9332	10.5665	11.7981	15.3356	19.9194	26.1353	29.5198	32.5182	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-33.3309	-52.1984	-83.7048	-102.0468	-114.4458	-108.1132	-106.2400	-97.7564	-82.5892	-62.7974	-38.0341	-27.9699	(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	-14.1790	-34.5575	-82.2600	-144.0907	-208.2369	-216.2720	-210.8782	-167.2824	-108.0716	-53.2172	-19.8336	-10.7443	(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												3781.5035	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3234.4620	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:
(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962)	35.9974	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	121.9974	(231)
Electricity for lighting (calculated in Appendix L)	255.3440	(232)

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

PV generation	-2178.8502	(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	5214.4568	(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	3781.5035	0.2100	794.1157	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3234.4620	0.2100	679.2370	(264)
Space and water heating			1473.3528	(265)
Pumps, fans and electric keep-hot	121.9974	0.1387	16.9225	(267)
Energy for lighting	255.3440	0.1443	36.8540	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2269	0.1330	-120.9246	
PV Unit electricity exported	-1269.6233	0.1223	-155.2322	
Total			-276.1567	(269)
Total CO2, kg/year			1250.9726	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.2000	(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	3781.5035	1.1300	4273.0990	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3234.4620	1.1300	3654.9421	(278)
Space and water heating			7928.0411	(279)
Pumps, fans and electric keep-hot	121.9974	1.5128	184.5576	(281)
Energy for lighting	255.3440	1.5338	391.6551	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2269	1.4915	-1356.0690	
PV Unit electricity exported	-1269.6233	0.4486	-569.5855	
Total			-1925.6545	(283)
Total Primary energy kWh/year			6578.5993	(286)
Dwelling Primary energy Rate (DPER)			53.6200	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	40.9000 (1b)	x	2.3000 (2b)	=	94.0700	(1b) - (3b)
First floor	40.9000 (1c)	x	2.6000 (2c)	=	106.3400	(1c) - (3c)
Second floor	40.9000 (1d)	x	2.6000 (2d)	=	106.3400	(1d) - (3d)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	122.7000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	306.7500	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1304	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3804	(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) = 0.3233 (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	0.4123	0.4042	0.3961	0.3557	0.3476	0.3072	0.3072	0.2991	0.3233	0.3476	0.3638	0.3799	(22b)
Effective ac	0.5850	0.5817	0.5784	0.5633	0.5604	0.5472	0.5472	0.5447	0.5523	0.5604	0.5662	0.5722	(25)

---

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			19.4000	1.1450	22.2137			(27)
Ground Floor			40.9000	0.1300	5.3170			(28a)
External Wall	141.6000	21.5000	120.1000	0.1800	21.6180			(29a)
External Roof	40.9000		40.9000	0.1100	4.4990			(30)
Total net area of external elements Aum(A, m2)			223.4000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		55.7477			(33)
Main dwelling								
Party Wall			70.7000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 278.6137 (35)
List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	16.1000	0.0500	0.8050	
E3 Sill	13.5000	0.0500	0.6750	
E4 Jamb	38.9000	0.0500	1.9450	
E5 Ground floor (normal)	18.1000	0.1600	2.8960	
E6 Intermediate floor within a dwelling	36.3000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	9.1000	0.0600	0.5460	
E12 Gable (insulation at ceiling level)	9.1000	0.0600	0.5460	
E16 Corner (normal)	15.6000	0.0900	1.4040	
E18 Party wall between dwellings	15.6000	0.0600	0.9360	
P1 Party wall - Ground floor	9.1000	0.0800	0.7280	
P4 Party wall - Roof (insulation at ceiling level)	9.1000	0.1200	1.0920	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 11.5730 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 67.3207 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	59.2159	58.8819	58.5544	57.0166	56.7288	55.3894	55.3894	55.1414	55.9053	56.7288	57.3109	57.9194	(38)
Heat transfer coeff	126.5366	126.2026	125.8752	124.3373	124.0496	122.7101	122.7101	122.4621	123.2261	124.0496	124.6317	125.2402	(39)
Average = Sum(39)m / 12 =												124.3359	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0313	1.0285	1.0259	1.0133	1.0110	1.0001	1.0001	0.9981	1.0043	1.0110	1.0157	1.0207	(40)
HLP (average)												1.0133	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.8732 (42)
Hot water usage for mixer showers

72.3934	71.3055	69.7202	66.6869	64.4485	61.9522	60.5333	62.1066	63.8313	66.5115	69.6099	72.1161	(42a)

Hot water usage for baths

31.2548	30.7906	30.1369	28.9317	28.0292	27.0286	26.4880	27.1371	27.8439	28.9146	30.1447	31.1491	(42b)

Hot water usage for other uses

44.0541	42.4522	40.8502	39.2482	37.6463	36.0443	36.0443	37.6463	39.2482	40.8502	42.4522	44.0541	(42c)

Average daily hot water use (litres/day) 135.7716 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	147.7023	144.5483	140.7073	134.8669	130.1240	125.0250	123.0656	126.8900	130.9233	136.2764	142.2068	147.3193	(44)
Energy conte	233.9244	205.8348	216.2619	184.6260	175.1719	153.7328	148.8372	157.1163	161.4416	184.9257	202.5996	230.6664	(45)
Energy content (annual)										Total = Sum(45)m =		2255.1387	
Distribution loss (46)m = 0.15 x (45)m	35.0887	30.8752	32.4393	27.6939	26.2758	23.0599	22.3256	23.5674	24.2162	27.7389	30.3899	34.6000	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	284.8833	251.8622	267.2208	233.9411	226.1308	203.0479	199.7961	208.0752	210.7566	235.8846	251.9147	281.6253	(62)
WWHRS	-33.0953	-29.2697	-30.6496	-25.3790	-23.6524	-20.2395	-18.9713	-20.1741	-20.9406	-24.6866	-27.9669	-32.4824	(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	251.7881	222.5925	236.5712	208.5620	202.4784	182.8084	180.8248	187.9011	189.8161	211.1980	223.9478	249.1430	(64)
										Total per year (kWh/year) = Sum(64)m =		2547.6314	(64)
12Total per year (kWh/year)												2548	(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	90.5196	79.9469	84.6468	73.7169	70.9844	63.4449	62.2281	64.9809	66.0081	74.2275	79.6931	89.4363	(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	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	143.6585	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
152.2709 168.5857 152.2709 157.3466 152.2709 157.3466 152.2709 152.2709 157.3466 152.2709 157.3466 152.2709 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
288.6877 291.6834 284.1344 268.0635 247.7768 228.7102 215.9725 212.9768 220.5258 236.5968 256.8835 275.9501 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 37.3658 (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)
-114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 -114.9268 (71)
Water heating gains (Table 5)
121.6661 118.9686 113.7726 102.3846 95.4091 88.1180 83.6399 87.3399 91.6779 99.7682 110.6849 120.2101 (72)
Total internal gains
631.7223 648.3353 619.2755 596.8922 564.5544 540.2723 517.9809 518.6852 535.6479 557.7335 594.0126 617.5287 (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	7.9000	10.6334	0.6300	0.7000	0.7700	25.6727	(74)
South	9.7000	46.7521	0.6300	0.7000	0.7700	138.5940	(78)
West	1.8000	19.6403	0.6300	0.7000	0.7700	10.8042	(80)

Solar gains 175.0708 297.1782 407.3085 511.4578 583.1312 584.5108 561.1218 506.0767 442.7514 328.3009 209.4232 150.0448 (83)
Total gains 806.7931 945.5135 1026.5840 1108.3501 1147.6855 1124.7832 1079.1027 1024.7619 978.3993 886.0344 803.4357 767.5734 (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	75.0461	75.2448	75.4405	76.3736	76.5507	77.3863	77.3863	77.5430	77.0623	76.5507	76.1932	75.8230	
alpha	6.0031	6.0163	6.0294	6.0916	6.1034	6.1591	6.1591	6.1695	6.1375	6.1034	6.0795	6.0549	
util living area	0.9981	0.9946	0.9861	0.9538	0.8614	0.6733	0.4968	0.5435	0.7930	0.9660	0.9950	0.9986	(86)
MIT	19.9310	20.1075	20.3350	20.6332	20.8647	20.9769	20.9969	20.9947	20.9390	20.6439	20.2354	19.9048	(87)
Th 2	20.0574	20.0596	20.0618	20.0722	20.0742	20.0833	20.0833	20.0849	20.0798	20.0742	20.0702	20.0661	(88)
util rest of house	0.9974	0.9927	0.9809	0.9360	0.8130	0.5878	0.3953	0.4388	0.7155	0.9493	0.9928	0.9981	(89)
MIT 2	18.8101	19.0369	19.3268	19.7022	19.9629	20.0709	20.0824	20.0833	20.0410	19.7225	19.2091	18.7832	(90)
Living area fraction										fLA = Living area / (4) =		0.1263	(91)
MIT	18.9517	19.1722	19.4542	19.8198	20.0768	20.1854	20.1979	20.1984	20.1544	19.8389	19.3387	18.9249	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9517	19.1722	19.4542	19.8198	20.0768	20.1854	20.1979	20.1984	20.1544	19.8389	19.3387	18.9249	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9901	0.9763	0.9301	0.8132	0.5977	0.4081	0.4520	0.7225	0.9438	0.9903	0.9971	(94)
Useful gains	803.6971	936.1108	1002.2846	1030.8389	933.2806	672.3379	440.4333	463.2093	706.8457	836.2327	795.6356	765.3484	(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	1853.9736	1801.1846	1630.6099	1357.7435	1039.1424	685.3811	441.4965	465.1595	746.0638	1146.0794	1525.3342	1844.1451	(97)
Space heating kWh	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98a)
Space heating requirement - total per year (kWh/year)												3702.8754	
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	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3702.8754	
Space heating per m2											(98c) / (4) =	30.1783	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 92.4000 (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	781.4057	581.3296	467.4740	235.3714	78.7612	0.0000	0.0000	0.0000	0.0000	230.5259	525.3830	802.6247	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	845.6771	629.1446	505.9242	254.7309	85.2394	0.0000	0.0000	0.0000	0.0000	249.4870	568.5963	868.6414	(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	251.7881	222.5925	236.5712	208.5620	202.4784	182.8084	180.8248	187.9011	189.8161	211.1980	223.9478	249.1430	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.6388	86.3397	85.8119	84.6412	82.5360	80.3000	80.3000	80.3000	80.3000	84.5695	86.1428	86.7005	(217)
Fuel for water heating, kWh/month	290.6183	257.8101	275.6858	246.4071	245.3213	227.6568	225.1865	233.9989	236.3837	249.7330	259.9728	287.3606	(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	31.6389	25.3819	22.8536	16.7435	12.9332	10.5665	11.7981	15.3356	19.9194	26.1353	29.5198	32.5182	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-40.1181	-57.5409	-84.1056	-96.1748	-105.0225	-98.4345	-97.1636	-91.0574	-80.5363	-66.4708	-44.4315	-34.5658	(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	-19.7676	-41.8889	-83.8458	-126.8133	-168.5717	-169.7604	-167.8229	-141.7364	-103.3740	-60.2651	-26.5037	-15.6136	(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	4007.4409	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	3036.1349	(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)	255.3440	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2021.5850	(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	5363.3348	(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	4007.4409	0.2100	841.5626	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3036.1349	0.2100	637.5883	(264)
Space and water heating			1479.1509	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	255.3440	0.1443	36.8540	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-895.6218	0.1342	-120.2345	
PV Unit electricity exported	-1125.9633	0.1257	-141.5130	
Total			-261.7475	(269)
Total CO2, kg/year			1266.1867	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3200	(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	4007.4409	1.1300	4528.4082	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3036.1349	1.1300	3430.8325	(278)
Space and water heating			7959.2407	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	255.3440	1.5338	391.6551	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-895.6218	1.4961	-1339.9712	
PV Unit electricity exported	-1125.9633	0.4613	-519.4379	
Total			-1859.4091	(283)
Total Primary energy kWh/year			6621.5875	(286)
Target Primary Energy Rate (TPER)			53.9700	(287)

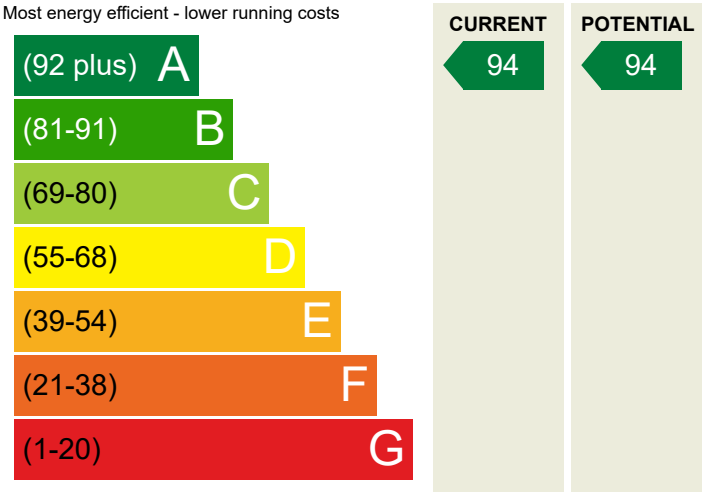
Energy Report

Dwelling Address	Devoke, Crabtree Lane, Openshaw
Reference	Devoke-Devoke (SD)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	123

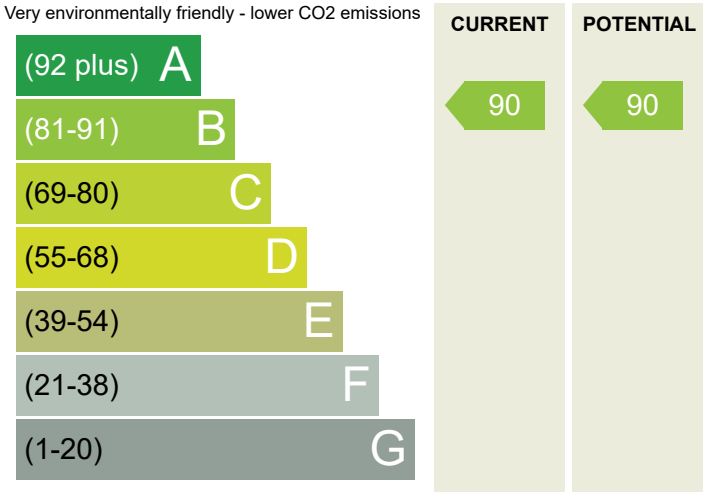
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

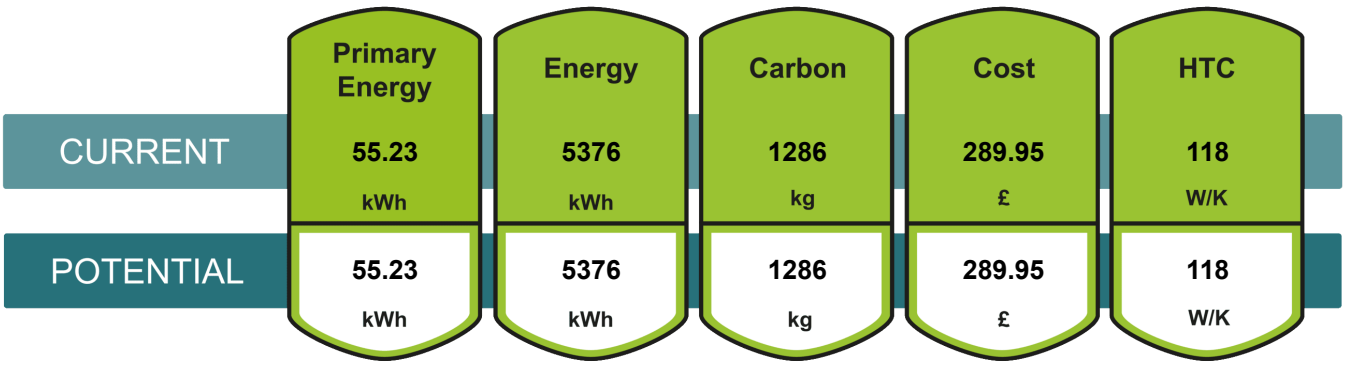
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£21	A 94			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£67	£67	
Heating	£352	£352	
Hot Water	£181	£181	
New Technologies e.g. Impact of PV	-(£310)	-(£310)	
TOTAL	£290	£290	

Estimated energy use and potential savings

Space Heating
3952
kWh per year

Water Heating
3234
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

Property Reference	Fewston	**Issued on Date**	14/04/2025
Assessment Reference	Fewston (SD)	**Prop Type Ref**	
Property	Fewston, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.21	**TER**	11.37
Environmental	91 B	**% DER < TER**			1.41
CO_2 Emissions (t/year)	0.97	**DFEE**	35.28	**TFEE**	35.66
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.68	**DPER**	58.99	**TPER**	59.40

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	274.42	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	42.60 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	33.70	m²	

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	95.10	81.30	0.00	None	13.80	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	43.00	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	47.80
FF Partitions	Plasterboard on timber frame	9.00	91.10

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	42.60	42.60	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	42.60

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	42.60

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	42.60

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	West	2.10	0
Front	Window	External Wall	West	3.70	0
Side	Window	External Wall	South	1.60	0
Rear	Window	External Wall	East	6.40	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	10.10	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	7.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	24.10	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	18.60	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	18.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	10.20	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.40	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.10	0.10	RCDs	No

Y-value	0.03	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	4
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0

Summary for Input Data

Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting: No

Name	Efficacy	Power	Capacity	Count
Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	89.00	
In Summer	87.30	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
System Type	Combi boiler	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No

Summary for Input Data

elmhurst energy

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

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
2.50	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 95	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Fewston	**Issued on Date**	14/04/2025
Assessment Reference	Fewston (SD)	**Prop Type Ref**	
Property	Fewston, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.21	**TER**	11.37
Environmental	91 B	**% DER < TER**			1.41
CO_2 Emissions (t/year)	0.97	**DFEE**	35.28	**TFEE**	35.66
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.68	**DPER**	58.99	**TPER**	59.40

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)
			Air changes per hour
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			23380.6998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.8473 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	(39)

Average = Sum(39)m / 12 = 84.2894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	(40)
HLP (average)												0.9893	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	538.8872	551.8108	526.7676	505.5661	477.5879	455.5464	436.2211	437.8431	452.7380	473.2715	505.6311	527.1188	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	622.3715	707.8433	769.7644	844.3088	882.8399	866.9499	829.2465	781.3697	729.7054	654.3741	608.3193	596.7264	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	
alpha	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	
util living area	0.9963	0.9911	0.9775	0.9271	0.8040	0.6090	0.4455	0.4928	0.7469	0.9519	0.9913	0.9971	(86)
MIT	20.0544	20.2130	20.4360	20.7152	20.9111	20.9862	20.9982	20.9968	20.9561	20.6954	20.3173	20.0142	(87)
Th 2	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	(88)
util rest of house	0.9950	0.9881	0.9696	0.9028	0.7498	0.5286	0.3546	0.3975	0.6682	0.9304	0.9878	0.9961	(89)
MIT 2	19.2376	19.3945	19.6129	19.8748	20.0377	20.0867	20.0919	20.0915	20.0712	19.8626	19.4989	19.1976	(90)
Living area fraction									fLA = Living area / (4) =			0.3955	(91)
MIT	19.5607	19.7183	19.9384	20.2072	20.3832	20.4425	20.4504	20.4496	20.4212	20.1920	19.8226	19.5206	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5607	19.7183	19.9384	20.2072	20.3832	20.4425	20.4504	20.4496	20.4212	20.1920	19.8226	19.5206	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9940	0.9865	0.9680	0.9063	0.7682	0.5603	0.3906	0.4353	0.6982	0.9332	0.9864	0.9953	(94)
Useful gains	618.6185	698.2761	745.1582	765.1804	678.2206	485.7261	323.9194	340.1385	509.4657	610.6412	600.0582	593.9032	(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	1286.3115	1249.0213	1132.7178	953.0788	731.8973	492.4592	324.5446	341.3345	532.8106	808.5038	1072.3810	1291.3661	(97)
Space heating kWh	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98a)
Space heating requirement - total per year (kWh/year)												2336.6256	
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	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2336.6256	
Space heating per m2											(98c) / (4) =	27.4252	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	558.1614	415.8436	323.9825	152.0076	44.8713	0.0000	0.0000	0.0000	0.0000	165.4042	382.1038	583.0476	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3918	88.3244	88.1983	87.9450	87.5703	87.3000	87.3000	87.3000	87.3000	87.9784	88.2948	88.4139	(217)
Fuel for water heating, kWh/month	307.0884	271.0521	286.2007	246.8053	236.5545	209.7280	203.8599	214.1415	218.9400	247.1386	267.8447	302.9043	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	29.7781	23.8891	21.5095	15.7588	12.1725	9.9451	11.1042	14.4336	18.7479	24.5982	27.7836	30.6057	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8473	-56.2577	-81.0366	-91.1939	-98.2524	-91.6706	-90.5429	-85.5470	-76.5837	-64.4074	-43.8361	-34.4326	(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	-22.7608	-48.2173	-96.8963	-147.2711	-196.3511	-197.9715	-195.2715	-164.1705	-118.9951	-69.1499	-30.4262	-17.9597	(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	2625.4220	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3012.2579	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 24.4958 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	240.3262	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3829.4527	(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	2625.4220	0.2100	551.3386	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3012.2579	0.2100	632.5742	(264)
Space and water heating			1183.9128	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	240.3262	0.1443	34.6865	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	0.1346	-114.8713	
PV Unit electricity exported	-1305.4412	0.1256	-163.9711	
Total			-278.8424	(269)
Total CO2, kg/year			955.0840	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.2100	(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	2625.4220	1.1300	2966.7269	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3012.2579	1.1300	3403.8514	(278)
Space and water heating			6370.5783	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	240.3262	1.5338	368.6203	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	1.4974	-1278.1529	
PV Unit electricity exported	-1305.4412	0.4610	-601.8675	
Total			-1880.0203	(283)
Total Primary energy kWh/year			5026.3364	(286)
Dwelling Primary energy Rate (DPER)			58.9900	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3937	(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) =	0.3347	(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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)
Average = Sum(39)m / 12 =												88.8406	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)
Hot water usage for baths	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												125.7377	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	533.1796	546.4567	522.2426	503.0597	476.2742	455.4991	437.0398	438.0800	452.2761	471.4050	501.8405	521.6845	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	616.6639	702.4892	765.2394	841.8023	881.5263	866.9027	830.0653	781.6065	729.2436	652.5075	604.5287	591.2921	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9967	0.9923	0.9809	0.9366	0.8246	0.6290	0.4620	0.5100	0.7672	0.9578	0.9923	0.9974	(86)
MIT	19.9378	20.1042	20.3427	20.6591	20.8841	20.9813	20.9974	20.9955	20.9429	20.6468	20.2414	19.9144	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9955	0.9896	0.9739	0.9142	0.7708	0.5446	0.3647	0.4085	0.6870	0.9381	0.9891	0.9965	(89)
MIT 2	18.8014	19.0148	19.3174	19.7108	19.9574	20.0496	20.0586	20.0597	20.0201	19.7056	19.1990	18.7784	(90)
Living area fraction										fLA = Living area / (4) =		0.3955	(91)
MIT	19.2509	19.4457	19.7229	20.0859	20.3239	20.4181	20.4300	20.4298	20.3851	20.0779	19.6113	19.2277	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2509	19.4457	19.7229	20.0859	20.3239	20.4181	20.4300	20.4298	20.3851	20.0779	19.6113	19.2277	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9874	0.9711	0.9152	0.7875	0.5777	0.4033	0.4488	0.7168	0.9388	0.9871	0.9954	(94)
Useful gains	613.0806	693.6515	743.1354	770.4260	694.1798	500.7704	334.7902	350.8068	522.7177	612.5541	596.7352	588.5487	(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													
	1352.2330	1312.0406	1189.5679	993.7719	764.3538	509.9900	335.7162	352.5087	553.2889	840.0428	1114.2085	1344.9748	(97)
Space heating kWh													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98a)
Space heating requirement - total per year (kWh/year)												2615.2646	
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													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2615.2646	
Space heating per m2											(98c) / (4) =	30.6956	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)

Fraction of space heat from main system(s) 1.0000 (202)

Efficiency of main space heating system 1 (in %) 92.4000 (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													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	595.1617	449.7375	359.4651	174.0358	56.5037	0.0000	0.0000	0.0000	0.0000	183.1727	403.2260	609.0704	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.1226	85.8190	85.2346	83.9521	82.0009	80.3000	80.3000	80.3000	80.3000	84.0326	85.5855	86.1852	(217)
Fuel for water heating, kWh/month													
	275.1255	244.1688	261.4592	234.4111	233.2664	215.3709	213.2342	221.3950	223.4520	237.2353	246.5850	272.0833	(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	25.9647	20.8298	18.7550	13.7407	10.6137	8.6715	9.6822	12.5853	16.3470	21.4482	24.2256	26.6863	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5581	-55.6087	-79.6943	-89.3179	-96.0564	-89.5521	-88.4388	-83.6201	-75.0702	-63.4555	-43.4309	-34.2186	(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	-22.8167	-47.9538	-95.2379	-142.9386	-188.9097	-189.7903	-187.5619	-158.8498	-116.4844	-68.5481	-30.4527	-18.0465	(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	2830.3730	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2877.7869	(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)	209.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3898.0981	(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	2830.3730	0.2100	594.3783	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2877.7869	0.2100	604.3352	(264)
Space and water heating			1198.7136	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	209.5499	0.1443	30.2445	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	0.1347	-112.8431	
PV Unit electricity exported	-1267.5902	0.1259	-159.6099	
Total			-272.4530	(269)
Total CO2, kg/year			968.4343	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3700	(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	2830.3730	1.1300	3198.3214	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2877.7869	1.1300	3251.8992	(278)
Space and water heating			6450.2206	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	209.5499	1.5338	321.4147	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	1.4977	-1255.0737	
PV Unit electricity exported	-1267.5902	0.4622	-585.8793	
Total			-1840.9530	(283)
Total Primary energy kWh/year			5060.7831	(286)
Target Primary Energy Rate (TPER)			59.4000	(287)

Full SAP Calculation Printout

Property Reference	Fewston	**Issued on Date**	14/04/2025
Assessment Reference	Fewston (SD)	**Prop Type Ref**	
Property	Fewston, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.21	**TER**	11.37
Environmental	91 B	**% DER < TER**			1.41
CO_2 Emissions (t/year)	0.97	**DFEE**	35.28	**TFEE**	35.66
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.68	**DPER**	58.99	**TPER**	59.40

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(5)

2. Ventilation rate

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

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3687	(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) =	0.3134	(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	0.3996	0.3918	0.3839	0.3448	0.3369	0.2977	0.2977	0.2899	0.3134	0.3369	0.3526	0.3683	(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	0.5798	0.5767	0.5737	0.5594	0.5568	0.5443	0.5443	0.5420	0.5491	0.5568	0.5622	0.5678	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		23380.6998	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							274.4214	(35)
List of Thermal Bridges								

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0210	0.1533	
E4 Jamb	24.1000	0.0160	0.3856	
E5 Ground floor (normal)	18.6000	0.0740	1.3764	
E6 Intermediate floor within a dwelling	18.6000	0.0010	0.0186	
E10 Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872	
E12 Gable (insulation at ceiling level)	10.2000	0.0570	0.5814	
E16 Corner (normal)	10.2000	0.0470	0.4794	
E18 Party wall between dwellings	10.2000	0.0380	0.3876	
P1 Party wall - Ground floor	8.4000	0.1080	0.9072	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.1301	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	49.8473	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	39.9418	39.7282	39.5189	38.5357	38.3517	37.4954	37.4954	37.3368	37.8252	38.3517	38.7239	39.1129	(38)
Heat transfer coeff	89.7891	89.5755	89.3662	88.3830	88.1990	87.3427	87.3427	87.1841	87.6725	88.1990	88.5712	88.9602	(39)
Average = Sum(39)m / 12 =												88.3821	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0539	1.0514	1.0489	1.0374	1.0352	1.0251	1.0251	1.0233	1.0290	1.0352	1.0396	1.0441	(40)
HLP (average)												1.0373	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5542	(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	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												63.9247	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)
Energy content (annual)										Total = Sum(45)m =		1061.6535	
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	93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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	93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)
										Total per year (kWh/year) = Sum(64)m =		902.4055	(64)
12Total per year (kWh/year)												902	(64)
Electric shower(s)	53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							610.7387	(64a)
Heat gains from water heating, kWh/month	36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains	465.8289	480.3551	459.0248	446.7960	424.1014	410.6468	395.1409	394.2121	406.0298	417.3388	441.1366	455.2799	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	549.3132	636.3876	702.0216	785.5387	829.3534	822.0503	788.1663	737.7386	682.9972	598.4413	543.8248	524.8876	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.3322	72.5046	72.6744	73.4829	73.6362	74.3582	74.3582	74.4934	74.0784	73.6362	73.3268	73.0061	
alpha	5.8221	5.8336	5.8450	5.8989	5.9091	5.9572	5.9572	5.9662	5.9386	5.9091	5.8885	5.8671	
util living area	0.9982	0.9953	0.9871	0.9512	0.8505	0.6565	0.4841	0.5370	0.7992	0.9706	0.9954	0.9986	(86)
MIT	19.8707	20.0393	20.2836	20.6163	20.8632	20.9770	20.9967	20.9942	20.9296	20.5993	20.1790	19.8460	(87)
Th 2	20.0387	20.0408	20.0428	20.0523	20.0541	20.0624	20.0624	20.0640	20.0592	20.0541	20.0505	20.0467	(88)
util rest of house	0.9975	0.9935	0.9822	0.9327	0.8002	0.5706	0.3829	0.4313	0.7216	0.9558	0.9935	0.9981	(89)
MIT 2	19.0114	19.1808	19.4240	19.7511	19.9669	20.0529	20.0617	20.0625	20.0239	19.7422	19.3283	18.9932	(90)
Living area fraction										fLA = Living area / (4) =		0.3955	(91)
MIT	19.3513	19.5204	19.7640	20.0933	20.3214	20.4184	20.4315	20.4310	20.3821	20.0812	19.6648	19.3305	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3513	19.5204	19.7640	20.0933	20.3214	20.4184	20.4315	20.4310	20.3821	20.0812	19.6648	19.3305	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9969	0.9923	0.9804	0.9336	0.8157	0.6043	0.4231	0.4734	0.7503	0.9563	0.9924	0.9976	(94)
Useful gains	547.5838	631.4957	688.2417	733.4121	676.4761	496.7342	333.4826	349.2221	512.4470	572.2841	539.6937	523.6095	(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	1351.4423	1309.6296	1185.3519	989.2984	760.4017	508.1935	334.6561	351.4399	550.7689	836.2327	1112.8783	1346.0129	(97)
Space heating kWh	598.0707	455.7060	369.8500	184.2381	62.4407	0.0000	0.0000	0.0000	0.0000	196.3778	412.6929	611.8682	(98a)
Space heating requirement - total per year (kWh/year)												2891.2443	
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	598.0707	455.7060	369.8500	184.2381	62.4407	0.0000	0.0000	0.0000	0.0000	196.3778	412.6929	611.8682	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2891.2443	
Space heating per m2											(98c) / (4) =	33.9348	(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	821.0209	646.3356	662.5989	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8947	0.9496	0.9279	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	734.5817	613.7556	614.8272	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	905.6983	868.7598	812.3421	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	123.2039	189.7231	146.9511	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	30.8010	47.4308	36.7378	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.9695	(107)
Energy for space heating												33.9348	(99)
Energy for space cooling												1.3494	(108)
Total												35.2842	(109)
Fabric Energy Efficiency (DFEE)												35.3	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b)	x 2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c)	x 2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

---

2. Ventilation rate

---

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

Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1437 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3937 (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) = 0.3347 (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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932	(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 0.5910 0.5875 0.5840 0.5678 0.5647 0.5505 0.5505 0.5479 0.5560 0.5647 0.5709 0.5773 (25)

---
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3 Sill	7.3000	0.0500	0.3650
E4 Jamb	24.1000	0.0500	1.2050
E5 Ground floor (normal)	18.6000	0.1600	2.9760
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.4000	0.0800	0.6720
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)

Average = Sum(39)m / 12 = 88.8406

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---
4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (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

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 63.9247 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)

Energy content (annual) Total = Sum(45)m = 1061.6535

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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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												
93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)

Total per year (kWh/year) = Sum(64)m = 902.4055 (64)
12Total per year (kWh/year) 902 (64)
Electric shower(s)

	53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												610.7387	(64a)
Heat gains from water heating, kWh/month													
	36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains													
	465.8289	480.3551	459.0248	446.7960	424.1014	410.6468	395.1409	394.2121	406.0298	417.3388	441.1366	455.2799	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	549.3132	636.3876	702.0216	785.5387	829.3534	822.0503	788.1663	737.7386	682.9972	598.4413	543.8248	524.8876	(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	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9982	0.9953	0.9872	0.9518	0.8521	0.6583	0.4857	0.5386	0.8009	0.9709	0.9955	0.9986	(86)
MIT	19.8592	20.0286	20.2743	20.6106	20.8601	20.9764	20.9966	20.9940	20.9280	20.5945	20.1718	19.8364	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9975	0.9936	0.9824	0.9334	0.8019	0.5721	0.3839	0.4324	0.7232	0.9562	0.9935	0.9981	(89)
MIT 2	18.9949	19.1653	19.4101	19.7420	19.9607	20.0496	20.0586	20.0596	20.0196	19.7341	19.3174	18.9795	(90)
Living area fraction										fLA = Living area / (4) =		0.3955	(91)
MIT	19.3368	19.5068	19.7519	20.0856	20.3164	20.4162	20.4296	20.4292	20.3789	20.0744	19.6553	19.3185	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3368	19.5068	19.7519	20.0856	20.3164	20.4162	20.4296	20.4292	20.3789	20.0744	19.6553	19.3185	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9969	0.9924	0.9805	0.9343	0.8173	0.6059	0.4244	0.4747	0.7519	0.9567	0.9924	0.9976	(94)
Useful gains	547.5852	631.5212	688.3639	733.9148	677.8083	498.0494	334.4735	350.1683	513.5425	572.5029	539.7108	523.6091	(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													
	1359.9970	1317.5502	1192.1804	993.7424	763.6894	509.8176	335.6880	352.4532	552.7411	839.7370	1118.1296	1353.0996	(97)
Space heating kWh													
	604.4344	461.0115	374.8395	187.0759	63.8956	0.0000	0.0000	0.0000	0.0000	198.8222	416.4615	617.1409	(98a)
Space heating requirement - total per year (kWh/year)												2923.6814	
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													
	604.4344	461.0115	374.8395	187.0759	63.8956	0.0000	0.0000	0.0000	0.0000	198.8222	416.4615	617.1409	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2923.6814	
Space heating per m2											(98c) / (4) =	34.3155	(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	823.9608	648.6500	664.8068	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8931	0.9485	0.9267	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	735.8596	615.2768	616.0592	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	905.6983	868.7598	812.3421	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	122.2839	188.5913	146.0345	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	30.5710	47.1478	36.5086	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.2274	(107)

Energy for space heating	34.3155 (99)
Energy for space cooling	1.3407 (108)
Total	35.6562 (109)
Fabric Energy Efficiency (TFEE)	35.7 (109)

Full SAP Calculation Printout

Property Reference	Fewston	**Issued on Date**	14/04/2025
Assessment Reference	Fewston (SD)	**Prop Type Ref**	
Property	Fewston, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.21	**TER**	11.37
Environmental	91 B	**% DER < TER**			1.41
CO_2 Emissions (t/year)	0.97	**DFEE**	35.28	**TFEE**	35.66
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.68	**DPER**	58.99	**TPER**	59.40

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)
			Air changes per hour
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			23380.6998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.8473 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	(39)

Average = Sum(39)m / 12 = 84.2894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	(40)
HLP (average)												0.9893	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	538.8872	551.8108	526.7676	505.5661	477.5879	455.5464	436.2211	437.8431	452.7380	473.2715	505.6311	527.1188	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	622.3715	707.8433	769.7644	844.3088	882.8399	866.9499	829.2465	781.3697	729.7054	654.3741	608.3193	596.7264	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	
alpha	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	
util living area	0.9963	0.9911	0.9775	0.9271	0.8040	0.6090	0.4455	0.4928	0.7469	0.9519	0.9913	0.9971	(86)
MIT	20.0544	20.2130	20.4360	20.7152	20.9111	20.9862	20.9982	20.9968	20.9561	20.6954	20.3173	20.0142	(87)
Th 2	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	(88)
util rest of house	0.9950	0.9881	0.9696	0.9028	0.7498	0.5286	0.3546	0.3975	0.6682	0.9304	0.9878	0.9961	(89)
MIT 2	19.2376	19.3945	19.6129	19.8748	20.0377	20.0867	20.0919	20.0915	20.0712	19.8626	19.4989	19.1976	(90)
Living area fraction									fLA = Living area / (4) =			0.3955	(91)
MIT	19.5607	19.7183	19.9384	20.2072	20.3832	20.4425	20.4504	20.4496	20.4212	20.1920	19.8226	19.5206	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5607	19.7183	19.9384	20.2072	20.3832	20.4425	20.4504	20.4496	20.4212	20.1920	19.8226	19.5206	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9940	0.9865	0.9680	0.9063	0.7682	0.5603	0.3906	0.4353	0.6982	0.9332	0.9864	0.9953	(94)
Useful gains	618.6185	698.2761	745.1582	765.1804	678.2206	485.7261	323.9194	340.1385	509.4657	610.6412	600.0582	593.9032	(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	1286.3115	1249.0213	1132.7178	953.0788	731.8973	492.4592	324.5446	341.3345	532.8106	808.5038	1072.3810	1291.3661	(97)
Space heating kWh	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98a)
Space heating requirement - total per year (kWh/year)												2336.6256	
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	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2336.6256	
Space heating per m2											(98c) / (4) =	27.4252	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	496.7636	370.1008	288.3444	135.2868	39.9354	0.0000	0.0000	0.0000	0.0000	147.2098	340.0724	518.9124	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	558.1614	415.8436	323.9825	152.0076	44.8713	0.0000	0.0000	0.0000	0.0000	165.4042	382.1038	583.0476	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3918	88.3244	88.1983	87.9450	87.5703	87.3000	87.3000	87.3000	87.3000	87.9784	88.2948	88.4139	(217)
Fuel for water heating, kWh/month	307.0884	271.0521	286.2007	246.8053	236.5545	209.7280	203.8599	214.1415	218.9400	247.1386	267.8447	302.9043	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	29.7781	23.8891	21.5095	15.7588	12.1725	9.9451	11.1042	14.4336	18.7479	24.5982	27.7836	30.6057	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8473	-56.2577	-81.0366	-91.1939	-98.2524	-91.6706	-90.5429	-85.5470	-76.5837	-64.4074	-43.8361	-34.4326	(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	-22.7608	-48.2173	-96.8963	-147.2711	-196.3511	-197.9715	-195.2715	-164.1705	-118.9951	-69.1499	-30.4262	-17.9597	(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	2625.4220	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3012.2579	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 24.4958 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	240.3262	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3829.4527	(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	2625.4220	0.2100	551.3386	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3012.2579	0.2100	632.5742	(264)
Space and water heating			1183.9128	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	240.3262	0.1443	34.6865	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	0.1346	-114.8713	
PV Unit electricity exported	-1305.4412	0.1256	-163.9711	
Total			-278.8424	(269)
Total CO2, kg/year			955.0840	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.2100	(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	2625.4220	1.1300	2966.7269	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3012.2579	1.1300	3403.8514	(278)
Space and water heating			6370.5783	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	240.3262	1.5338	368.6203	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	1.4974	-1278.1529	
PV Unit electricity exported	-1305.4412	0.4610	-601.8675	
Total			-1880.0203	(283)
Total Primary energy kWh/year			5026.3364	(286)
Dwelling Primary energy Rate (DPER)			58.9900	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3937	(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) =	0.3347	(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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)
Average = Sum(39)m / 12 =												88.8406	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)
Hot water usage for baths	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												125.7377	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	533.1796	546.4567	522.2426	503.0597	476.2742	455.4991	437.0398	438.0800	452.2761	471.4050	501.8405	521.6845	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	616.6639	702.4892	765.2394	841.8023	881.5263	866.9027	830.0653	781.6065	729.2436	652.5075	604.5287	591.2921	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9967	0.9923	0.9809	0.9366	0.8246	0.6290	0.4620	0.5100	0.7672	0.9578	0.9923	0.9974	(86)
MIT	19.9378	20.1042	20.3427	20.6591	20.8841	20.9813	20.9974	20.9955	20.9429	20.6468	20.2414	19.9144	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9955	0.9896	0.9739	0.9142	0.7708	0.5446	0.3647	0.4085	0.6870	0.9381	0.9891	0.9965	(89)
MIT 2	18.8014	19.0148	19.3174	19.7108	19.9574	20.0496	20.0586	20.0597	20.0201	19.7056	19.1990	18.7784	(90)
Living area fraction										fLA = Living area / (4) =		0.3955	(91)
MIT	19.2509	19.4457	19.7229	20.0859	20.3239	20.4181	20.4300	20.4298	20.3851	20.0779	19.6113	19.2277	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2509	19.4457	19.7229	20.0859	20.3239	20.4181	20.4300	20.4298	20.3851	20.0779	19.6113	19.2277	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9874	0.9711	0.9152	0.7875	0.5777	0.4033	0.4488	0.7168	0.9388	0.9871	0.9954	(94)
Useful gains	613.0806	693.6515	743.1354	770.4260	694.1798	500.7704	334.7902	350.8068	522.7177	612.5541	596.7352	588.5487	(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													
	1352.2330	1312.0406	1189.5679	993.7719	764.3538	509.9900	335.7162	352.5087	553.2889	840.0428	1114.2085	1344.9748	(97)
Space heating kWh													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98a)
Space heating requirement - total per year (kWh/year)												2615.2646	
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													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2615.2646	
Space heating per m2											(98c) / (4) =	30.6956	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)

Fraction of space heat from main system(s) 1.0000 (202)

Efficiency of main space heating system 1 (in %) 92.4000 (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													
	549.9294	415.5575	332.1458	160.8091	52.2095	0.0000	0.0000	0.0000	0.0000	169.2516	372.5808	562.7810	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	595.1617	449.7375	359.4651	174.0358	56.5037	0.0000	0.0000	0.0000	0.0000	183.1727	403.2260	609.0704	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.1226	85.8190	85.2346	83.9521	82.0009	80.3000	80.3000	80.3000	80.3000	84.0326	85.5855	86.1852	(217)
Fuel for water heating, kWh/month													
	275.1255	244.1688	261.4592	234.4111	233.2664	215.3709	213.2342	221.3950	223.4520	237.2353	246.5850	272.0833	(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	25.9647	20.8298	18.7550	13.7407	10.6137	8.6715	9.6822	12.5853	16.3470	21.4482	24.2256	26.6863	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5581	-55.6087	-79.6943	-89.3179	-96.0564	-89.5521	-88.4388	-83.6201	-75.0702	-63.4555	-43.4309	-34.2186	(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	-22.8167	-47.9538	-95.2379	-142.9386	-188.9097	-189.7903	-187.5619	-158.8498	-116.4844	-68.5481	-30.4527	-18.0465	(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	2830.3730	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2877.7869	(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)	209.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3898.0981	(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	2830.3730	0.2100	594.3783	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2877.7869	0.2100	604.3352	(264)
Space and water heating			1198.7136	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	209.5499	0.1443	30.2445	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	0.1347	-112.8431	
PV Unit electricity exported	-1267.5902	0.1259	-159.6099	
Total			-272.4530	(269)
Total CO2, kg/year			968.4343	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.3700	(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	2830.3730	1.1300	3198.3214	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2877.7869	1.1300	3251.8992	(278)
Space and water heating			6450.2206	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	209.5499	1.5338	321.4147	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	1.4977	-1255.0737	
PV Unit electricity exported	-1267.5902	0.4622	-585.8793	
Total			-1840.9530	(283)
Total Primary energy kWh/year			5060.7831	(286)
Target Primary Energy Rate (TPER)			59.4000	(287)

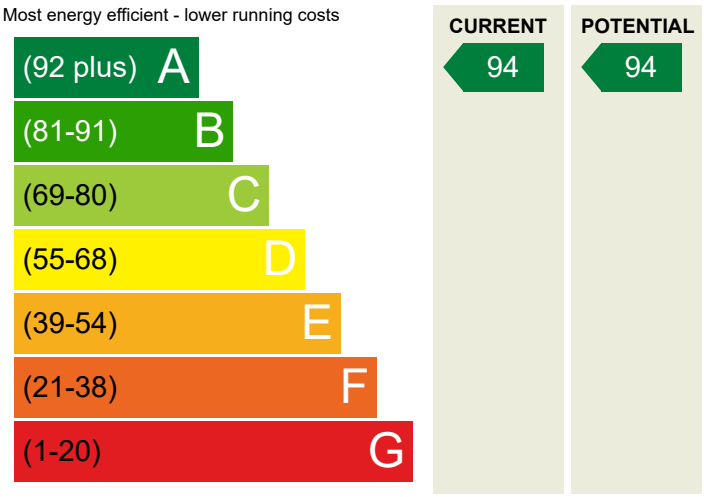
Energy Report

Dwelling Address	Fewston, Crabtree Lane, Openshaw
Reference	Fewston-Fewston (SD)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	85

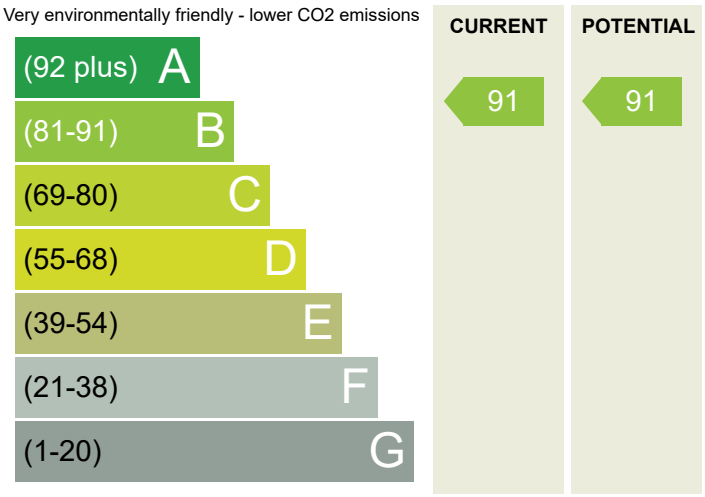
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

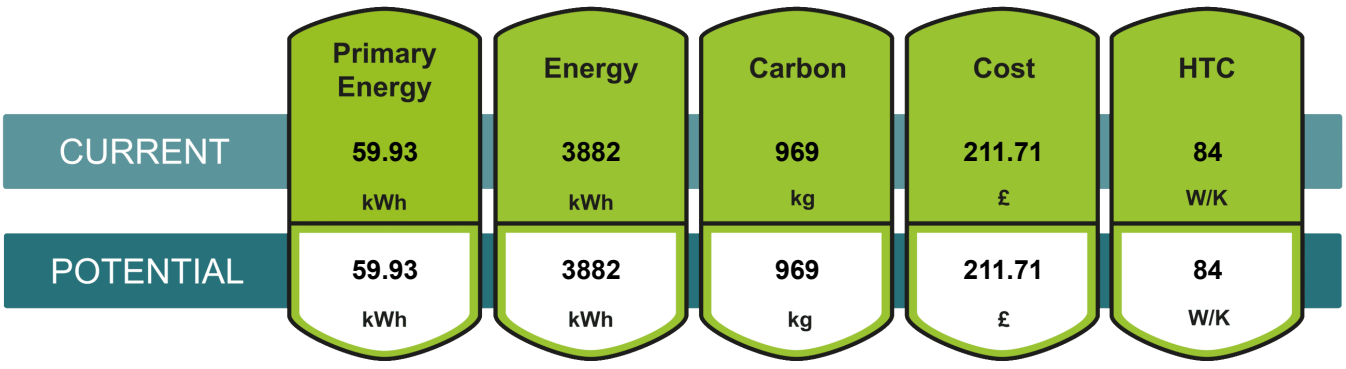
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£21	A 95			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£63	£63	
Heating	£279	£279	
Hot Water	£169	£169	
New Technologies e.g. Impact of PV	-(£298)	-(£298)	
TOTAL	£212	£212	

Estimated energy use and potential savings

Space Heating
2696
kWh per year

Water Heating
3012
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Holgate	**Issued on Date**	14/04/2025
Assessment Reference	Holgate (SD)	**Prop Type Ref**	
Property	Holgate, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.39	**TER**	10.34
Environmental	91 B	**% DER < TER**			-0.48
CO_2 Emissions (t/year)	1	**DFEE**	32.90	**TFEE**	33.18
Compliance Check	See BREL	**% DFEE < TFEE**			0.84
% DPER < TPER	-1.20	**DPER**	54.58	**TPER**	53.93

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	47.30 m²	2.30 m
1st Storey:	1.00 m	47.30 m²	2.60 m

8.0 Living Area	17.20	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	100.20	86.10	0.00	None	14.10	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	45.20	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	74.50
FF Partitions	Plasterboard on timber frame	9.00	106.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	47.30	47.30	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	47.30

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	47.30

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	47.30

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	North	2.10	0
Front	Window	External Wall	North	5.00	0
Side	Window	External Wall	West	0.60	0
Rear	Window	External Wall	South	6.40	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	10.10	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	7.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	24.10	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	19.60	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	19.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	10.80	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	8.90	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.90	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.90	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	5
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	2
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0

Summary for Input Data

Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	

Summary for Input Data

Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

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
2.70	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 95	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Holgate	**Issued on Date**	14/04/2025
Assessment Reference	Holgate (SD)	**Prop Type Ref**	
Property	Holgate, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.39	**TER**	10.34
Environmental	91 B	**% DER < TER**			-0.48
CO_2 Emissions (t/year)	1	**DFEE**	32.90	**TFEE**	33.18
Compliance Check	See BREL	**% DFEE < TFEE**			0.84
% DPER < TPER	-1.20	**DPER**	54.58	**TPER**	53.93

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000 (1b)	x	2.3000 (2b)	=	108.7900	(1b) - (3b)
First floor	47.3000 (1c)	x	2.6000 (2c)	=	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	231.7700	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			12.0000	1.2357	14.8289			(27)
Ground Floor			47.3000	0.1700	8.0410	75.0000	3547.5000	(28a)
External Wall	100.2000	14.1000	86.1000	0.1900	16.3590	140.0000	12053.9996	(29a)
External Roof	47.3000		47.3000	0.1000	4.7300	9.0000	425.7000	(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.2689			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000	140.0000	6328.0001	(32)
GF Partitions			74.5000			9.0000	670.5000	(32c)
FF Partitions			106.7000			9.0000	960.3000	(32c)
Internal Floor			47.3000			18.0000	851.4000	(32d)
Internal Ceiling			47.3000			9.0000	425.7000	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	25263.0997 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 267.0518 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	19.6000	0.0740	1.4504
E6	Intermediate floor within a dwelling	19.6000	0.0010	0.0196
E10	Eaves (insulation at ceiling level)	10.8000	0.0580	0.6264
E12	Gable (insulation at ceiling level)	8.9000	0.0570	0.5073
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.9000	0.1080	0.9612
P4	Party wall - Roof (insulation at ceiling level)	8.9000	0.1010	0.8989

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.3747 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 52.6436 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	(38)
Heat transfer coeff	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	(39)

Average = Sum(39)m / 12 = 90.8856

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	(40)
HLP (average)												0.9607	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6836 (42)

Hot water usage for mixer showers

95.1705	93.7403	91.6562	87.6686	84.7258	81.4441	79.5788	81.6471	83.9144	87.4380	91.5112	94.8059	(42a)

Hot water usage for baths

29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day) 153.7391 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	167.1712	163.7657	159.5251	152.8536	147.5165	141.7465	139.3643	143.5847	148.0592	154.1381	160.9190	166.7055	(44)
Energy conte	264.7582	233.2001	245.1841	209.2490	198.5856	174.2939	168.5490	177.7879	182.5718	209.1639	229.2586	261.0205	(45)

Energy content (annual) Total = Sum(45)m = 2553.6226

Distribution loss (46)m = 0.15 x (45)m	39.7137	34.9800	36.7776	31.3873	29.7878	26.1441	25.2824	26.6682	27.3858	31.3746	34.3888	39.1531	(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	15.0112	13.5407	14.9525	14.3860	14.8127	14.2812	14.7226	14.7503	14.3060	14.8444	14.4461	15.0000	(61)
Total heat required for water heating calculated for each month	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(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	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(64)

Total per year (kWh/year) = Sum(64)m = 2728.6761 (64)

12Total per year (kWh/year) 2729 (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	91.7849	80.9242	85.2618	73.1718	69.7329	61.5230	59.7232	62.8020	64.2816	73.2581	79.8400	90.5393	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)	123.3668	120.4229	114.5993	101.6275	93.7270	85.4486	80.2731	84.4113	89.2800	98.4652	110.8889	121.6926	(72)
Total internal gains	573.6635	587.9377	560.9955	538.8157	508.9792	485.9267	465.2817	466.8538	482.7474	504.1406	538.5003	561.0782	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	684.9568	775.7953	816.1310	856.1003	868.5662	845.6011	810.8658	779.9122	758.9618	710.9943	671.4271	656.6009	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	
alpha	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	
util living area	0.9959	0.9904	0.9793	0.9430	0.8481	0.6648	0.4899	0.5306	0.7666	0.9505	0.9903	0.9968	(86)
MIT	20.0711	20.2276	20.4236	20.6749	20.8793	20.9783	20.9971	20.9953	20.9497	20.7005	20.3348	20.0303	(87)
Th 2	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	(88)
util rest of house	0.9945	0.9872	0.9722	0.9232	0.8000	0.5829	0.3933	0.4316	0.6908	0.9292	0.9865	0.9957	(89)
MIT 2	19.2755	19.4303	19.6226	19.8616	20.0383	20.1068	20.1155	20.1149	20.0911	19.8892	19.5375	19.2350	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.4202	19.5753	19.7682	20.0094	20.1912	20.2653	20.2758	20.2750	20.2472	20.0367	19.6824	19.3796	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4202	19.5753	19.7682	20.0094	20.1912	20.2653	20.2758	20.2750	20.2472	20.0367	19.6824	19.3796	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9930	0.9847	0.9688	0.9204	0.8045	0.5973	0.4110	0.4497	0.7029	0.9269	0.9840	0.9945	(94)
Useful gains	680.1700	763.9462	790.6354	787.9134	698.7985	505.0698	333.2299	350.7205	533.4471	659.0005	660.6899	652.9988	(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	1374.2078	1333.7711	1205.8923	1009.6895	771.7321	514.8925	334.0743	352.1819	558.6957	857.6596	1143.5632	1379.6082	(97)
Space heating kWh	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98a)
Space heating requirement - total per year (kWh/year)												2458.2476	
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	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2458.2476	
Space heating per m2											(98c) / (4) =	25.9857	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	580.1844	430.2498	347.1361	179.4144	60.9692	0.0000	0.0000	0.0000	0.0000	166.0701	390.6391	607.4128	(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	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3951	88.3260	88.2148	88.0002	87.6394	87.3000	87.3000	87.3000	87.3000	87.9679	88.2915	88.4180	(217)
Fuel for water heating, kWh/month	316.4988	279.3524	294.8901	254.1301	243.4959	216.0081	209.9331	220.5477	225.5187	254.6477	276.0228	312.1767	(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	9.8140	8.8642	9.8140	9.4974	9.8140	9.4974	9.8140	9.8140	9.4974	9.8140	9.4974	9.8140	(231)
Lighting	31.1918	25.0232	22.5306	16.5069	12.7504	10.4172	11.6313	15.1189	19.6379	25.7660	29.1026	32.0587	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-42.9284	-60.5573	-87.1584	-97.9965	-105.5009	-98.3913	-97.1598	-91.8208	-82.2558	-69.2627	-47.1989	-37.0992	(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	-24.6883	-52.2757	-105.0091	-159.5457	-212.6708	-214.4222	-211.5198	-177.8741	-128.9694	-74.9792	-33.0043	-19.4845	(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	2762.0760	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3103.2219	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 4.7030, total flow = 45.0000, SFP = 0.1045)

mechanical ventilation fans (SFP = 0.1045) 29.5515 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	115.5515	(231)
Electricity for lighting (calculated in Appendix L)	251.7354	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	3900.8116	(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	2762.0760	0.2100	580.0360	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3103.2219	0.2100	651.6766	(264)
Space and water heating			1231.7125	(265)
Pumps, fans and electric keep-hot	115.5515	0.1387	16.0284	(267)
Energy for lighting	251.7354	0.1443	36.3332	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-917.3301	0.1346	-123.4661	
PV Unit electricity exported	-1414.4431	0.1256	-177.6737	
Total			-301.1398	(269)
Total CO2, kg/year			982.9343	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.3900	(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	2762.0760	1.1300	3121.1458	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3103.2219	1.1300	3506.6407	(278)
Space and water heating			6627.7866	(279)
Pumps, fans and electric keep-hot	115.5515	1.5128	174.8063	(281)
Energy for lighting	251.7354	1.5338	386.1202	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-917.3301	1.4974	-1373.6408	
PV Unit electricity exported	-1414.4431	0.4611	-652.1642	
Total			-2025.8050	(283)
Total Primary energy kWh/year			5162.9081	(286)
Dwelling Primary energy Rate (DPER)			54.5800	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000	(1b) x	2.3000	(2b) =	108.7900	(1b) - (3b)
First floor	47.3000	(1c) x	2.6000	(2c) =	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		231.7700	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1294	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3794	(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) =	0.3225	(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												
	0.4112	0.4032	0.3951	0.3548	0.3467	0.3064	0.3064	0.2983	0.3225	0.3467	0.3628	0.3790 (22b)
Effective ac	0.5845	0.5813	0.5780	0.5629	0.5601	0.5469	0.5469	0.5445	0.5520	0.5601	0.5658	0.5718 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			12.0000	1.1450	13.7405			(27)
Ground Floor			47.3000	0.1300	6.1490			(28a)
External Wall	100.2000	14.1000	86.1000	0.1800	15.4980			(29a)
External Roof	47.3000		47.3000	0.1100	5.2030			(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.6905			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 267.0518 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	19.6000	0.1600	3.1360	
E6 Intermediate floor within a dwelling	19.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	10.8000	0.0600	0.6480	
E12 Gable (insulation at ceiling level)	8.9000	0.0600	0.5340	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.9000	0.0800	0.7120	
P4 Party wall - Roof (insulation at ceiling level)	8.9000	0.1200	1.0680	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.7030 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 52.3935 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.7087	44.4576	44.2115	43.0554	42.8391	41.8322	41.8322	41.6457	42.2200	42.8391	43.2767	43.7341	(38)
Heat transfer coeff	97.1022	96.8511	96.6050	95.4489	95.2326	94.2256	94.2256	94.0392	94.6135	95.2326	95.6701	96.1276	(39)
Average = Sum(39)m / 12 =												95.4478	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0265	1.0238	1.0212	1.0090	1.0067	0.9960	0.9960	0.9941	1.0001	1.0067	1.0113	1.0161	(40)
HLP (average)												1.0090	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6836 (42)

Hot water usage for mixer showers

69.2149	68.1748	66.6590	63.7590	61.6188	59.2321	57.8755	59.3797	61.0287	63.5913	66.5536	68.9497	(42a)

Hot water usage for baths

29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day) 129.8089 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	141.2156	138.2001	134.5280	128.9440	124.4095	119.5345	117.6610	121.3173	125.1735	130.2914	135.9613	140.8493	(44)
Energy conte	223.6509	196.7952	206.7645	176.5179	167.4791	146.9816	142.3008	150.2162	154.3514	176.8042	193.7019	220.5360	(45)
Energy content (annual)										Total = Sum(45)m =		2156.0995	
Distribution loss (46)m = 0.15 x (45)m													
	33.5476	29.5193	31.0147	26.4777	25.1219	22.0472	21.3451	22.5324	23.1527	26.5206	29.0553	33.0804	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	274.6098	242.8226	257.7234	225.8330	218.4380	196.2966	193.2597	201.1751	203.6665	227.7631	243.0169	271.4949	(62)
WWHRS	-31.6422	-27.9846	-29.3039	-24.2647	-22.6139	-19.3509	-18.1383	-19.2883	-20.0211	-23.6027	-26.7390	-31.0562	(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													
	242.9677	214.8380	228.4195	201.5682	195.8241	176.9458	175.1213	181.8868	183.6453	204.1603	216.2779	240.4387	(64)
										Total per year (kWh/year) = Sum(64)m =		2462.0937	(64)
12Total per year (kWh/year)												2462	(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													
	87.1037	76.9412	81.4889	71.0210	68.4265	61.2001	60.0547	62.6866	63.6506	71.5271	76.7346	86.0679	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)													
	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)													
	117.0748	114.4959	109.5281	98.6402	91.9711	85.0002	80.7187	84.2562	88.4036	96.1386	106.5759	115.6827	(72)
Total internal gains													
	567.3715	582.0107	555.9244	535.8285	507.2233	485.4783	465.7273	466.6987	481.8710	501.8140	534.1873	555.0683	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	678.6648	769.8683	811.0598	853.1131	866.8104	845.1527	811.3115	779.7571	758.0853	708.6677	667.1141	650.5910	(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	72.2695	72.4569	72.6415	73.5213	73.6883	74.4758	74.4758	74.6235	74.1705	73.6883	73.3513	73.0022	
alpha	5.8180	5.8305	5.8428	5.9014	5.9126	5.9651	5.9651	5.9749	5.9447	5.9126	5.8901	5.8668	
util living area													
	0.9963	0.9917	0.9823	0.9501	0.8644	0.6834	0.5064	0.5473	0.7850	0.9564	0.9914	0.9971	(86)
MIT	19.9613	20.1252	20.3357	20.6205	20.8496	20.9718	20.9959	20.9936	20.9363	20.6553	20.2636	19.9365	(87)
Th 2	20.0613	20.0636	20.0657	20.0759	20.0778	20.0866	20.0866	20.0883	20.0832	20.0778	20.0739	20.0699	(88)
util rest of house													
	0.9951	0.9888	0.9760	0.9319	0.8176	0.5986	0.4038	0.4428	0.7084	0.9367	0.9879	0.9961	(89)
MIT 2	18.8558	19.0659	19.3335	19.6916	19.9517	20.0710	20.0854	20.0861	20.0420	19.7400	19.2510	18.8306	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.0568	19.2585	19.5157	19.8605	20.1149	20.2348	20.2509	20.2511	20.2046	19.9064	19.4351	19.0317	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0568	19.2585	19.5157	19.8605	20.1149	20.2348	20.2509	20.2511	20.2046	19.9064	19.4351	19.0317	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9932	0.9855	0.9712	0.9267	0.8197	0.6130	0.4226	0.4619	0.7194	0.9321	0.9846	0.9945	(94)
Useful gains	674.0164	758.7355	787.6788	790.5791	710.5473	518.1021	342.8203	360.1610	545.4039	660.5650	656.8359	647.0295	(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													
	1432.9181	1390.6388	1257.3818	1046.1645	801.3758	530.9381	344.0099	362.1550	577.5783	886.2705	1180.1006	1425.7352	(97)
Space heating kWh													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98a)
Space heating requirement - total per year (kWh/year)												2714.3511	
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													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.3511	
Space heating per m2											(98c) / (4) =	28.6929	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	611.0636	459.5660	378.2023	199.1574	73.1346	0.0000	0.0000	0.0000	0.0000	181.7369	407.7387	627.0098	(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													
	242.9677	214.8380	228.4195	201.5682	195.8241	176.9458	175.1213	181.8868	183.6453	204.1603	216.2779	240.4387	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.1250	85.8124	85.2894	84.1867	82.3436	80.3000	80.3000	80.3000	80.3000	83.9658	85.5582	86.1926	(217)
Fuel for water heating, kWh/month													
	282.1106	250.3577	267.8169	239.4300	237.8132	220.3559	218.0838	226.5091	228.6990	243.1469	252.7846	278.9552	(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	28.4143	22.7950	20.5244	15.0371	11.6151	9.4896	10.5956	13.7726	17.8893	23.4717	26.5112	29.2040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.5596	-61.0451	-87.2086	-97.4065	-104.4591	-97.2623	-96.0407	-90.9499	-81.8762	-69.4968	-47.7527	-37.7013	(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	-25.6969	-53.9433	-107.0237	-160.4745	-211.9469	-212.8995	-210.4107	-178.2714	-130.8122	-77.0706	-34.2824	-20.3302	(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	2937.6094	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2946.0629	(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)	229.3199	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2337.9210	(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	3861.0713	(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	2937.6094	0.2100	616.8980	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2946.0629	0.2100	618.6732	(264)
Space and water heating			1235.5712	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	229.3199	0.1443	33.0979	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-914.7587	0.1347	-123.2429	
PV Unit electricity exported	-1423.1622	0.1259	-179.2369	
Total			-302.4798	(269)
Total CO2, kg/year			978.1186	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3400	(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	2937.6094	1.1300	3319.4987	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2946.0629	1.1300	3329.0511	(278)
Space and water heating			6648.5498	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	229.3199	1.5338	351.7385	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-914.7587	1.4979	-1370.2509	
PV Unit electricity exported	-1423.1622	0.4623	-657.9255	
Total			-2028.1764	(283)
Total Primary energy kWh/year			5102.2127	(286)
Target Primary Energy Rate (TPER)			53.9300	(287)

Full SAP Calculation Printout

Property Reference	Holgate	**Issued on Date**	14/04/2025
Assessment Reference	Holgate (SD)	**Prop Type Ref**	
Property	Holgate, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.39	**TER**	10.34
Environmental	91 B	**% DER < TER**			-0.48
CO_2 Emissions (t/year)	1	**DFEE**	32.90	**TFEE**	33.18
Compliance Check	See BREL	**% DFEE < TFEE**			0.84
% DPER < TPER	-1.20	**DPER**	54.58	**TPER**	53.93

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000 (1b)	x	2.3000 (2b)	=	108.7900	(1b) - (3b)
First floor	47.3000 (1c)	x	2.6000 (2c)	=	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	231.7700	(5)

2. Ventilation rate

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

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1294	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.5000	(17)
Infiltration rate		0.3544	(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) =	0.3013	(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	0.3841	0.3766	0.3691	0.3314	0.3239	0.2862	0.2862	0.2787	0.3013	0.3239	0.3389	0.3540	(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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5738	0.5709	0.5681	0.5549	0.5524	0.5410	0.5410	0.5388	0.5454	0.5524	0.5574	0.5627	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			12.0000	1.2357	14.8289			(27)
Ground Floor			47.3000	0.1700	8.0410	75.0000	3547.5000	(28a)
External Wall	100.2000	14.1000	86.1000	0.1900	16.3590	140.0000	12053.9996	(29a)
External Roof	47.3000		47.3000	0.1000	4.7300	9.0000	425.7000	(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		46.2689			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000	140.0000	6328.0001	(32)
GF Partitions			74.5000			9.0000	670.5000	(32c)
FF Partitions			106.7000			9.0000	960.3000	(32c)
Internal Floor			47.3000			18.0000	851.4000	(32d)
Internal Ceiling			47.3000			9.0000	425.7000	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	25263.0997 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		267.0518 (35)
List of Thermal Bridges		

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0210	0.1533	
E4 Jamb	24.1000	0.0160	0.3856	
E5 Ground floor (normal)	19.6000	0.0740	1.4504	
E6 Intermediate floor within a dwelling	19.6000	0.0010	0.0196	
E10 Eaves (insulation at ceiling level)	10.8000	0.0580	0.6264	
E12 Gable (insulation at ceiling level)	8.9000	0.0570	0.5073	
E16 Corner (normal)	10.2000	0.0470	0.4794	
E18 Party wall between dwellings	10.2000	0.0380	0.3876	
P1 Party wall - Ground floor	8.9000	0.1080	0.9612	
P4 Party wall - Roof (insulation at ceiling level)	8.9000	0.1010	0.8989	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.3747	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	52.6436	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.8847	43.6656	43.4508	42.4420	42.2533	41.3747	41.3747	41.2120	41.7131	42.2533	42.6351	43.0343	(38)
Heat transfer coeff	96.5283	96.3092	96.0944	95.0856	94.8969	94.0183	94.0183	93.8556	94.3567	94.8969	95.2787	95.6779	(39)
Average = Sum(39)m / 12 =												95.0847	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0204	1.0181	1.0158	1.0051	1.0031	0.9939	0.9939	0.9921	0.9974	1.0031	1.0072	1.0114	(40)
HLP (average)												1.0051	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6836 (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

29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day) 65.9951 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.0006	70.0254	67.8690	65.1851	62.7907	60.3024	59.7855	61.9376	64.1448	66.7001	69.4077	71.8996	(44)
Energy conte	114.0314	99.7152	104.3121	89.2351	84.5283	74.1488	72.3054	76.6917	79.0969	90.5114	98.8840	112.5774	(45)
Energy content (annual)										Total = Sum(45)m =		1096.0378	
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													
	96.9267	84.7579	88.6652	75.8498	71.8491	63.0265	61.4596	65.1879	67.2324	76.9347	84.0514	95.6908	(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													
	96.9267	84.7579	88.6652	75.8498	71.8491	63.0265	61.4596	65.1879	67.2324	76.9347	84.0514	95.6908	(64)
										Total per year (kWh/year) = Sum(64)m =		931.6321	(64)
12Total per year (kWh/year)												932	(64)
Electric shower(s)													
	55.4296	49.3882	53.9301	51.4648	52.4305	50.0136	51.6807	52.4305	51.4648	53.9301	52.9160	55.4296	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												630.5086	(64a)
Heat gains from water heating, kWh/month													
	38.0891	33.5365	35.6488	31.8287	31.0699	28.2600	28.2851	29.4046	29.6743	32.7162	34.2419	37.7801	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)													
	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)													
	51.1950	49.9056	47.9151	44.2065	41.7606	39.2500	38.0176	39.5223	41.2143	43.9734	47.5581	50.7797	(72)
Total internal gains													
	498.4917	514.4203	491.3114	478.3947	454.0128	439.7281	423.0262	421.9648	434.6817	446.6488	472.1695	487.1653	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	609.7850	702.2780	746.4468	795.6793	813.5999	799.4026	768.6103	735.0232	710.8960	653.5025	605.0964	582.6880	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.6992	72.8646	73.0274	73.8022	73.9490	74.6400	74.6400	74.7694	74.3723	73.9490	73.6526	73.3454	
alpha	5.8466	5.8576	5.8685	5.9201	5.9299	5.9760	5.9760	5.9846	5.9582	5.9299	5.9102	5.8897	
util living area	0.9979	0.9947	0.9879	0.9623	0.8881	0.7132	0.5320	0.5771	0.8161	0.9689	0.9947	0.9984	(86)
MIT	19.8963	20.0625	20.2780	20.5756	20.8235	20.9651	20.9947	20.9916	20.9217	20.6098	20.2035	19.8702	(87)
Th 2	20.0664	20.0683	20.0702	20.0791	20.0807	20.0885	20.0885	20.0899	20.0855	20.0807	20.0774	20.0738	(88)
util rest of house	0.9971	0.9928	0.9835	0.9477	0.8458	0.6279	0.4252	0.4684	0.7425	0.9539	0.9925	0.9978	(89)
MIT 2	19.0613	19.2281	19.4429	19.7384	19.9625	20.0730	20.0872	20.0876	20.0447	19.7759	19.3763	19.0413	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.2131	19.3798	19.5947	19.8906	20.1190	20.2352	20.2522	20.2520	20.2042	19.9275	19.5267	19.1920	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2131	19.3798	19.5947	19.8906	20.1190	20.2352	20.2522	20.2520	20.2042	19.9275	19.5267	19.1920	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9910	0.9805	0.9440	0.8478	0.6425	0.4447	0.4883	0.7531	0.9507	0.9907	0.9970	(94)
Useful gains	607.4620	695.9513	731.8714	751.1237	689.7733	513.5960	341.8268	358.8838	535.3938	621.2734	599.4428	580.9674	(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	1439.5373	1394.5419	1258.3281	1045.0483	798.9401	529.8077	343.3722	361.5323	575.9686	885.1492	1184.0012	1434.4011	(97)
Space heating kWh	619.0640	469.4529	391.6838	211.6257	81.2201	0.0000	0.0000	0.0000	0.0000	196.3236	420.8820	634.9547	(98a)
Space heating requirement - total per year (kWh/year)												3025.2069	
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	619.0640	469.4529	391.6838	211.6257	81.2201	0.0000	0.0000	0.0000	0.0000	196.3236	420.8820	634.9547	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3025.2069	
Space heating per m2										(98c) / (4) =		31.9789	(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	883.7717	695.7352	713.3023	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8506	0.9233	0.9019	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	751.7214	642.3906	643.3140	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	871.4800	838.4567	801.9909	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	86.2261	145.8732	118.0556	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	21.5565	36.4683	29.5139	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												87.5387	(107)
Energy for space heating												31.9789	(99)
Energy for space cooling												0.9254	(108)
Total												32.9043	(109)
Fabric Energy Efficiency (DFEE)												32.9	(109)

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000	(1b)	x 2.3000	(2b) =	108.7900	(1b) - (3b)
First floor	47.3000	(1c)	x 2.6000	(2c) =	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		231.7700	(5)

---

2. Ventilation rate

---

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

Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1294 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3794 (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) =	0.3225 (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	0.4112	0.4032	0.3951	0.3548	0.3467	0.3064	0.3064	0.2983	0.3225	0.3467	0.3628	0.3790	(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	0.5845 0.5813 0.5780 0.5629 0.5601 0.5469 0.5469 0.5445 0.5520 0.5601 0.5658 0.5718	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			12.0000	1.1450	13.7405			(27)
Ground Floor			47.3000	0.1300	6.1490			(28a)
External Wall	100.2000	14.1000	86.1000	0.1800	15.4980			(29a)
External Roof	47.3000		47.3000	0.1100	5.2030			(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.6905			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		267.0518 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3 Sill	7.3000	0.0500	0.3650
E4 Jamb	24.1000	0.0500	1.2050
E5 Ground floor (normal)	19.6000	0.1600	3.1360
E6 Intermediate floor within a dwelling	19.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	10.8000	0.0600	0.6480
E12 Gable (insulation at ceiling level)	8.9000	0.0600	0.5340
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.9000	0.0800	0.7120
P4 Party wall - Roof (insulation at ceiling level)	8.9000	0.1200	1.0680

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		9.7030 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	52.3935 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.7087	44.4576	44.2115	43.0554	42.8391	41.8322	41.8322	41.6457	42.2200	42.8391	43.2767	43.7341	(38)
Heat transfer coeff	97.1022	96.8511	96.6050	95.4489	95.2326	94.2256	94.2256	94.0392	94.6135	95.2326	95.6701	96.1276	(39)

Average = Sum(39)m / 12 =		95.4478

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0265	1.0238	1.0212	1.0090	1.0067	0.9960	0.9960	0.9941	1.0001	1.0067	1.0113	1.0161	(40)
HLP (average)												1.0090	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.6836 (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

	29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

	42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day)		65.9951 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	72.0006	70.0254	67.8690	65.1851	62.7907	60.3024	59.7855	61.9376	64.1448	66.7001	69.4077	71.8996	(44)
Energy conte	114.0314	99.7152	104.3121	89.2351	84.5283	74.1488	72.3054	76.6917	79.0969	90.5114	98.8840	112.5774	(45)

Energy content (annual)	Total = Sum(45)m =	1096.0378

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

	96.9267	84.7579	88.6652	75.8498	71.8491	63.0265	61.4596	65.1879	67.2324	76.9347	84.0514	95.6908	(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

	96.9267	84.7579	88.6652	75.8498	71.8491	63.0265	61.4596	65.1879	67.2324	76.9347	84.0514	95.6908	(64)

	Total per year (kWh/year) = Sum(64)m =	931.6321 (64)
12Total per year (kWh/year)		932 (64)
Electric shower(s)		

	55.4296	49.3882	53.9301	51.4648	52.4305	50.0136	51.6807	52.4305	51.4648	53.9301	52.9160	55.4296	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												630.5086	(64a)
Heat gains from water heating, kWh/month													
	38.0891	33.5365	35.6488	31.8287	31.0699	28.2600	28.2851	29.4046	29.6743	32.7162	34.2419	37.7801	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)													
	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)													
	51.1950	49.9056	47.9151	44.2065	41.7606	39.2500	38.0176	39.5223	41.2143	43.9734	47.5581	50.7797	(72)
Total internal gains													
	498.4917	514.4203	491.3114	478.3947	454.0128	439.7281	423.0262	421.9648	434.6817	446.6488	472.1695	487.1653	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	609.7850	702.2780	746.4468	795.6793	813.5999	799.4026	768.6103	735.0232	710.8960	653.5025	605.0964	582.6880	(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	72.2695	72.4569	72.6415	73.5213	73.6883	74.4758	74.4758	74.6235	74.1705	73.6883	73.3513	73.0022	
alpha	5.8180	5.8305	5.8428	5.9014	5.9126	5.9651	5.9651	5.9749	5.9447	5.9126	5.8901	5.8668	
util living area													
	0.9979	0.9947	0.9880	0.9626	0.8890	0.7142	0.5331	0.5781	0.8171	0.9691	0.9947	0.9984	(86)
MIT	19.8870	20.0539	20.2706	20.5713	20.8210	20.9646	20.9946	20.9915	20.9206	20.6063	20.1981	19.8628	(87)
Th 2	20.0613	20.0636	20.0657	20.0759	20.0778	20.0866	20.0866	20.0883	20.0832	20.0778	20.0739	20.0699	(88)
util rest of house													
	0.9971	0.9929	0.9836	0.9481	0.8468	0.6289	0.4259	0.4691	0.7436	0.9542	0.9925	0.9978	(89)
MIT 2	19.0479	19.2157	19.4320	19.7316	19.9578	20.0709	20.0853	20.0860	20.0418	19.7701	19.3682	19.0308	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.2005	19.3681	19.5844	19.8843	20.1147	20.2334	20.2506	20.2506	20.2016	19.9222	19.5191	19.1820	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2005	19.3681	19.5844	19.8843	20.1147	20.2334	20.2506	20.2506	20.2016	19.9222	19.5191	19.1820	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9962	0.9910	0.9806	0.9444	0.8488	0.6434	0.4455	0.4890	0.7541	0.9510	0.9907	0.9970	(94)
Useful gains	607.4649	695.9805	731.9714	751.4256	690.5592	514.3519	342.4084	359.4168	536.1215	621.4671	599.4626	580.9678	(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													
	1446.8704	1401.2548	1264.0221	1048.4399	801.3542	530.8087	343.9848	362.1098	577.2954	887.7745	1188.1346	1440.1874	(97)
Space heating kWh													
	624.5177	473.9443	395.8457	213.8503	82.4315	0.0000	0.0000	0.0000	0.0000	198.1327	423.8438	639.2593	(98a)
Space heating requirement - total per year (kWh/year)												3051.8253	
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													
	624.5177	473.9443	395.8457	213.8503	82.4315	0.0000	0.0000	0.0000	0.0000	198.1327	423.8438	639.2593	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3051.8253	
Space heating per m2											(98c) / (4) =	32.2603	(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	885.7209	697.2697	714.6976	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8494	0.9225	0.9010	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	752.3251	643.2186	643.9547	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	871.4800	838.4567	801.9909	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	85.7915	145.2571	117.5790	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	21.4479	36.3143	29.3947	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												87.1569	(107)

Energy for space heating	32.2603 (99)
Energy for space cooling	0.9213 (108)
Total	33.1816 (109)
Fabric Energy Efficiency (TFEE)	33.2 (109)

Full SAP Calculation Printout

Property Reference	Holgate	**Issued on Date**	14/04/2025
Assessment Reference	Holgate (SD)	**Prop Type Ref**	
Property	Holgate, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.39	**TER**	10.34
Environmental	91 B	**% DER < TER**			-0.48
CO_2 Emissions (t/year)	1	**DFEE**	32.90	**TFEE**	33.18
Compliance Check	See BREL	**% DFEE < TFEE**			0.84
% DPER < TPER	-1.20	**DPER**	54.58	**TPER**	53.93

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000 (1b)	x	2.3000 (2b)	=	108.7900	(1b) - (3b)
First floor	47.3000 (1c)	x	2.6000 (2c)	=	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	231.7700	(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)

	Air changes per hour	
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		4.5000 (17)
Infiltration rate		0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			12.0000	1.2357	14.8289			(27)
Ground Floor			47.3000	0.1700	8.0410	75.0000	3547.5000	(28a)
External Wall	100.2000	14.1000	86.1000	0.1900	16.3590	140.0000	12053.9996	(29a)
External Roof	47.3000		47.3000	0.1000	4.7300	9.0000	425.7000	(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	46.2689			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000	140.0000	6328.0001	(32)
GF Partitions			74.5000			9.0000	670.5000	(32c)
FF Partitions			106.7000			9.0000	960.3000	(32c)
Internal Floor			47.3000			18.0000	851.4000	(32d)
Internal Ceiling			47.3000			9.0000	425.7000	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	25263.0997 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 267.0518 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	19.6000	0.0740	1.4504
E6	Intermediate floor within a dwelling	19.6000	0.0010	0.0196
E10	Eaves (insulation at ceiling level)	10.8000	0.0580	0.6264
E12	Gable (insulation at ceiling level)	8.9000	0.0570	0.5073
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.9000	0.1080	0.9612
P4	Party wall - Roof (insulation at ceiling level)	8.9000	0.1010	0.8989

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.3747 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 52.6436 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	38.2420	(38)
Heat transfer coeff	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	90.8856	(39)

Average = Sum(39)m / 12 = 90.8856

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	0.9607	(40)
HLP (average)												0.9607	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6836 (42)

Hot water usage for mixer showers

95.1705	93.7403	91.6562	87.6686	84.7258	81.4441	79.5788	81.6471	83.9144	87.4380	91.5112	94.8059	(42a)

Hot water usage for baths

29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day) 153.7391 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	167.1712	163.7657	159.5251	152.8536	147.5165	141.7465	139.3643	143.5847	148.0592	154.1381	160.9190	166.7055	(44)
Energy conte	264.7582	233.2001	245.1841	209.2490	198.5856	174.2939	168.5490	177.7879	182.5718	209.1639	229.2586	261.0205	(45)

Energy content (annual) Total = Sum(45)m = 2553.6226

Distribution loss (46)m = 0.15 x (45)m	39.7137	34.9800	36.7776	31.3873	29.7878	26.1441	25.2824	26.6682	27.3858	31.3746	34.3888	39.1531	(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	15.0112	13.5407	14.9525	14.3860	14.8127	14.2812	14.7226	14.7503	14.3060	14.8444	14.4461	15.0000	(61)
Total heat required for water heating calculated for each month	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(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	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(64)

Total per year (kWh/year) = Sum(64)m = 2728.6761 (64)

12Total per year (kWh/year) 2729 (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	91.7849	80.9242	85.2618	73.1718	69.7329	61.5230	59.7232	62.8020	64.2816	73.2581	79.8400	90.5393	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)	123.3668	120.4229	114.5993	101.6275	93.7270	85.4486	80.2731	84.4113	89.2800	98.4652	110.8889	121.6926	(72)
Total internal gains	573.6635	587.9377	560.9955	538.8157	508.9792	485.9267	465.2817	466.8538	482.7474	504.1406	538.5003	561.0782	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	684.9568	775.7953	816.1310	856.1003	868.5662	845.6011	810.8658	779.9122	758.9618	710.9943	671.4271	656.6009	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	77.2127	
alpha	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	6.1475	
util living area	0.9959	0.9904	0.9793	0.9430	0.8481	0.6648	0.4899	0.5306	0.7666	0.9505	0.9903	0.9968	(86)
MIT	20.0711	20.2276	20.4236	20.6749	20.8793	20.9783	20.9971	20.9953	20.9497	20.7005	20.3348	20.0303	(87)
Th 2	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	20.1162	(88)
util rest of house	0.9945	0.9872	0.9722	0.9232	0.8000	0.5829	0.3933	0.4316	0.6908	0.9292	0.9865	0.9957	(89)
MIT 2	19.2755	19.4303	19.6226	19.8616	20.0383	20.1068	20.1155	20.1149	20.0911	19.8892	19.5375	19.2350	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.4202	19.5753	19.7682	20.0094	20.1912	20.2653	20.2758	20.2750	20.2472	20.0367	19.6824	19.3796	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.4202	19.5753	19.7682	20.0094	20.1912	20.2653	20.2758	20.2750	20.2472	20.0367	19.6824	19.3796	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9930	0.9847	0.9688	0.9204	0.8045	0.5973	0.4110	0.4497	0.7029	0.9269	0.9840	0.9945	(94)
Useful gains	680.1700	763.9462	790.6354	787.9134	698.7985	505.0698	333.2299	350.7205	533.4471	659.0005	660.6899	652.9988	(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	1374.2078	1333.7711	1205.8923	1009.6895	771.7321	514.8925	334.0743	352.1819	558.6957	857.6596	1143.5632	1379.6082	(97)
Space heating kWh	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98a)
Space heating requirement - total per year (kWh/year)												2458.2476	
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	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2458.2476	
Space heating per m2											(98c) / (4) =	25.9857	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	516.3642	382.9224	308.9511	159.6788	54.2626	0.0000	0.0000	0.0000	0.0000	147.8024	347.6688	540.5974	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	580.1844	430.2498	347.1361	179.4144	60.9692	0.0000	0.0000	0.0000	0.0000	166.0701	390.6391	607.4128	(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	279.7694	246.7408	260.1366	223.6350	213.3982	188.5750	183.2716	192.5381	196.8778	224.0083	243.7046	276.0205	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3951	88.3260	88.2148	88.0002	87.6394	87.3000	87.3000	87.3000	87.3000	87.9679	88.2915	88.4180	(217)
Fuel for water heating, kWh/month	316.4988	279.3524	294.8901	254.1301	243.4959	216.0081	209.9331	220.5477	225.5187	254.6477	276.0228	312.1767	(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	9.8140	8.8642	9.8140	9.4974	9.8140	9.4974	9.8140	9.8140	9.4974	9.8140	9.4974	9.8140	(231)
Lighting	31.1918	25.0232	22.5306	16.5069	12.7504	10.4172	11.6313	15.1189	19.6379	25.7660	29.1026	32.0587	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-42.9284	-60.5573	-87.1584	-97.9965	-105.5009	-98.3913	-97.1598	-91.8208	-82.2558	-69.2627	-47.1989	-37.0992	(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	-24.6883	-52.2757	-105.0091	-159.5457	-212.6708	-214.4222	-211.5198	-177.8741	-128.9694	-74.9792	-33.0043	-19.4845	(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	2762.0760	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3103.2219	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 4.7030, total flow = 45.0000, SFP = 0.1045)

mechanical ventilation fans (SFP = 0.1045) 29.5515 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	115.5515	(231)
Electricity for lighting (calculated in Appendix L)	251.7354	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	3900.8116	(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	2762.0760	0.2100	580.0360	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3103.2219	0.2100	651.6766	(264)
Space and water heating			1231.7125	(265)
Pumps, fans and electric keep-hot	115.5515	0.1387	16.0284	(267)
Energy for lighting	251.7354	0.1443	36.3332	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-917.3301	0.1346	-123.4661	
PV Unit electricity exported	-1414.4431	0.1256	-177.6737	
Total			-301.1398	(269)
Total CO2, kg/year			982.9343	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.3900	(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	2762.0760	1.1300	3121.1458	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3103.2219	1.1300	3506.6407	(278)
Space and water heating			6627.7866	(279)
Pumps, fans and electric keep-hot	115.5515	1.5128	174.8063	(281)
Energy for lighting	251.7354	1.5338	386.1202	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-917.3301	1.4974	-1373.6408	
PV Unit electricity exported	-1414.4431	0.4611	-652.1642	
Total			-2025.8050	(283)
Total Primary energy kWh/year			5162.9081	(286)
Dwelling Primary energy Rate (DPER)			54.5800	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	47.3000	(1b) x	2.3000	(2b) =	108.7900	(1b) - (3b)
First floor	47.3000	(1c) x	2.6000	(2c) =	122.9800	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.6000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		231.7700	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1294	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3794	(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) =	0.3225	(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												
	0.4112	0.4032	0.3951	0.3548	0.3467	0.3064	0.3064	0.2983	0.3225	0.3467	0.3628	0.3790 (22b)
Effective ac	0.5845	0.5813	0.5780	0.5629	0.5601	0.5469	0.5469	0.5445	0.5520	0.5601	0.5658	0.5718 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			12.0000	1.1450	13.7405			(27)
Ground Floor			47.3000	0.1300	6.1490			(28a)
External Wall	100.2000	14.1000	86.1000	0.1800	15.4980			(29a)
External Roof	47.3000		47.3000	0.1100	5.2030			(30)
Total net area of external elements Aum(A, m2)			194.8000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.6905			(33)
Main dwelling								
Party Wall			45.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 267.0518 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	19.6000	0.1600	3.1360	
E6 Intermediate floor within a dwelling	19.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	10.8000	0.0600	0.6480	
E12 Gable (insulation at ceiling level)	8.9000	0.0600	0.5340	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.9000	0.0800	0.7120	
P4 Party wall - Roof (insulation at ceiling level)	8.9000	0.1200	1.0680	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.7030 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 52.3935 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.7087	44.4576	44.2115	43.0554	42.8391	41.8322	41.8322	41.6457	42.2200	42.8391	43.2767	43.7341	(38)
Heat transfer coeff	97.1022	96.8511	96.6050	95.4489	95.2326	94.2256	94.2256	94.0392	94.6135	95.2326	95.6701	96.1276	(39)
Average = Sum(39)m / 12 =												95.4478	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0265	1.0238	1.0212	1.0090	1.0067	0.9960	0.9960	0.9941	1.0001	1.0067	1.0113	1.0161	(40)
HLP (average)												1.0090	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.6836 (42)

Hot water usage for mixer showers

69.2149	68.1748	66.6590	63.7590	61.6188	59.2321	57.8755	59.3797	61.0287	63.5913	66.5536	68.9497	(42a)

Hot water usage for baths

29.8879	29.4440	28.8190	27.6664	26.8034	25.8465	25.3296	25.9503	26.6262	27.6501	28.8264	29.7869	(42b)

Hot water usage for other uses

42.1127	40.5814	39.0500	37.5186	35.9873	34.4559	34.4559	35.9873	37.5186	39.0500	40.5814	42.1127	(42c)

Average daily hot water use (litres/day) 129.8089 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	141.2156	138.2001	134.5280	128.9440	124.4095	119.5345	117.6610	121.3173	125.1735	130.2914	135.9613	140.8493	(44)
Energy conte	223.6509	196.7952	206.7645	176.5179	167.4791	146.9816	142.3008	150.2162	154.3514	176.8042	193.7019	220.5360	(45)
Energy content (annual)										Total = Sum(45)m =		2156.0995	
Distribution loss (46)m = 0.15 x (45)m													
	33.5476	29.5193	31.0147	26.4777	25.1219	22.0472	21.3451	22.5324	23.1527	26.5206	29.0553	33.0804	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	274.6098	242.8226	257.7234	225.8330	218.4380	196.2966	193.2597	201.1751	203.6665	227.7631	243.0169	271.4949	(62)
WWHRS	-31.6422	-27.9846	-29.3039	-24.2647	-22.6139	-19.3509	-18.1383	-19.2883	-20.0211	-23.6027	-26.7390	-31.0562	(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													
	242.9677	214.8380	228.4195	201.5682	195.8241	176.9458	175.1213	181.8868	183.6453	204.1603	216.2779	240.4387	(64)
										Total per year (kWh/year) = Sum(64)m =		2462.0937	(64)
12Total per year (kWh/year)												2462	(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													
	87.1037	76.9412	81.4889	71.0210	68.4265	61.2001	60.0547	62.6866	63.6506	71.5271	76.7346	86.0679	(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	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	134.1800	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	136.7518	151.4038	136.7518	141.3102	136.7518	141.3102	136.7518	136.7518	141.3102	136.7518	141.3102	136.7518	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.2909	249.8570	243.3905	229.6241	212.2464	195.9139	185.0028	182.4367	188.9032	202.6696	220.0472	236.3797	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	36.4180	(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)													
	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	-107.3440	(71)
Water heating gains (Table 5)													
	117.0748	114.4959	109.5281	98.6402	91.9711	85.0002	80.7187	84.2562	88.4036	96.1386	106.5759	115.6827	(72)
Total internal gains													
	567.3715	582.0107	555.9244	535.8285	507.2233	485.4783	465.7273	466.6987	481.8710	501.8140	534.1873	555.0683	(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	5.0000	10.6334	0.6300	0.7000	0.7700	16.2485	(74)
South	6.4000	46.7521	0.6300	0.7000	0.7700	91.4434	(78)
West	0.6000	19.6403	0.6300	0.7000	0.7700	3.6014	(80)

Solar gains	111.2934	187.8576	255.1355	317.2846	359.5870	359.6744	345.5842	313.0584	276.2144	206.8537	132.9268	95.5227	(83)
Total gains	678.6648	769.8683	811.0598	853.1131	866.8104	845.1527	811.3115	779.7571	758.0853	708.6677	667.1141	650.5910	(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	72.2695	72.4569	72.6415	73.5213	73.6883	74.4758	74.4758	74.6235	74.1705	73.6883	73.3513	73.0022	
alpha	5.8180	5.8305	5.8428	5.9014	5.9126	5.9651	5.9651	5.9749	5.9447	5.9126	5.8901	5.8668	
util living area													
	0.9963	0.9917	0.9823	0.9501	0.8644	0.6834	0.5064	0.5473	0.7850	0.9564	0.9914	0.9971	(86)
MIT	19.9613	20.1252	20.3357	20.6205	20.8496	20.9718	20.9959	20.9936	20.9363	20.6553	20.2636	19.9365	(87)
Th 2	20.0613	20.0636	20.0657	20.0759	20.0778	20.0866	20.0866	20.0883	20.0832	20.0778	20.0739	20.0699	(88)
util rest of house													
	0.9951	0.9888	0.9760	0.9319	0.8176	0.5986	0.4038	0.4428	0.7084	0.9367	0.9879	0.9961	(89)
MIT 2	18.8558	19.0659	19.3335	19.6916	19.9517	20.0710	20.0854	20.0861	20.0420	19.7400	19.2510	18.8306	(90)
Living area fraction										fLA = Living area / (4) =		0.1818	(91)
MIT	19.0568	19.2585	19.5157	19.8605	20.1149	20.2348	20.2509	20.2511	20.2046	19.9064	19.4351	19.0317	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0568	19.2585	19.5157	19.8605	20.1149	20.2348	20.2509	20.2511	20.2046	19.9064	19.4351	19.0317	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9932	0.9855	0.9712	0.9267	0.8197	0.6130	0.4226	0.4619	0.7194	0.9321	0.9846	0.9945	(94)
Useful gains	674.0164	758.7355	787.6788	790.5791	710.5473	518.1021	342.8203	360.1610	545.4039	660.5650	656.8359	647.0295	(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													
	1432.9181	1390.6388	1257.3818	1046.1645	801.3758	530.9381	344.0099	362.1550	577.5783	886.2705	1180.1006	1425.7352	(97)
Space heating kWh													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98a)
Space heating requirement - total per year (kWh/year)												2714.3511	
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													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.3511	
Space heating per m2											(98c) / (4) =	28.6929	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	92.4000	(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													
	564.6228	424.6390	349.4590	184.0215	67.5763	0.0000	0.0000	0.0000	0.0000	167.9249	376.7506	579.3571	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	611.0636	459.5660	378.2023	199.1574	73.1346	0.0000	0.0000	0.0000	0.0000	181.7369	407.7387	627.0098	(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													
	242.9677	214.8380	228.4195	201.5682	195.8241	176.9458	175.1213	181.8868	183.6453	204.1603	216.2779	240.4387	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.1250	85.8124	85.2894	84.1867	82.3436	80.3000	80.3000	80.3000	80.3000	83.9658	85.5582	86.1926	(217)
Fuel for water heating, kWh/month													
	282.1106	250.3577	267.8169	239.4300	237.8132	220.3559	218.0838	226.5091	228.6990	243.1469	252.7846	278.9552	(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	28.4143	22.7950	20.5244	15.0371	11.6151	9.4896	10.5956	13.7726	17.8893	23.4717	26.5112	29.2040	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-43.5596	-61.0451	-87.2086	-97.4065	-104.4591	-97.2623	-96.0407	-90.9499	-81.8762	-69.4968	-47.7527	-37.7013	(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	-25.6969	-53.9433	-107.0237	-160.4745	-211.9469	-212.8995	-210.4107	-178.2714	-130.8122	-77.0706	-34.2824	-20.3302	(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	2937.6094	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2946.0629	(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)	229.3199	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2337.9210	(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	3861.0713	(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	2937.6094	0.2100	616.8980	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2946.0629	0.2100	618.6732	(264)
Space and water heating			1235.5712	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	229.3199	0.1443	33.0979	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-914.7587	0.1347	-123.2429	
PV Unit electricity exported	-1423.1622	0.1259	-179.2369	
Total			-302.4798	(269)
Total CO2, kg/year			978.1186	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.3400	(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	2937.6094	1.1300	3319.4987	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2946.0629	1.1300	3329.0511	(278)
Space and water heating			6648.5498	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	229.3199	1.5338	351.7385	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-914.7587	1.4979	-1370.2509	
PV Unit electricity exported	-1423.1622	0.4623	-657.9255	
Total			-2028.1764	(283)
Total Primary energy kWh/year			5102.2127	(286)
Target Primary Energy Rate (TPER)			53.9300	(287)

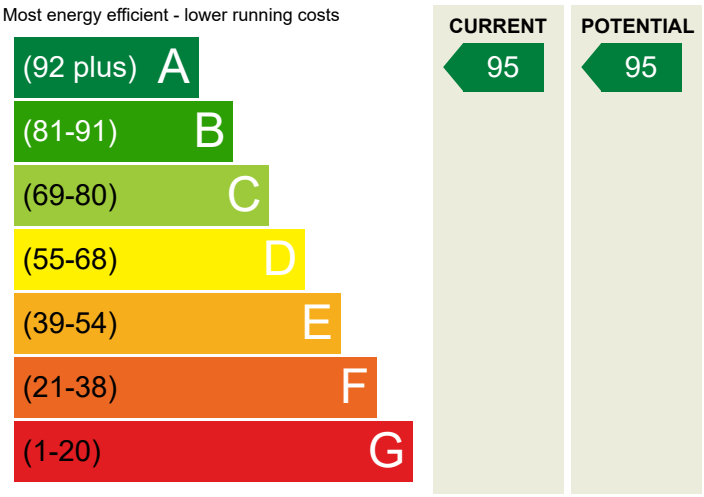
Energy Report

Dwelling Address	Holgate, Crabtree Lane, Openshaw
Reference	Holgate-Holgate (SD)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	95

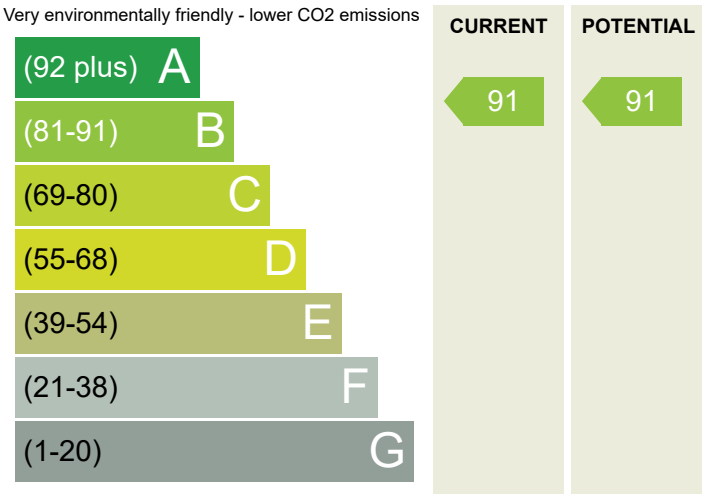
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

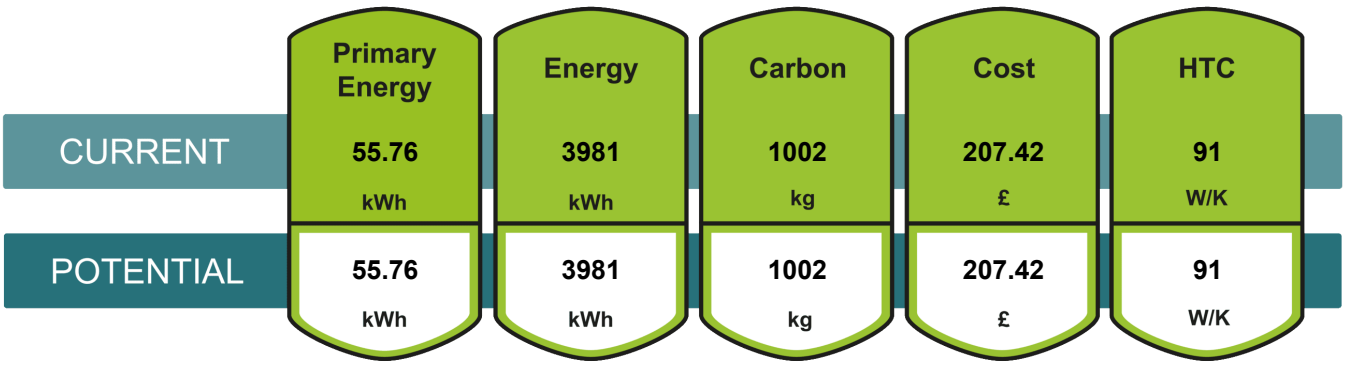
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£21	A 95			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£66	£66	
Heating	£289	£289	
Hot Water	£174	£174	
New Technologies e.g. Impact of PV	-(£321)	-(£321)	
TOTAL	£207	£207	

Estimated energy use and potential savings

Space Heating
2862
kWh per year

Water Heating
3103
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Longford	**Issued on Date**	14/04/2025
Assessment Reference	Longford (SD)	**Prop Type Ref**	
Property	Longford, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.10	**TER**	10.03
Environmental	91 B	**% DER < TER**			-0.70
CO_2 Emissions (t/year)	1.11	**DFEE**	34.80	**TFEE**	35.04
Compliance Check	See BREL	**% DFEE < TFEE**			0.69
% DPER < TPER	-1.24	**DPER**	52.93	**TPER**	52.28

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	East	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Semi-Detached	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	53.50 m²	2.30 m
1st Storey:	1.00 m	53.50 m²	2.60 m

8.0 Living Area	16.70	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	107.60	90.30	0.00	None	17.30	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	44.40	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	98.40
FF Partitions	Plasterboard on timber frame	9.00	129.30

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	53.50	53.50	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	53.50

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	53.50

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	53.50

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	East	2.10	0
Front	Window	External Wall	East	6.60	0
Side	Window	External Wall	South	1.00	0
Rear	Window	External Wall	West	7.60	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	12.20	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	9.40	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	29.40	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	21.10	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	21.10	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.70	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	12.40	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.70	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.70	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	5
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	2
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0

Summary for Input Data

Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	

Summary for Input Data

Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
3.00	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 96	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Longford	**Issued on Date**	14/04/2025
Assessment Reference	Longford (SD)	**Prop Type Ref**	
Property	Longford, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.10	**TER**	10.03
Environmental	91 B	**% DER < TER**			-0.70
CO_2 Emissions (t/year)	1.11	**DFEE**	34.80	**TFEE**	35.04
Compliance Check	See BREL	**% DFEE < TFEE**			0.69
% DPER < TPER	-1.24	**DPER**	52.93	**TPER**	52.28

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000 (1b)	x	2.3000 (2b)	=	123.0500	(1b) - (3b)
First floor	53.5000 (1c)	x	2.6000 (2c)	=	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	262.1500	(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)

		Air changes per hour	
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			15.2000	1.2357	18.7833			(27)
Ground Floor			53.5000	0.1700	9.0950	75.0000	4012.5000	(28a)
External Wall	107.6000	17.3000	90.3000	0.1900	17.1570	140.0000	12641.9998	(29a)
External Roof	53.5000		53.5000	0.1000	5.3500	9.0000	481.5000	(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.6953			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000	140.0000	6216.0002	(32)
GF Partitions			98.4000			9.0000	885.6000	(32c)
FF Partitions			129.3000			9.0000	1163.7000	(32c)
Internal Floor			53.5000			18.0000	963.0000	(32d)
Internal Ceiling			53.5000			9.0000	481.5000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		26845.8000	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.8953 (35)
List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	12.2000	0.0500	0.6100
E3	Sill	9.4000	0.0210	0.1974
E4	Jamb	29.4000	0.0160	0.4704
E5	Ground floor (normal)	21.1000	0.0740	1.5614
E6	Intermediate floor within a dwelling	21.1000	0.0010	0.0211
E10	Eaves (insulation at ceiling level)	8.7000	0.0580	0.5046
E12	Gable (insulation at ceiling level)	12.4000	0.0570	0.7068
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.7000	0.1080	0.9396
P4	Party wall - Roof (insulation at ceiling level)	8.7000	0.1010	0.8787

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.7570 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.4523 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	(38)
Heat transfer coeff	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	(39)

Average = Sum(39)m / 12 = 102.7070

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	(40)
HLP (average)												0.9599	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7956 (42)
Hot water usage for mixer showers

97.7519	96.2829	94.1422	90.0465	87.0239	83.6532	81.7373	83.8617	86.1905	89.8096	93.9934	97.3774	(42a)

Hot water usage for baths

30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)

Hot water usage for other uses

43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)

Average daily hot water use (litres/day) 157.9100 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	171.7065	168.2086	163.8529	157.0004	151.5185	145.5919	143.1452	147.4801	152.0761	158.3199	165.2847	171.2282	(44)
Energy conte	271.9412	239.5268	251.8358	214.9257	203.9730	179.0223	173.1217	182.6112	187.5250	214.8386	235.4784	268.1020	(45)

Energy content (annual) Total = Sum(45)m = 2622.9017

Distribution loss (46)m = 0.15 x (45)m												
40.7912	35.9290	37.7754	32.2389	30.5960	26.8533	25.9682	27.3917	28.1288	32.2258	35.3218	40.2153	(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	15.0327	13.5597	14.9724	14.4031	14.8288	14.2954	14.7363	14.7647	14.3209	14.8614	14.4647	15.0212	(61)
Total heat required for water heating calculated for each month												
286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(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													
286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(64)

Total per year (kWh/year) = Sum(64)m = 2798.1630 (64)

12Total per year (kWh/year) 2798 (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												
94.1786	83.0326	87.4785	75.0636	71.5282	63.0987	61.2470	64.4094	65.9323	75.1492	81.9127	92.8992	(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	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)	126.5842	123.5604	117.5786	104.2550	96.1401	87.6371	82.3213	86.5718	91.5726	101.0070	113.7677	124.8646	(72)
Total internal gains	605.8052	620.9946	592.5857	569.1926	537.4991	513.1543	491.2462	492.7243	509.5154	532.0191	568.3585	592.2972	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	705.3262	811.1285	896.9800	1003.3500	1063.3941	1049.3489	1002.5707	935.6466	860.0086	755.1020	691.5701	674.7348	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	
alpha	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	
util living area	0.9967	0.9920	0.9788	0.9282	0.8043	0.6105	0.4484	0.5003	0.7602	0.9574	0.9925	0.9975	(86)
MIT	19.9526	20.1215	20.3674	20.6777	20.8967	20.9828	20.9975	20.9955	20.9432	20.6428	20.2330	19.9110	(87)
Th 2	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	(88)
util rest of house	0.9957	0.9894	0.9719	0.9058	0.7530	0.5331	0.3597	0.4067	0.6858	0.9392	0.9896	0.9966	(89)
MIT 2	19.1626	19.3302	19.5718	19.8653	20.0510	20.1094	20.1163	20.1157	20.0877	19.8393	19.4417	19.1212	(90)
Living area fraction										fLA = Living area / (4) =		0.1561	(91)
MIT	19.2859	19.4537	19.6960	19.9921	20.1830	20.2457	20.2538	20.2530	20.2213	19.9647	19.5652	19.2444	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2859	19.4537	19.6960	19.9921	20.1830	20.2457	20.2538	20.2530	20.2213	19.9647	19.5652	19.2444	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9943	0.9869	0.9677	0.9022	0.7572	0.5447	0.3736	0.4213	0.6953	0.9353	0.9872	0.9955	(94)
Useful gains	701.2990	800.5239	868.0346	905.1730	805.2027	571.5926	374.5174	394.2237	597.9596	706.2811	682.7228	671.7165	(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	1539.1588	1494.7654	1355.3179	1139.2324	871.2623	579.8552	375.2738	395.7274	628.6968	961.8233	1280.2624	1545.1690	(97)
Space heating kWh	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98a)
Space heating requirement - total per year (kWh/year)												2940.3085	
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	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2940.3085	
Space heating per m2											(98c) / (4) =	27.4795	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	700.4131	524.1914	407.3470	189.3515	55.2229	0.0000	0.0000	0.0000	0.0000	213.6218	483.4028	730.1670	(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	286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.4570	88.3946	88.2713	88.0121	87.6069	87.3000	87.3000	87.3000	87.3000	88.0618	88.3677	88.4772	(217)
Fuel for water heating, kWh/month	324.4220	286.3143	302.2594	260.5651	249.7540	221.4406	215.1866	226.0893	231.2095	260.8397	282.8446	319.9959	(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	10.1429	9.1614	10.1429	9.8158	10.1429	9.8158	10.1429	10.1429	9.8158	10.1429	9.8158	10.1429	(231)
Lighting	31.3261	25.1310	22.6276	16.5780	12.8053	10.4620	11.6814	15.1840	19.7225	25.8769	29.2279	32.1967	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-47.2613	-66.4585	-95.3614	-106.8865	-114.7898	-106.9376	-105.5582	-99.8547	-89.6524	-75.7990	-51.8699	-40.8651	(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	-27.8685	-58.9115	-118.1580	-179.2716	-238.7344	-240.6330	-237.4191	-199.8063	-145.0422	-84.4698	-37.2448	-22.0057	(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												3303.7174	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3180.9209	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 4.7030, total flow = 45.0000, SFP = 0.1045)

mechanical ventilation fans (SFP = 0.1045) 33.4251 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	119.4251	(231)
Electricity for lighting (calculated in Appendix L)	252.8195	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2590.8591	(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	4266.0238	(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	3303.7174	0.2100	693.7806	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3180.9209	0.2100	667.9934	(264)
Space and water heating			1361.7740	(265)
Pumps, fans and electric keep-hot	119.4251	0.1387	16.5657	(267)
Energy for lighting	252.8195	0.1443	36.4897	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.2943	0.1347	-134.8371	
PV Unit electricity exported	-1589.5648	0.1257	-199.7309	
Total			-334.5680	(269)
Total CO2, kg/year			1080.2614	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.1000	(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	3303.7174	1.1300	3733.2006	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3180.9209	1.1300	3594.4406	(278)
Space and water heating			7327.6413	(279)
Pumps, fans and electric keep-hot	119.4251	1.5128	180.6662	(281)
Energy for lighting	252.8195	1.5338	387.7830	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.2943	1.4977	-1499.6341	
PV Unit electricity exported	-1589.5648	0.4612	-733.1293	
Total			-2232.7634	(283)
Total Primary energy kWh/year			5663.3270	(286)
Dwelling Primary energy Rate (DPER)			52.9300	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000 (1b)	x	2.3000 (2b)	=	123.0500	(1b) - (3b)
First floor	53.5000 (1c)	x	2.6000 (2c)	=	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	262.1500	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1526	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4026	(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) =	0.3422	(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												
	0.4363	0.4277	0.4192	0.3764	0.3679	0.3251	0.3251	0.3165	0.3422	0.3679	0.3850	0.4021 (22b)
Effective ac	0.5952	0.5915	0.5879	0.5708	0.5677	0.5528	0.5528	0.5501	0.5585	0.5677	0.5741	0.5808 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			15.2000	1.1450	17.4046			(27)
Ground Floor			53.5000	0.1300	6.9550			(28a)
External Wall	107.6000	17.3000	90.3000	0.1800	16.2540			(29a)
External Roof	53.5000		53.5000	0.1100	5.8850			(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.5986			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.8953 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	12.2000	0.0500	0.6100	
E3 Sill	9.4000	0.0500	0.4700	
E4 Jamb	29.4000	0.0500	1.4700	
E5 Ground floor (normal)	21.1000	0.1600	3.3760	
E6 Intermediate floor within a dwelling	21.1000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.7000	0.0600	0.5220	
E12 Gable (insulation at ceiling level)	12.4000	0.0600	0.7440	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.7000	0.0800	0.6960	
P4 Party wall - Roof (insulation at ceiling level)	8.7000	0.1200	1.0440	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.4620 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 59.0606 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	51.4887	51.1689	50.8555	49.3835	49.1081	47.8260	47.8260	47.5886	48.3198	49.1081	49.6652	50.2477	(38)
Heat transfer coeff	110.5492	110.2295	109.9161	108.4441	108.1687	106.8866	106.8866	106.6491	107.3804	108.1687	108.7258	109.3083	(39)
Average = Sum(39)m / 12 =												108.4427	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0332	1.0302	1.0273	1.0135	1.0109	0.9989	0.9989	0.9967	1.0036	1.0109	1.0161	1.0216	(40)
HLP (average)												1.0135	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7956 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	71.0923	70.0239	68.4671	65.4883	63.2901	60.8387	59.4453	60.9903	62.6840	65.3161	68.3588	70.8199	(42a)
Hot water usage for baths	30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)
Hot water usage for other uses	43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)
Average daily hot water use (litres/day)												133.3308	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	145.0469	141.9496	138.1777	132.4423	127.7847	122.7774	120.8532	124.6088	128.5696	133.8264	139.6502	144.6708	(44)
Energy conte	229.7189	202.1344	212.3741	181.3069	172.0228	150.9692	146.1614	154.2917	158.5392	181.6011	198.9573	226.5195	(45)
Energy content (annual)										Total = Sum(45)m =		2214.5962	
Distribution loss (46)m = 0.15 x (45)m	34.4578	30.3202	31.8561	27.1960	25.8034	22.6454	21.9242	23.1438	23.7809	27.2402	29.8436	33.9779	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	280.6778	248.1618	263.3330	230.6220	222.9817	200.2842	197.1203	205.2506	207.8542	232.5600	248.2723	277.4784	(62)
WWHRS	-32.5004	-28.7436	-30.0987	-24.9229	-23.2272	-19.8757	-18.6303	-19.8115	-20.5642	-24.2429	-27.4643	-31.8986	(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	248.1774	219.4181	233.2343	205.6991	199.7544	180.4085	178.4900	185.4391	187.2900	208.3171	220.8081	245.5798	(64)
										Total per year (kWh/year) = Sum(64)m =		2512.6158	(64)
12Total per year (kWh/year)												2513	(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	89.1213	78.7165	83.3541	72.6133	69.9373	62.5260	61.3384	64.0417	65.0430	73.1221	78.4821	88.0574	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)													
	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)													
	119.7866	117.1377	112.0351	100.8518	94.0017	86.8417	82.4441	86.0776	90.3375	98.2824	109.0029	118.3568	(72)
Total internal gains													
	599.0077	614.5720	587.0421	565.7894	535.3607	512.3588	491.3690	492.2301	508.2803	529.2946	563.5936	585.7894	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	698.5287	804.7058	891.4364	999.9468	1061.2558	1048.5535	1002.6935	935.1524	858.7735	752.3774	686.8053	668.2270	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	67.4556	67.6513	67.8442	68.7651	68.9402	69.7671	69.7671	69.9224	69.4463	68.9402	68.5869	68.2214	
alpha	5.4970	5.5101	5.5229	5.5843	5.5960	5.6511	5.6511	5.6615	5.6298	5.5960	5.5725	5.5481	
util living area													
	0.9970	0.9930	0.9818	0.9374	0.8248	0.6308	0.4656	0.5180	0.7801	0.9625	0.9932	0.9977	(86)
MIT	19.8265	20.0036	20.2658	20.6160	20.8661	20.9768	20.9964	20.9937	20.9272	20.5892	20.1510	19.8035	(87)
Th 2	20.0558	20.0583	20.0607	20.0721	20.0742	20.0842	20.0842	20.0861	20.0804	20.0742	20.0699	20.0654	(88)
util rest of house													
	0.9960	0.9907	0.9756	0.9167	0.7740	0.5496	0.3705	0.4186	0.7048	0.9458	0.9906	0.9969	(89)
MIT 2	18.6858	18.9133	19.2467	19.6844	19.9633	20.0712	20.0831	20.0838	20.0318	19.6623	19.1110	18.6635	(90)
Living area fraction										fLA = Living area / (4) =		0.1561	(91)
MIT	18.8638	19.0835	19.4058	19.8298	20.1042	20.2125	20.2256	20.2258	20.1715	19.8070	19.2734	18.8414	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8638	19.0835	19.4058	19.8298	20.1042	20.2125	20.2256	20.2258	20.1715	19.8070	19.2734	18.8414	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9873	0.9700	0.9102	0.7758	0.5614	0.3854	0.4341	0.7130	0.9396	0.9874	0.9954	(94)
Useful gains	694.4965	794.5179	864.6834	910.1287	823.3739	588.6937	386.4242	405.9133	612.2883	706.9207	678.1501	665.1569	(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													
	1610.0203	1563.4408	1418.5501	1185.2719	909.0691	599.9054	387.5302	408.0228	651.9615	995.9048	1323.5582	1600.4318	(97)
Space heating kWh													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98a)
Space heating requirement - total per year (kWh/year)												3247.3456	
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													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3247.3456	
Space heating per m2											(98c) / (4) =	30.3490	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	737.1750	559.2166	445.9706	214.3973	69.0013	0.0000	0.0000	0.0000	0.0000	232.6885	502.9154	753.0785	(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													
	248.1774	219.4181	233.2343	205.6991	199.7544	180.4085	178.4900	185.4391	187.2900	208.3171	220.8081	245.5798	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.4281	86.1499	85.5871	84.3008	82.2245	80.3000	80.3000	80.3000	80.3000	84.4492	85.9354	86.4838	(217)
Fuel for water heating, kWh/month													
	287.1489	254.6935	272.5112	244.0059	242.9377	224.6681	222.2790	230.9329	233.2379	246.6773	256.9465	283.9603	(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	29.9441	24.0223	21.6294	15.8466	12.2404	10.0005	11.1661	14.5141	18.8524	24.7353	27.9385	30.7763	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-48.6461	-67.8621	-96.5089	-107.2845	-114.6148	-106.5429	-105.1751	-99.7906	-90.1610	-76.9828	-53.2055	-42.1381	(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	-29.6884	-62.1988	-123.1830	-184.3991	-243.2651	-244.2744	-241.4454	-204.7196	-150.4062	-88.7964	-39.5826	-23.5000	(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	3514.4433	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2999.9992	(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)	241.6660	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2644.3715	(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	4197.7369	(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	3514.4433	0.2100	738.0331	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2999.9992	0.2100	629.9998	(264)
Space and water heating			1368.0329	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	241.6660	0.1443	34.8799	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1008.9126	0.1348	-136.0319	
PV Unit electricity exported	-1635.4590	0.1260	-206.0505	
Total			-342.0825	(269)
Total CO2, kg/year			1072.7596	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0300	(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	3514.4433	1.1300	3971.3209	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2999.9992	1.1300	3389.9991	(278)
Space and water heating			7361.3200	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	241.6660	1.5338	370.6754	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1008.9126	1.4983	-1511.6775	
PV Unit electricity exported	-1635.4590	0.4625	-756.3533	
Total			-2268.0308	(283)
Total Primary energy kWh/year			5594.0654	(286)
Target Primary Energy Rate (TPER)			52.2800	(287)

Full SAP Calculation Printout

Property Reference	Longford	**Issued on Date**	14/04/2025
Assessment Reference	Longford (SD)	**Prop Type Ref**	
Property	Longford, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.10	**TER**	10.03
Environmental	91 B	**% DER < TER**			-0.70
CO_2 Emissions (t/year)	1.11	**DFEE**	34.80	**TFEE**	35.04
Compliance Check	See BREL	**% DFEE < TFEE**			0.69
% DPER < TPER	-1.24	**DPER**	52.93	**TPER**	52.28

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000 (1b)	x	2.3000 (2b)	=	123.0500	(1b) - (3b)
First floor	53.5000 (1c)	x	2.6000 (2c)	=	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	262.1500	(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		4 * 10 =	40.0000	(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) =		40.0000 / (5) =	0.1526	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3776	(18)
Number of sides sheltered			2	(19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.3209	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate	0.4092	0.4012	0.3932	0.3530	0.3450	0.3049	0.3049	0.2969	0.3209	0.3450	0.3611	0.3771	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.5837	0.5805	0.5773	0.5623	0.5595	0.5465	0.5465	0.5441	0.5515	0.5595	0.5652	0.5711	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			15.2000	1.2357	18.7833			(27)
Ground Floor			53.5000	0.1700	9.0950	75.0000	4012.5000	(28a)
External Wall	107.6000	17.3000	90.3000	0.1900	17.1570	140.0000	12641.9998	(29a)
External Roof	53.5000		53.5000	0.1000	5.3500	9.0000	481.5000	(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.6953			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000	140.0000	6216.0002	(32)
GF Partitions			98.4000			9.0000	885.6000	(32c)
FF Partitions			129.3000			9.0000	1163.7000	(32c)
Internal Floor			53.5000			18.0000	963.0000	(32d)
Internal Ceiling			53.5000			9.0000	481.5000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		26845.8000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.8953	(35)
List of Thermal Bridges								

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	12.2000	0.0500	0.6100	
E3 Sill	9.4000	0.0210	0.1974	
E4 Jamb	29.4000	0.0160	0.4704	
E5 Ground floor (normal)	21.1000	0.0740	1.5614	
E6 Intermediate floor within a dwelling	21.1000	0.0010	0.0211	
E10 Eaves (insulation at ceiling level)	8.7000	0.0580	0.5046	
E12 Gable (insulation at ceiling level)	12.4000	0.0570	0.7068	
E16 Corner (normal)	10.2000	0.0470	0.4794	
E18 Party wall between dwellings	10.2000	0.0380	0.3876	
P1 Party wall - Ground floor	8.7000	0.1080	0.9396	
P4 Party wall - Roof (insulation at ceiling level)	8.7000	0.1010	0.8787	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.7570	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	59.4523	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	50.4978	50.2165	49.9408	48.6459	48.4037	47.2759	47.2759	47.0670	47.7103	48.4037	48.8938	49.4062	(38)
Heat transfer coeff	109.9500	109.6688	109.3931	108.0982	107.8559	106.7281	106.7281	106.5193	107.1626	107.8559	108.3461	108.8584	(39)
Average = Sum(39)m / 12 =												108.0971	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0276	1.0249	1.0224	1.0103	1.0080	0.9975	0.9975	0.9955	1.0015	1.0080	1.0126	1.0174	(40)
HLP (average)												1.0103	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.7956	(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	30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)
Hot water usage for other uses	43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)
Average daily hot water use (litres/day)												67.7861	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	73.9546	71.9257	69.7107	66.9540	64.4946	61.9387	61.4079	63.6184	65.8856	68.5103	71.2914	73.8509	(44)
Energy conte	117.1261	102.4212	107.1427	91.6566	86.8221	76.1609	74.2675	78.7729	81.2435	92.9678	101.5676	115.6326	(45)
Energy content (annual)										Total = Sum(45)m =		1125.7816	
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	99.5572	87.0581	91.0713	77.9081	73.7988	64.7368	63.1274	66.9570	69.0570	79.0226	86.3325	98.2877	(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	99.5572	87.0581	91.0713	77.9081	73.7988	64.7368	63.1274	66.9570	69.0570	79.0226	86.3325	98.2877	(64)
										Total per year (kWh/year) = Sum(64)m =		956.9144	(64)
12Total per year (kWh/year)												957	(64)
Electric shower(s)	56.9331	50.7278	55.3929	52.8607	53.8526	51.3702	53.0825	53.8526	52.8607	55.3929	54.3513	56.9331	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							647.6104	(64a)
Heat gains from water heating, kWh/month	39.1226	34.4465	36.6160	32.6922	31.9129	29.0267	29.0525	30.2024	30.4794	33.6039	35.1709	38.8052	(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	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)	52.5841	51.2596	49.2151	45.4059	42.8936	40.3149	39.0490	40.5946	42.3325	45.1665	48.8485	52.1575	(72)
Total internal gains	528.8051	545.6939	521.2222	507.3435	481.2526	465.8320	447.9740	446.7471	460.2753	473.1787	500.4393	516.5902	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	628.3261	735.8278	825.6165	941.5008	1007.1477	1002.0267	959.2984	889.6695	810.7685	696.2615	623.6510	599.0278	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	67.8232	67.9972	68.1685	68.9851	69.1401	69.8707	69.8707	70.0077	69.5874	69.1401	68.8273	68.5033	
alpha	5.5215	5.5331	5.5446	5.5990	5.6093	5.6580	5.6580	5.6672	5.6392	5.6093	5.5885	5.5669	
util living area	0.9982	0.9954	0.9870	0.9498	0.8470	0.6548	0.4851	0.5422	0.8077	0.9727	0.9957	0.9987	(86)
MIT	19.7648	19.9438	20.2111	20.5759	20.8461	20.9723	20.9956	20.9922	20.9131	20.5442	20.0932	19.7403	(87)
Th 2	20.0604	20.0626	20.0647	20.0748	20.0767	20.0855	20.0855	20.0871	20.0821	20.0767	20.0729	20.0689	(88)
util rest of house	0.9976	0.9938	0.9824	0.9323	0.7991	0.5723	0.3867	0.4390	0.7349	0.9598	0.9940	0.9982	(89)
MIT 2	18.9304	19.1103	19.3767	19.7363	19.9754	20.0732	20.0843	20.0849	20.0357	19.7138	19.2679	18.9126	(90)
Living area fraction										fLA = Living area / (4) =		0.1561	(91)
MIT	19.0606	19.2404	19.5069	19.8673	20.1113	20.2135	20.2266	20.2265	20.1726	19.8434	19.3967	19.0418	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0606	19.2404	19.5069	19.8673	20.1113	20.2135	20.2266	20.2265	20.1726	19.8434	19.3967	19.0418	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9967	0.9920	0.9789	0.9275	0.8011	0.5844	0.4021	0.4551	0.7429	0.9556	0.9923	0.9975	(94)
Useful gains	626.2800	729.9308	808.1737	873.2680	806.7830	585.5525	385.6960	404.9313	602.3310	665.3439	618.8492	597.5208	(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	1622.9287	1572.6952	1422.8667	1185.5486	907.2132	599.1167	387.0579	407.5940	650.7577	996.9594	1332.3025	1615.6559	(97)
Space heating kWh	741.5066	566.3377	457.3316	224.8420	74.7201	0.0000	0.0000	0.0000	0.0000	246.7219	513.6863	757.4926	(98a)
Space heating requirement - total per year (kWh/year)												3582.6388	
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	741.5066	566.3377	457.3316	224.8420	74.7201	0.0000	0.0000	0.0000	0.0000	246.7219	513.6863	757.4926	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3582.6388	
Space heating per m2											(98c) / (4) =	33.4826	(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	1003.2445	789.7882	809.5466	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8880	0.9437	0.9184	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	890.8431	745.3051	743.5091	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1106.0444	1059.1304	980.6727	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	154.9449	233.4860	176.4497	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	38.7362	58.3715	44.1124	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												141.2202	(107)
Energy for space heating												33.4826	(99)
Energy for space cooling												1.3198	(108)
Total												34.8024	(109)
Fabric Energy Efficiency (DFEE)												34.8	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000	(1b) x	2.3000	(2b) =	123.0500	(1b) - (3b)
First floor	53.5000	(1c) x	2.6000	(2c) =	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	262.1500	(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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1526 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.4026 (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) =	0.3422 (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	0.4363	0.4277	0.4192	0.3764	0.3679	0.3251	0.3251	0.3165	0.3422	0.3679	0.3850	0.4021	(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	0.5952 0.5915 0.5879 0.5708 0.5677 0.5528 0.5528 0.5501 0.5585 0.5677 0.5741 0.5808	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			15.2000	1.1450	17.4046			(27)
Ground Floor			53.5000	0.1300	6.9550			(28a)
External Wall	107.6000	17.3000	90.3000	0.1800	16.2540			(29a)
External Roof	53.5000		53.5000	0.1100	5.8850			(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.5986			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	250.8953 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	12.2000	0.0500	0.6100
E3 Sill	9.4000	0.0500	0.4700
E4 Jamb	29.4000	0.0500	1.4700
E5 Ground floor (normal)	21.1000	0.1600	3.3760
E6 Intermediate floor within a dwelling	21.1000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.7000	0.0600	0.5220
E12 Gable (insulation at ceiling level)	12.4000	0.0600	0.7440
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.7000	0.0800	0.6960
P4 Party wall - Roof (insulation at ceiling level)	8.7000	0.1200	1.0440

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		10.4620 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	59.0606 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	51.4887	51.1689	50.8555	49.3835	49.1081	47.8260	47.8260	47.5886	48.3198	49.1081	49.6652	50.2477	(38)
Heat transfer coeff	110.5492	110.2295	109.9161	108.4441	108.1687	106.8866	106.8866	106.6491	107.3804	108.1687	108.7258	109.3083	(39)
Average = Sum(39)m / 12 =												108.4427	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0332	1.0302	1.0273	1.0135	1.0109	0.9989	0.9989	0.9967	1.0036	1.0109	1.0161	1.0216	(40)
HLP (average)												1.0135	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.7956 (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

30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)

Hot water usage for other uses

43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)

Average daily hot water use (litres/day)	67.7861 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	73.9546	71.9257	69.7107	66.9540	64.4946	61.9387	61.4079	63.6184	65.8856	68.5103	71.2914	73.8509	(44)
Energy conte	117.1261	102.4212	107.1427	91.6566	86.8221	76.1609	74.2675	78.7729	81.2435	92.9678	101.5676	115.6326	(45)
Energy content (annual)										Total = Sum(45)m =		1125.7816	

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

99.5572	87.0581	91.0713	77.9081	73.7988	64.7368	63.1274	66.9570	69.0570	79.0226	86.3325	98.2877	(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

99.5572	87.0581	91.0713	77.9081	73.7988	64.7368	63.1274	66.9570	69.0570	79.0226	86.3325	98.2877	(64)

Total per year (kWh/year) = Sum(64)m =	956.9144 (64)
12Total per year (kWh/year)	957 (64)
Electric shower(s)	

	56.9331	50.7278	55.3929	52.8607	53.8526	51.3702	53.0825	53.8526	52.8607	55.3929	54.3513	56.9331	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												647.6104	(64a)
Heat gains from water heating, kWh/month													
	39.1226	34.4465	36.6160	32.6922	31.9129	29.0267	29.0525	30.2024	30.4794	33.6039	35.1709	38.8052	(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	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)													
	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)													
	52.5841	51.2596	49.2151	45.4059	42.8936	40.3149	39.0490	40.5946	42.3325	45.1665	48.8485	52.1575	(72)
Total internal gains													
	528.8051	545.6939	521.2222	507.3435	481.2526	465.8320	447.9740	446.7471	460.2753	473.1787	500.4393	516.5902	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	628.3261	735.8278	825.6165	941.5008	1007.1477	1002.0267	959.2984	889.6695	810.7685	696.2615	623.6510	599.0278	(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	67.4556	67.6513	67.8442	68.7651	68.9402	69.7671	69.7671	69.9224	69.4463	68.9402	68.5869	68.2214	
alpha	5.4970	5.5101	5.5229	5.5843	5.5960	5.6511	5.6511	5.6615	5.6298	5.5960	5.5725	5.5481	
util living area													
	0.9982	0.9954	0.9871	0.9501	0.8479	0.6555	0.4858	0.5428	0.8084	0.9729	0.9958	0.9987	(86)
MIT	19.7558	19.9356	20.2042	20.5722	20.8442	20.9720	20.9956	20.9921	20.9123	20.5413	20.0884	19.7335	(87)
Th 2	20.0558	20.0583	20.0607	20.0721	20.0742	20.0842	20.0842	20.0861	20.0804	20.0742	20.0699	20.0654	(88)
util rest of house													
	0.9976	0.9939	0.9826	0.9327	0.8000	0.5729	0.3871	0.4394	0.7357	0.9600	0.9941	0.9982	(89)
MIT 2	18.9178	19.0987	19.3666	19.7305	19.9717	20.0718	20.0831	20.0838	20.0335	19.7090	19.2608	18.9031	(90)
Living area fraction									fLA = Living area / (4) =			0.1561	(91)
MIT	19.0486	19.2293	19.4973	19.8619	20.1079	20.2123	20.2255	20.2256	20.1706	19.8389	19.3900	19.0327	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0486	19.2293	19.4973	19.8619	20.1079	20.2123	20.2255	20.2256	20.1706	19.8389	19.3900	19.0327	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9967	0.9920	0.9790	0.9279	0.8020	0.5850	0.4025	0.4556	0.7437	0.9558	0.9923	0.9975	(94)
Useful gains	626.2785	729.9462	808.2670	873.6312	807.7104	586.1708	386.1385	405.3064	602.9307	665.4749	618.8575	597.5189	(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													
	1630.4455	1579.5171	1428.6111	1188.7539	909.4664	599.8784	387.5188	407.9965	651.8681	999.3564	1336.2372	1621.3413	(97)
Space heating kWh													
	747.1002	570.9116	461.5360	226.8883	75.7065	0.0000	0.0000	0.0000	0.0000	248.4078	516.5134	761.7238	(98a)
Space heating requirement - total per year (kWh/year)												3608.7878	
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													
	747.1002	570.9116	461.5360	226.8883	75.7065	0.0000	0.0000	0.0000	0.0000	248.4078	516.5134	761.7238	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3608.7878	
Space heating per m2											(98c) / (4) =	33.7270	(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	1004.7336	790.9605	810.5334	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8873	0.9432	0.9180	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	891.4749	746.0525	744.0323	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1106.0444	1059.1304	980.6727	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	154.4900	232.9299	176.0605	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	38.6225	58.2325	44.0151	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												140.8701	(107)

Energy for space heating	33.7270 (99)
Energy for space cooling	1.3165 (108)
Total	35.0435 (109)
Fabric Energy Efficiency (TFEE)	35.0 (109)

Full SAP Calculation Printout

Property Reference	Longford	**Issued on Date**	14/04/2025
Assessment Reference	Longford (SD)	**Prop Type Ref**	
Property	Longford, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	10.10	**TER**	10.03
Environmental	91 B	**% DER < TER**			-0.70
CO_2 Emissions (t/year)	1.11	**DFEE**	34.80	**TFEE**	35.04
Compliance Check	See BREL	**% DFEE < TFEE**			0.69
% DPER < TPER	-1.24	**DPER**	52.93	**TPER**	52.28

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000 (1b)	x	2.3000 (2b)	=	123.0500	(1b) - (3b)
First floor	53.5000 (1c)	x	2.6000 (2c)	=	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	262.1500	(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)

		Air changes per hour	
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			15.2000	1.2357	18.7833			(27)
Ground Floor			53.5000	0.1700	9.0950	75.0000	4012.5000	(28a)
External Wall	107.6000	17.3000	90.3000	0.1900	17.1570	140.0000	12641.9998	(29a)
External Roof	53.5000		53.5000	0.1000	5.3500	9.0000	481.5000	(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		52.6953			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000	140.0000	6216.0002	(32)
GF Partitions			98.4000			9.0000	885.6000	(32c)
FF Partitions			129.3000			9.0000	1163.7000	(32c)
Internal Floor			53.5000			18.0000	963.0000	(32d)
Internal Ceiling			53.5000			9.0000	481.5000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		26845.8000	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.8953 (35)
List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	12.2000	0.0500	0.6100
E3	Sill	9.4000	0.0210	0.1974
E4	Jamb	29.4000	0.0160	0.4704
E5	Ground floor (normal)	21.1000	0.0740	1.5614
E6	Intermediate floor within a dwelling	21.1000	0.0010	0.0211
E10	Eaves (insulation at ceiling level)	8.7000	0.0580	0.5046
E12	Gable (insulation at ceiling level)	12.4000	0.0570	0.7068
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.7000	0.1080	0.9396
P4	Party wall - Roof (insulation at ceiling level)	8.7000	0.1010	0.8787

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.7570 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 59.4523 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	43.2547	(38)
Heat transfer coeff	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	102.7070	(39)

Average = Sum(39)m / 12 = 102.7070

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	0.9599	(40)
HLP (average)												0.9599	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7956 (42)
Hot water usage for mixer showers

97.7519	96.2829	94.1422	90.0465	87.0239	83.6532	81.7373	83.8617	86.1905	89.8096	93.9934	97.3774	(42a)

Hot water usage for baths

30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)

Hot water usage for other uses

43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)

Average daily hot water use (litres/day) 157.9100 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	171.7065	168.2086	163.8529	157.0004	151.5185	145.5919	143.1452	147.4801	152.0761	158.3199	165.2847	171.2282	(44)
Energy conte	271.9412	239.5268	251.8358	214.9257	203.9730	179.0223	173.1217	182.6112	187.5250	214.8386	235.4784	268.1020	(45)

Energy content (annual) Total = Sum(45)m = 2622.9017

Distribution loss (46)m = 0.15 x (45)m												
40.7912	35.9290	37.7754	32.2389	30.5960	26.8533	25.9682	27.3917	28.1288	32.2258	35.3218	40.2153	(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	15.0327	13.5597	14.9724	14.4031	14.8288	14.2954	14.7363	14.7647	14.3209	14.8614	14.4647	15.0212	(61)
Total heat required for water heating calculated for each month												
286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(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													
286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(64)

Total per year (kWh/year) = Sum(64)m = 2798.1630 (64)

12Total per year (kWh/year) 2798 (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												
94.1786	83.0326	87.4785	75.0636	71.5282	63.0987	61.2470	64.4094	65.9323	75.1492	81.9127	92.8992	(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	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)	126.5842	123.5604	117.5786	104.2550	96.1401	87.6371	82.3213	86.5718	91.5726	101.0070	113.7677	124.8646	(72)
Total internal gains	605.8052	620.9946	592.5857	569.1926	537.4991	513.1543	491.2462	492.7243	509.5154	532.0191	568.3585	592.2972	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	705.3262	811.1285	896.9800	1003.3500	1063.3941	1049.3489	1002.5707	935.6466	860.0086	755.1020	691.5701	674.7348	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	72.6062	
alpha	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	5.8404	
util living area	0.9967	0.9920	0.9788	0.9282	0.8043	0.6105	0.4484	0.5003	0.7602	0.9574	0.9925	0.9975	(86)
MIT	19.9526	20.1215	20.3674	20.6777	20.8967	20.9828	20.9975	20.9955	20.9432	20.6428	20.2330	19.9110	(87)
Th 2	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	20.1169	(88)
util rest of house	0.9957	0.9894	0.9719	0.9058	0.7530	0.5331	0.3597	0.4067	0.6858	0.9392	0.9896	0.9966	(89)
MIT 2	19.1626	19.3302	19.5718	19.8653	20.0510	20.1094	20.1163	20.1157	20.0877	19.8393	19.4417	19.1212	(90)
Living area fraction										fLA = Living area / (4) =		0.1561	(91)
MIT	19.2859	19.4537	19.6960	19.9921	20.1830	20.2457	20.2538	20.2530	20.2213	19.9647	19.5652	19.2444	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2859	19.4537	19.6960	19.9921	20.1830	20.2457	20.2538	20.2530	20.2213	19.9647	19.5652	19.2444	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9943	0.9869	0.9677	0.9022	0.7572	0.5447	0.3736	0.4213	0.6953	0.9353	0.9872	0.9955	(94)
Useful gains	701.2990	800.5239	868.0346	905.1730	805.2027	571.5926	374.5174	394.2237	597.9596	706.2811	682.7228	671.7165	(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	1539.1588	1494.7654	1355.3179	1139.2324	871.2623	579.8552	375.2738	395.7274	628.6968	961.8233	1280.2624	1545.1690	(97)
Space heating kWh	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98a)
Space heating requirement - total per year (kWh/year)												2940.3085	
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	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2940.3085	
Space heating per m2											(98c) / (4) =	27.4795	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	623.3676	466.5303	362.5388	168.5228	49.1484	0.0000	0.0000	0.0000	0.0000	190.1234	430.2285	649.8486	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	700.4131	524.1914	407.3470	189.3515	55.2229	0.0000	0.0000	0.0000	0.0000	213.6218	483.4028	730.1670	(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	286.9739	253.0864	266.8082	229.3288	218.8018	193.3176	187.8579	197.3760	201.8459	229.7000	249.9431	283.1233	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.4570	88.3946	88.2713	88.0121	87.6069	87.3000	87.3000	87.3000	87.3000	88.0618	88.3677	88.4772	(217)
Fuel for water heating, kWh/month	324.4220	286.3143	302.2594	260.5651	249.7540	221.4406	215.1866	226.0893	231.2095	260.8397	282.8446	319.9959	(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	10.1429	9.1614	10.1429	9.8158	10.1429	9.8158	10.1429	10.1429	9.8158	10.1429	9.8158	10.1429	(231)
Lighting	31.3261	25.1310	22.6276	16.5780	12.8053	10.4620	11.6814	15.1840	19.7225	25.8769	29.2279	32.1967	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-47.2613	-66.4585	-95.3614	-106.8865	-114.7898	-106.9376	-105.5582	-99.8547	-89.6524	-75.7990	-51.8699	-40.8651	(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	-27.8685	-58.9115	-118.1580	-179.2716	-238.7344	-240.6330	-237.4191	-199.8063	-145.0422	-84.4698	-37.2448	-22.0057	(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												3303.7174	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3180.9209	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 4.7030, total flow = 45.0000, SFP = 0.1045)

mechanical ventilation fans (SFP = 0.1045) 33.4251 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	119.4251	(231)
Electricity for lighting (calculated in Appendix L)	252.8195	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2590.8591	(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	4266.0238	(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	3303.7174	0.2100	693.7806	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3180.9209	0.2100	667.9934	(264)
Space and water heating			1361.7740	(265)
Pumps, fans and electric keep-hot	119.4251	0.1387	16.5657	(267)
Energy for lighting	252.8195	0.1443	36.4897	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.2943	0.1347	-134.8371	
PV Unit electricity exported	-1589.5648	0.1257	-199.7309	
Total			-334.5680	(269)
Total CO2, kg/year			1080.2614	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			10.1000	(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	3303.7174	1.1300	3733.2006	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3180.9209	1.1300	3594.4406	(278)
Space and water heating			7327.6413	(279)
Pumps, fans and electric keep-hot	119.4251	1.5128	180.6662	(281)
Energy for lighting	252.8195	1.5338	387.7830	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1001.2943	1.4977	-1499.6341	
PV Unit electricity exported	-1589.5648	0.4612	-733.1293	
Total			-2232.7634	(283)
Total Primary energy kWh/year			5663.3270	(286)
Dwelling Primary energy Rate (DPER)			52.9300	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	53.5000 (1b)	x	2.3000 (2b)	=	123.0500	(1b) - (3b)
First floor	53.5000 (1c)	x	2.6000 (2c)	=	139.1000	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	107.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	262.1500	(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	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1526	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4026	(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) =	0.3422	(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												
	0.4363	0.4277	0.4192	0.3764	0.3679	0.3251	0.3251	0.3165	0.3422	0.3679	0.3850	0.4021 (22b)
Effective ac	0.5952	0.5915	0.5879	0.5708	0.5677	0.5528	0.5528	0.5501	0.5585	0.5677	0.5741	0.5808 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			15.2000	1.1450	17.4046			(27)
Ground Floor			53.5000	0.1300	6.9550			(28a)
External Wall	107.6000	17.3000	90.3000	0.1800	16.2540			(29a)
External Roof	53.5000		53.5000	0.1100	5.8850			(30)
Total net area of external elements Aum(A, m2)			214.6000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.5986			(33)
Main dwelling								
Party Wall			44.4000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.8953 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	12.2000	0.0500	0.6100	
E3 Sill	9.4000	0.0500	0.4700	
E4 Jamb	29.4000	0.0500	1.4700	
E5 Ground floor (normal)	21.1000	0.1600	3.3760	
E6 Intermediate floor within a dwelling	21.1000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.7000	0.0600	0.5220	
E12 Gable (insulation at ceiling level)	12.4000	0.0600	0.7440	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.7000	0.0800	0.6960	
P4 Party wall - Roof (insulation at ceiling level)	8.7000	0.1200	1.0440	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.4620 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 59.0606 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	51.4887	51.1689	50.8555	49.3835	49.1081	47.8260	47.8260	47.5886	48.3198	49.1081	49.6652	50.2477	(38)
Heat transfer coeff	110.5492	110.2295	109.9161	108.4441	108.1687	106.8866	106.8866	106.6491	107.3804	108.1687	108.7258	109.3083	(39)
Average = Sum(39)m / 12 =												108.4427	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0332	1.0302	1.0273	1.0135	1.0109	0.9989	0.9989	0.9967	1.0036	1.0109	1.0161	1.0216	(40)
HLP (average)												1.0135	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.7956 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	71.0923	70.0239	68.4671	65.4883	63.2901	60.8387	59.4453	60.9903	62.6840	65.3161	68.3588	70.8199	(42a)
Hot water usage for baths	30.6952	30.2394	29.5974	28.4138	27.5274	26.5447	26.0138	26.6513	27.3454	28.3970	29.6050	30.5915	(42b)
Hot water usage for other uses	43.2594	41.6863	40.1133	38.5402	36.9671	35.3941	35.3941	36.9671	38.5402	40.1133	41.6863	43.2594	(42c)
Average daily hot water use (litres/day)												133.3308	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	145.0469	141.9496	138.1777	132.4423	127.7847	122.7774	120.8532	124.6088	128.5696	133.8264	139.6502	144.6708	(44)
Energy conte	229.7189	202.1344	212.3741	181.3069	172.0228	150.9692	146.1614	154.2917	158.5392	181.6011	198.9573	226.5195	(45)
Energy content (annual)										Total = Sum(45)m =		2214.5962	
Distribution loss (46)m = 0.15 x (45)m	34.4578	30.3202	31.8561	27.1960	25.8034	22.6454	21.9242	23.1438	23.7809	27.2402	29.8436	33.9779	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	280.6778	248.1618	263.3330	230.6220	222.9817	200.2842	197.1203	205.2506	207.8542	232.5600	248.2723	277.4784	(62)
WWHRS	-32.5004	-28.7436	-30.0987	-24.9229	-23.2272	-19.8757	-18.6303	-19.8115	-20.5642	-24.2429	-27.4643	-31.8986	(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	248.1774	219.4181	233.2343	205.6991	199.7544	180.4085	178.4900	185.4391	187.2900	208.3171	220.8081	245.5798	(64)
										Total per year (kWh/year) = Sum(64)m =		2512.6158	(64)
12Total per year (kWh/year)												2513	(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	89.1213	78.7165	83.3541	72.6133	69.9373	62.5260	61.3384	64.0417	65.0430	73.1221	78.4821	88.0574	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	139.7784	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	144.1143	159.5551	144.1143	148.9181	144.1143	148.9181	144.1143	144.1143	148.9181	144.1143	148.9181	144.1143	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.1732	269.9457	262.9593	248.0860	229.3112	211.6655	199.8771	197.1047	204.0911	218.9644	237.7392	255.3849	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	36.9778	(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)													
	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	-111.8227	(71)
Water heating gains (Table 5)													
	119.7866	117.1377	112.0351	100.8518	94.0017	86.8417	82.4441	86.0776	90.3375	98.2824	109.0029	118.3568	(72)
Total internal gains													
	599.0077	614.5720	587.0421	565.7894	535.3607	512.3588	491.3690	492.2301	508.2803	529.2946	563.5936	585.7894	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.6000	19.6403	0.6300	0.7000	0.7700	39.6153	(76)
South	1.0000	46.7521	0.6300	0.7000	0.7700	14.2880	(78)
West	7.6000	19.6403	0.6300	0.7000	0.7700	45.6176	(80)

Solar gains	99.5210	190.1338	304.3943	434.1574	525.8950	536.1947	511.3245	442.9223	350.4932	223.0828	123.2117	82.4376	(83)
Total gains	698.5287	804.7058	891.4364	999.9468	1061.2558	1048.5535	1002.6935	935.1524	858.7735	752.3774	686.8053	668.2270	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	67.4556	67.6513	67.8442	68.7651	68.9402	69.7671	69.7671	69.9224	69.4463	68.9402	68.5869	68.2214	
alpha	5.4970	5.5101	5.5229	5.5843	5.5960	5.6511	5.6511	5.6615	5.6298	5.5960	5.5725	5.5481	
util living area													
	0.9970	0.9930	0.9818	0.9374	0.8248	0.6308	0.4656	0.5180	0.7801	0.9625	0.9932	0.9977	(86)
MIT	19.8265	20.0036	20.2658	20.6160	20.8661	20.9768	20.9964	20.9937	20.9272	20.5892	20.1510	19.8035	(87)
Th 2	20.0558	20.0583	20.0607	20.0721	20.0742	20.0842	20.0842	20.0861	20.0804	20.0742	20.0699	20.0654	(88)
util rest of house													
	0.9960	0.9907	0.9756	0.9167	0.7740	0.5496	0.3705	0.4186	0.7048	0.9458	0.9906	0.9969	(89)
MIT 2	18.6858	18.9133	19.2467	19.6844	19.9633	20.0712	20.0831	20.0838	20.0318	19.6623	19.1110	18.6635	(90)
Living area fraction										fLA = Living area / (4) =		0.1561	(91)
MIT	18.8638	19.0835	19.4058	19.8298	20.1042	20.2125	20.2256	20.2258	20.1715	19.8070	19.2734	18.8414	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.8638	19.0835	19.4058	19.8298	20.1042	20.2125	20.2256	20.2258	20.1715	19.8070	19.2734	18.8414	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9942	0.9873	0.9700	0.9102	0.7758	0.5614	0.3854	0.4341	0.7130	0.9396	0.9874	0.9954	(94)
Useful gains	694.4965	794.5179	864.6834	910.1287	823.3739	588.6937	386.4242	405.9133	612.2883	706.9207	678.1501	665.1569	(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													
	1610.0203	1563.4408	1418.5501	1185.2719	909.0691	599.9054	387.5302	408.0228	651.9615	995.9048	1323.5582	1600.4318	(97)
Space heating kWh													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98a)
Space heating requirement - total per year (kWh/year)												3247.3456	
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													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3247.3456	
Space heating per m2											(98c) / (4) =	30.3490	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	92.4000 (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													
	681.1497	516.7162	412.0768	198.1031	63.7572	0.0000	0.0000	0.0000	0.0000	215.0042	464.6938	695.8445	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	737.1750	559.2166	445.9706	214.3973	69.0013	0.0000	0.0000	0.0000	0.0000	232.6885	502.9154	753.0785	(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													
	248.1774	219.4181	233.2343	205.6991	199.7544	180.4085	178.4900	185.4391	187.2900	208.3171	220.8081	245.5798	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.4281	86.1499	85.5871	84.3008	82.2245	80.3000	80.3000	80.3000	80.3000	84.4492	85.9354	86.4838	(217)
Fuel for water heating, kWh/month													
	287.1489	254.6935	272.5112	244.0059	242.9377	224.6681	222.2790	230.9329	233.2379	246.6773	256.9465	283.9603	(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	29.9441	24.0223	21.6294	15.8466	12.2404	10.0005	11.1661	14.5141	18.8524	24.7353	27.9385	30.7763	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-48.6461	-67.8621	-96.5089	-107.2845	-114.6148	-106.5429	-105.1751	-99.7906	-90.1610	-76.9828	-53.2055	-42.1381	(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	-29.6884	-62.1988	-123.1830	-184.3991	-243.2651	-244.2744	-241.4454	-204.7196	-150.4062	-88.7964	-39.5826	-23.5000	(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	3514.4433	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2999.9992	(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)	241.6660	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2644.3715	(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	4197.7369	(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	3514.4433	0.2100	738.0331	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2999.9992	0.2100	629.9998	(264)
Space and water heating			1368.0329	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	241.6660	0.1443	34.8799	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1008.9126	0.1348	-136.0319	
PV Unit electricity exported	-1635.4590	0.1260	-206.0505	
Total			-342.0825	(269)
Total CO2, kg/year			1072.7596	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.0300	(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	3514.4433	1.1300	3971.3209	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2999.9992	1.1300	3389.9991	(278)
Space and water heating			7361.3200	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	241.6660	1.5338	370.6754	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1008.9126	1.4983	-1511.6775	
PV Unit electricity exported	-1635.4590	0.4625	-756.3533	
Total			-2268.0308	(283)
Total Primary energy kWh/year			5594.0654	(286)
Target Primary Energy Rate (TPER)			52.2800	(287)

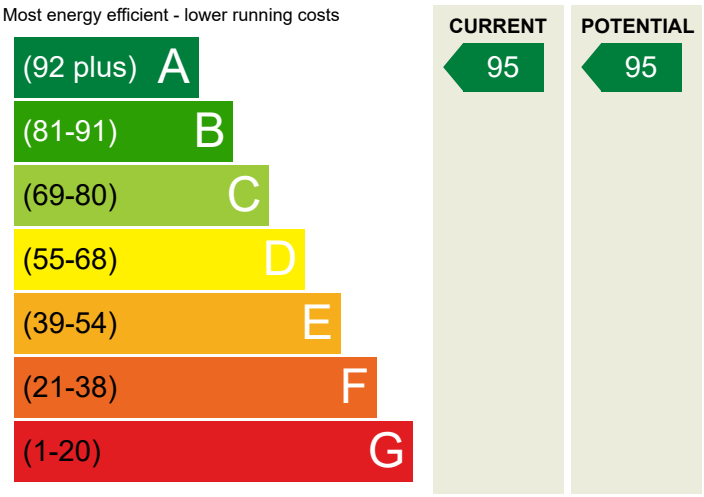
Energy Report

Dwelling Address	Longford, Crabtree Lane, Openshaw
Reference	Longford-Longford (SD)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Semi-Detached
Total Floor Area	107

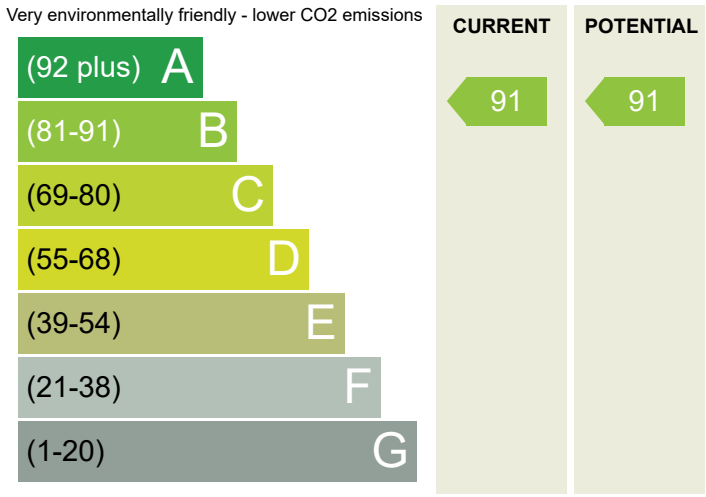
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

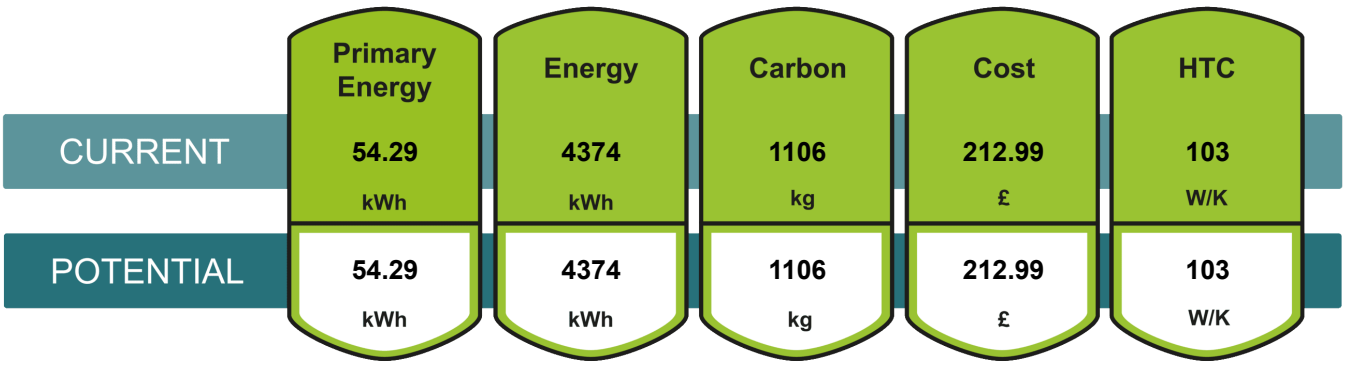
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£22	A 96			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£66	£66	
Heating	£322	£322	
Hot Water	£178	£178	
New Technologies e.g. Impact of PV	-(£353)	-(£353)	
TOTAL	£213	£213	

Estimated energy use and potential savings

Space Heating
3433
kWh per year

Water Heating
3180
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (ET)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.01	**TER**	11.10
Environmental	91 B	**% DER < TER**			0.81
CO_2 Emissions (t/year)	0.95	**DFEE**	34.28	**TFEE**	34.64
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.14	**DPER**	57.91	**TPER**	57.99

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	West	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, End-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	42.60 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	15.10	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	95.10	81.30	0.00	None	13.80	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	43.00	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	47.80
FF Partitions	Plasterboard on timber frame	9.00	91.10

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	42.60	42.60	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	42.60

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	42.60

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	42.60

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	West	2.10	0
Front	Window	External Wall	West	3.70	0
Side	Window	External Wall	South	1.60	0
Rear	Window	External Wall	East	6.40	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	10.10	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	7.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	24.10	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	18.60	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	18.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	10.20	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.40	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	4
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0

Summary for Input Data

Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	

Summary for Input Data

Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
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
2.50	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None		
Electricity Generated	0.00		
Apportioned	0.00	kWh/Year	
Connected to dwelling's electricity meter	Yes		
Electricity Generation	Annual		

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 95	A 92
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (ET)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.01	**TER**	11.10
Environmental	91 B	**% DER < TER**			0.81
CO_2 Emissions (t/year)	0.95	**DFEE**	34.28	**TFEE**	34.64
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.14	**DPER**	57.91	**TPER**	57.99

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)

		Air changes per hour	
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			23380.6998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.8473 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	(39)

Average = Sum(39)m / 12 = 84.2894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	(40)
HLP (average)												0.9893	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	538.8872	551.8108	526.7676	505.5661	477.5879	455.5464	436.2211	437.8431	452.7380	473.2715	505.6311	527.1188	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	622.3715	707.8433	769.7644	844.3088	882.8399	866.9499	829.2465	781.3697	729.7054	654.3741	608.3193	596.7264	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	
alpha	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	
util living area	0.9963	0.9911	0.9775	0.9271	0.8040	0.6090	0.4455	0.4928	0.7469	0.9519	0.9913	0.9971	(86)
MIT	20.0544	20.2130	20.4360	20.7152	20.9111	20.9862	20.9982	20.9968	20.9561	20.6954	20.3173	20.0142	(87)
Th 2	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	(88)
util rest of house	0.9950	0.9881	0.9696	0.9028	0.7498	0.5286	0.3546	0.3975	0.6682	0.9304	0.9878	0.9961	(89)
MIT 2	19.2376	19.3945	19.6129	19.8748	20.0377	20.0867	20.0919	20.0915	20.0712	19.8626	19.4989	19.1976	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.3823	19.5396	19.7587	20.0237	20.1925	20.2461	20.2525	20.2519	20.2280	20.0102	19.6439	19.3424	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3823	19.5396	19.7587	20.0237	20.1925	20.2461	20.2525	20.2519	20.2280	20.0102	19.6439	19.3424	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9936	0.9856	0.9660	0.9007	0.7563	0.5426	0.3707	0.4144	0.6807	0.9280	0.9854	0.9950	(94)
Useful gains	618.3805	697.6849	743.6285	760.4714	667.6483	470.4193	307.4231	323.8073	496.7404	607.2703	599.4606	593.7226	(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	1271.2804	1233.9604	1117.5711	937.6132	715.8262	475.9064	307.8661	324.6751	516.5279	793.1798	1057.3200	1276.3395	(97)
Space heating kWh	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98a)
Space heating requirement - total per year (kWh/year)												2263.5768	
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	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2263.5768	
Space heating per m2											(98c) / (4) =	26.5678	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	545.7950	404.9181	312.5992	143.3057	40.2745	0.0000	0.0000	0.0000	0.0000	155.4119	370.4032	570.6371	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3830	88.3136	88.1831	87.9216	87.5467	87.3000	87.3000	87.3000	87.3000	87.9532	88.2819	88.4056	(217)
Fuel for water heating, kWh/month	307.1189	271.0854	286.2499	246.8710	236.6185	209.7280	203.8599	214.1415	218.9400	247.2095	267.8838	302.9327	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	29.7781	23.8891	21.5095	15.7588	12.1725	9.9451	11.1042	14.4336	18.7479	24.5982	27.7836	30.6057	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8473	-56.2577	-81.0366	-91.1939	-98.2524	-91.6706	-90.5429	-85.5470	-76.5837	-64.4074	-43.8361	-34.4326	(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	-22.7608	-48.2173	-96.8963	-147.2711	-196.3511	-197.9715	-195.2715	-164.1705	-118.9951	-69.1499	-30.4262	-17.9597	(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	2543.3447	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3012.6391	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 24.4958 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	240.3262	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3747.7566	(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	2543.3447	0.2100	534.1024	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3012.6391	0.2100	632.6542	(264)
Space and water heating			1166.7566	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	240.3262	0.1443	34.6865	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	0.1346	-114.8713	
PV Unit electricity exported	-1305.4412	0.1256	-163.9711	
Total			-278.8424	(269)
Total CO2, kg/year			937.9278	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.0100	(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	2543.3447	1.1300	2873.9795	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3012.6391	1.1300	3404.2822	(278)
Space and water heating			6278.2617	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	240.3262	1.5338	368.6203	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	1.4974	-1278.1529	
PV Unit electricity exported	-1305.4412	0.4610	-601.8675	
Total			-1880.0203	(283)
Total Primary energy kWh/year			4934.0198	(286)
Dwelling Primary energy Rate (DPER)			57.9100	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3937 (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) =	0.3347 (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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)
Average = Sum(39)m / 12 =												88.8406	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)
Hot water usage for baths	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												125.7377	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	533.1796	546.4567	522.2426	503.0597	476.2742	455.4991	437.0398	438.0800	452.2761	471.4050	501.8405	521.6845	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	616.6639	702.4892	765.2394	841.8023	881.5263	866.9027	830.0653	781.6065	729.2436	652.5075	604.5287	591.2921	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9967	0.9923	0.9809	0.9366	0.8246	0.6290	0.4620	0.5100	0.7672	0.9578	0.9923	0.9974	(86)
MIT	19.9378	20.1042	20.3427	20.6591	20.8841	20.9813	20.9974	20.9955	20.9429	20.6468	20.2414	19.9144	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9955	0.9896	0.9739	0.9142	0.7708	0.5446	0.3647	0.4085	0.6870	0.9381	0.9891	0.9965	(89)
MIT 2	18.8014	19.0148	19.3174	19.7108	19.9574	20.0496	20.0586	20.0597	20.0201	19.7056	19.1990	18.7784	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.0028	19.2079	19.4991	19.8789	20.1216	20.2147	20.2250	20.2256	20.1837	19.8724	19.3837	18.9797	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0028	19.2079	19.4991	19.8789	20.1216	20.2147	20.2250	20.2256	20.1837	19.8724	19.3837	18.9797	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9937	0.9864	0.9689	0.9094	0.7752	0.5590	0.3820	0.4266	0.6988	0.9334	0.9859	0.9950	(94)
Useful gains	612.7698	692.9346	741.4343	765.5620	683.4013	484.6418	317.0974	333.4054	509.6033	609.0498	596.0231	588.3073	(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													
	1329.7950	1290.5896	1169.4316	975.3785	746.4225	492.1613	317.7523	334.6389	535.5553	821.8307	1093.9432	1322.7786	(97)
Space heating kWh													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98a)
Space heating requirement - total per year (kWh/year)												2514.7347	
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													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2514.7347	
Space heating per m2											(98c) / (4) =	29.5157	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.4000	(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													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	577.3450	434.6581	344.6212	163.4934	50.7443	0.0000	0.0000	0.0000	0.0000	171.3301	387.9897	591.3925	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.0651	85.7513	85.1456	83.8214	81.8590	80.3000	80.3000	80.3000	80.3000	83.8921	85.5067	86.1302	(217)
Fuel for water heating, kWh/month													
	275.3092	244.3617	261.7324	234.7764	233.6709	215.3709	213.2342	221.3950	223.4520	237.6327	246.8123	272.2571	(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	25.9647	20.8298	18.7550	13.7407	10.6137	8.6715	9.6822	12.5853	16.3470	21.4482	24.2256	26.6863	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5581	-55.6087	-79.6943	-89.3179	-96.0564	-89.5521	-88.4388	-83.6201	-75.0702	-63.4555	-43.4309	-34.2186	(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	-22.8167	-47.9538	-95.2379	-142.9386	-188.9097	-189.7903	-187.5619	-158.8498	-116.4844	-68.5481	-30.4527	-18.0465	(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	2721.5743	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2880.0049	(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)	209.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3791.5175	(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	2721.5743	0.2100	571.5306	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2880.0049	0.2100	604.8010	(264)
Space and water heating			1176.3316	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	209.5499	0.1443	30.2445	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	0.1347	-112.8431	
PV Unit electricity exported	-1267.5902	0.1259	-159.6099	
Total			-272.4530	(269)
Total CO2, kg/year			946.0524	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1000	(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	2721.5743	1.1300	3075.3790	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2880.0049	1.1300	3254.4056	(278)
Space and water heating			6329.7845	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	209.5499	1.5338	321.4147	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	1.4977	-1255.0737	
PV Unit electricity exported	-1267.5902	0.4622	-585.8793	
Total			-1840.9530	(283)
Total Primary energy kWh/year			4940.3470	(286)
Target Primary Energy Rate (TPER)			57.9900	(287)

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (ET)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.01	**TER**	11.10
Environmental	91 B	**% DER < TER**			0.81
CO_2 Emissions (t/year)	0.95	**DFEE**	34.28	**TFEE**	34.64
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.14	**DPER**	57.91	**TPER**	57.99

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(5)

2. Ventilation rate

			m3 per hour	
Number of open chimneys		0 * 80 =	0.0000	(6a)
Number of open flues		0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000	(6d)
Number of flues attached to other heater		0 * 35 =	0.0000	(6e)
Number of blocked chimneys		0 * 20 =	0.0000	(6f)
Number of intermittent extract fans		3 * 10 =	30.0000	(7a)
Number of passive vents		0 * 10 =	0.0000	(7b)
Number of flueless gas fires		0 * 40 =	0.0000	(7c)
			Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		30.0000 / (5) =	0.1437	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3687	(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) =	0.3134	(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	0.3996	0.3918	0.3839	0.3448	0.3369	0.2977	0.2977	0.2899	0.3134	0.3369	0.3526	0.3683	(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	0.5798	0.5767	0.5737	0.5594	0.5568	0.5443	0.5443	0.5420	0.5491	0.5568	0.5622	0.5678	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		23380.6998	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							274.4214	(35)
List of Thermal Bridges								

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0210	0.1533	
E4 Jamb	24.1000	0.0160	0.3856	
E5 Ground floor (normal)	18.6000	0.0740	1.3764	
E6 Intermediate floor within a dwelling	18.6000	0.0010	0.0186	
E10 Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872	
E12 Gable (insulation at ceiling level)	10.2000	0.0570	0.5814	
E16 Corner (normal)	10.2000	0.0470	0.4794	
E18 Party wall between dwellings	10.2000	0.0380	0.3876	
P1 Party wall - Ground floor	8.4000	0.1080	0.9072	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.1301	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	49.8473	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	39.9418	39.7282	39.5189	38.5357	38.3517	37.4954	37.4954	37.3368	37.8252	38.3517	38.7239	39.1129	(38)
Heat transfer coeff	89.7891	89.5755	89.3662	88.3830	88.1990	87.3427	87.3427	87.1841	87.6725	88.1990	88.5712	88.9602	(39)
Average = Sum(39)m / 12 =												88.3821	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0539	1.0514	1.0489	1.0374	1.0352	1.0251	1.0251	1.0233	1.0290	1.0352	1.0396	1.0441	(40)
HLP (average)												1.0373	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5542	(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	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												63.9247	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)
Energy content (annual)										Total = Sum(45)m =		1061.6535	
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	93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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	93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)
										Total per year (kWh/year) = Sum(64)m =		902.4055	(64)
12Total per year (kWh/year)												902	(64)
Electric shower(s)	53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							610.7387	(64a)
Heat gains from water heating, kWh/month	36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains	465.8289	480.3551	459.0248	446.7960	424.1014	410.6468	395.1409	394.2121	406.0298	417.3388	441.1366	455.2799	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	549.3132	636.3876	702.0216	785.5387	829.3534	822.0503	788.1663	737.7386	682.9972	598.4413	543.8248	524.8876	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	72.3322	72.5046	72.6744	73.4829	73.6362	74.3582	74.3582	74.4934	74.0784	73.6362	73.3268	73.0061	
alpha	5.8221	5.8336	5.8450	5.8989	5.9091	5.9572	5.9572	5.9662	5.9386	5.9091	5.8885	5.8671	
util living area	0.9982	0.9953	0.9871	0.9512	0.8505	0.6565	0.4841	0.5370	0.7992	0.9706	0.9954	0.9986	(86)
MIT	19.8707	20.0393	20.2836	20.6163	20.8632	20.9770	20.9967	20.9942	20.9296	20.5993	20.1790	19.8460	(87)
Th 2	20.0387	20.0408	20.0428	20.0523	20.0541	20.0624	20.0624	20.0640	20.0592	20.0541	20.0505	20.0467	(88)
util rest of house	0.9975	0.9935	0.9822	0.9327	0.8002	0.5706	0.3829	0.4313	0.7216	0.9558	0.9935	0.9981	(89)
MIT 2	19.0114	19.1808	19.4240	19.7511	19.9669	20.0529	20.0617	20.0625	20.0239	19.7422	19.3283	18.9932	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.1637	19.3330	19.5763	19.9044	20.1258	20.2166	20.2274	20.2276	20.1844	19.8941	19.4791	19.1443	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1637	19.3330	19.5763	19.9044	20.1258	20.2166	20.2274	20.2276	20.1844	19.8941	19.4791	19.1443	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9966	0.9918	0.9790	0.9292	0.8044	0.5853	0.4009	0.4502	0.7330	0.9525	0.9918	0.9974	(94)
Useful gains	547.4686	631.1746	687.3141	729.9493	667.1678	481.1795	315.9945	332.0931	500.6077	570.0442	539.3763	523.5239	(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	1334.5991	1292.8418	1168.5805	972.6041	743.1452	490.5728	316.8271	333.7075	533.4347	819.7296	1096.4294	1329.4518	(97)
Space heating kWh	585.6251	444.6404	358.0622	174.7114	56.5272	0.0000	0.0000	0.0000	0.0000	185.7659	401.0782	599.6104	(98a)
Space heating requirement - total per year (kWh/year)												2806.0209	
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	585.6251	444.6404	358.0622	174.7114	56.5272	0.0000	0.0000	0.0000	0.0000	185.7659	401.0782	599.6104	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2806.0209	
Space heating per m2											(98c) / (4) =	32.9345	(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	821.0209	646.3356	662.5989	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8947	0.9496	0.9279	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	734.5817	613.7556	614.8272	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	905.6983	868.7598	812.3421	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	123.2039	189.7231	146.9511	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	30.8010	47.4308	36.7378	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.9695	(107)
Energy for space heating												32.9345	(99)
Energy for space cooling												1.3494	(108)
Total												34.2839	(109)
Fabric Energy Efficiency (DFEE)												34.3	(109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b)	x 2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c)	x 2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

---

2. Ventilation rate

---

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

Number of passive vents 0 * 10 = 0.0000 (7b)
Number of flueless gas fires 0 * 40 = 0.0000 (7c)

Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1437 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3937 (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) = 0.3347 (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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932	(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 0.5910 0.5875 0.5840 0.5678 0.5647 0.5505 0.5505 0.5479 0.5560 0.5647 0.5709 0.5773 (25)

---
3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3 Sill	7.3000	0.0500	0.3650
E4 Jamb	24.1000	0.0500	1.2050
E5 Ground floor (normal)	18.6000	0.1600	2.9760
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.4000	0.0800	0.6720
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)

Average = Sum(39)m / 12 = 88.8406

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---
4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (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

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 63.9247 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)

Energy content (annual) Total = Sum(45)m = 1061.6535

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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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												
93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)

Total per year (kWh/year) = Sum(64)m = 902.4055 (64)
12Total per year (kWh/year) 902 (64)
Electric shower(s)

	53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												610.7387	(64a)
Heat gains from water heating, kWh/month													
	36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains													
	465.8289	480.3551	459.0248	446.7960	424.1014	410.6468	395.1409	394.2121	406.0298	417.3388	441.1366	455.2799	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	549.3132	636.3876	702.0216	785.5387	829.3534	822.0503	788.1663	737.7386	682.9972	598.4413	543.8248	524.8876	(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	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9982	0.9953	0.9872	0.9518	0.8521	0.6583	0.4857	0.5386	0.8009	0.9709	0.9955	0.9986	(86)
MIT	19.8592	20.0286	20.2743	20.6106	20.8601	20.9764	20.9966	20.9940	20.9280	20.5945	20.1718	19.8364	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9975	0.9936	0.9824	0.9334	0.8019	0.5721	0.3839	0.4324	0.7232	0.9562	0.9935	0.9981	(89)
MIT 2	18.9949	19.1653	19.4101	19.7420	19.9607	20.0496	20.0586	20.0596	20.0196	19.7341	19.3174	18.9795	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.1481	19.3183	19.5633	19.8959	20.1201	20.2138	20.2249	20.2252	20.1806	19.8866	19.4688	19.1314	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1481	19.3183	19.5633	19.8959	20.1201	20.2138	20.2249	20.2252	20.1806	19.8866	19.4688	19.1314	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9966	0.9919	0.9792	0.9299	0.8061	0.5869	0.4020	0.4513	0.7345	0.9529	0.9919	0.9974	(94)
Useful gains	547.4698	631.2012	687.4421	730.4720	668.5160	482.4341	316.8770	332.9470	501.6944	570.2752	539.3943	523.5234	(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													
	1342.9312	1300.5504	1175.2075	976.8953	746.2864	492.0822	317.7386	334.6102	535.2827	823.0896	1101.5178	1336.3566	(97)
Space heating kWh													
	591.8233	449.8026	362.8975	177.4248	57.8612	0.0000	0.0000	0.0000	0.0000	188.0939	404.7289	604.7479	(98a)
Space heating requirement - total per year (kWh/year)												2837.3800	
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													
	591.8233	449.8026	362.8975	177.4248	57.8612	0.0000	0.0000	0.0000	0.0000	188.0939	404.7289	604.7479	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2837.3800	
Space heating per m2											(98c) / (4) =	33.3026	(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	823.9608	648.6500	664.8068	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8931	0.9485	0.9267	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	735.8596	615.2768	616.0592	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	905.6983	868.7598	812.3421	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	122.2839	188.5913	146.0345	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	30.5710	47.1478	36.5086	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.2274	(107)

Energy for space heating	33.3026 (99)
Energy for space cooling	1.3407 (108)
Total	34.6433 (109)
Fabric Energy Efficiency (TFEE)	34.6 (109)

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (ET)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	94 A	**DER**	11.01	**TER**	11.10
Environmental	91 B	**% DER < TER**			0.81
CO_2 Emissions (t/year)	0.95	**DFEE**	34.28	**TFEE**	34.64
Compliance Check	See BREL	**% DFEE < TFEE**			1.04
% DPER < TPER	0.14	**DPER**	57.91	**TPER**	57.99

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)

		Air changes per hour	
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		4.5000	(17)
Infiltration rate		0.2250	(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) =	0.1913	(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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			11.7000	1.2357	14.4582			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	95.1000	13.8000	81.3000	0.1900	15.4470	140.0000	11381.9998	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	43.7172			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000	140.0000	6020.0000	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			23380.6998	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.8473 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	84.2894	(39)

Average = Sum(39)m / 12 = 84.2894

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	0.9893	(40)
HLP (average)												0.9893	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	538.8872	551.8108	526.7676	505.5661	477.5879	455.5464	436.2211	437.8431	452.7380	473.2715	505.6311	527.1188	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	622.3715	707.8433	769.7644	844.3088	882.8399	866.9499	829.2465	781.3697	729.7054	654.3741	608.3193	596.7264	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	77.0517	
alpha	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	6.1368	
util living area	0.9963	0.9911	0.9775	0.9271	0.8040	0.6090	0.4455	0.4928	0.7469	0.9519	0.9913	0.9971	(86)
MIT	20.0544	20.2130	20.4360	20.7152	20.9111	20.9862	20.9982	20.9968	20.9561	20.6954	20.3173	20.0142	(87)
Th 2	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	20.0922	(88)
util rest of house	0.9950	0.9881	0.9696	0.9028	0.7498	0.5286	0.3546	0.3975	0.6682	0.9304	0.9878	0.9961	(89)
MIT 2	19.2376	19.3945	19.6129	19.8748	20.0377	20.0867	20.0919	20.0915	20.0712	19.8626	19.4989	19.1976	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.3823	19.5396	19.7587	20.0237	20.1925	20.2461	20.2525	20.2519	20.2280	20.0102	19.6439	19.3424	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3823	19.5396	19.7587	20.0237	20.1925	20.2461	20.2525	20.2519	20.2280	20.0102	19.6439	19.3424	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9936	0.9856	0.9660	0.9007	0.7563	0.5426	0.3707	0.4144	0.6807	0.9280	0.9854	0.9950	(94)
Useful gains	618.3805	697.6849	743.6285	760.4714	667.6483	470.4193	307.4231	323.8073	496.7404	607.2703	599.4606	593.7226	(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	1271.2804	1233.9604	1117.5711	937.6132	715.8262	475.9064	307.8661	324.6751	516.5279	793.1798	1057.3200	1276.3395	(97)
Space heating kWh	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98a)
Space heating requirement - total per year (kWh/year)												2263.5768	
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	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2263.5768	
Space heating per m2											(98c) / (4) =	26.5678	(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 %)	89.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	485.7575	360.3771	278.2133	127.5421	35.8443	0.0000	0.0000	0.0000	0.0000	138.3166	329.6588	507.8670	(98)
Space heating efficiency (main heating system 1)	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)	545.7950	404.9181	312.5992	143.3057	40.2745	0.0000	0.0000	0.0000	0.0000	155.4119	370.4032	570.6371	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3830	88.3136	88.1831	87.9216	87.5467	87.3000	87.3000	87.3000	87.3000	87.9532	88.2819	88.4056	(217)
Fuel for water heating, kWh/month	307.1189	271.0854	286.2499	246.8710	236.6185	209.7280	203.8599	214.1415	218.9400	247.2095	267.8838	302.9327	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	29.7781	23.8891	21.5095	15.7588	12.1725	9.9451	11.1042	14.4336	18.7479	24.5982	27.7836	30.6057	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8473	-56.2577	-81.0366	-91.1939	-98.2524	-91.6706	-90.5429	-85.5470	-76.5837	-64.4074	-43.8361	-34.4326	(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	-22.7608	-48.2173	-96.8963	-147.2711	-196.3511	-197.9715	-195.2715	-164.1705	-118.9951	-69.1499	-30.4262	-17.9597	(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	2543.3447	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	87.3000	
Water heating fuel used	3012.6391	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962) 24.4958 (230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	240.3262	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3747.7566	(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	2543.3447	0.2100	534.1024	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3012.6391	0.2100	632.6542	(264)
Space and water heating			1166.7566	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	240.3262	0.1443	34.6865	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	0.1346	-114.8713	
PV Unit electricity exported	-1305.4412	0.1256	-163.9711	
Total			-278.8424	(269)
Total CO2, kg/year			937.9278	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			11.0100	(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	2543.3447	1.1300	2873.9795	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3012.6391	1.1300	3404.2822	(278)
Space and water heating			6278.2617	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	240.3262	1.5338	368.6203	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-853.6081	1.4974	-1278.1529	
PV Unit electricity exported	-1305.4412	0.4610	-601.8675	
Total			-1880.0203	(283)
Total Primary energy kWh/year			4934.0198	(286)
Dwelling Primary energy Rate (DPER)			57.9100	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3937 (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) =	0.3347 (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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			11.7000	1.1450	13.3969			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	95.1000	13.8000	81.3000	0.1800	14.6340			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			180.3000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	40.3549			(33)
Main dwelling								
Party Wall			43.0000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 274.4214 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 49.7319 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	90.4448	90.2013	89.9626	88.8416	88.6318	87.6554	87.6554	87.4746	88.0315	88.6318	89.0561	89.4997	(39)
Average = Sum(39)m / 12 =												88.8406	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0616	1.0587	1.0559	1.0427	1.0403	1.0288	1.0288	1.0267	1.0332	1.0403	1.0453	1.0505	(40)
HLP (average)												1.0427	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)
Hot water usage for baths	28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)
Hot water usage for other uses	40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)
Average daily hot water use (litres/day)												125.7377	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.9623	138.3511	124.9623	129.1277	124.9623	129.1277	124.9623	124.9623	129.1277	124.9623	129.1277	124.9623	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	533.1796	546.4567	522.2426	503.0597	476.2742	455.4991	437.0398	438.0800	452.2761	471.4050	501.8405	521.6845	(73)

---

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
East	6.4000	19.6403	0.6300	0.7000	0.7700	38.4148	(76)
South	1.6000	46.7521	0.6300	0.7000	0.7700	22.8609	(78)
West	3.7000	19.6403	0.6300	0.7000	0.7700	22.2086	(80)

Solar gains	83.4843	156.0325	242.9968	338.7426	405.2520	411.4036	393.0255	343.5265	276.9675	181.1025	102.6882	69.6076	(83)
Total gains	616.6639	702.4892	765.2394	841.8023	881.5263	866.9027	830.0653	781.6065	729.2436	652.5075	604.5287	591.2921	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	71.8077	72.0016	72.1926	73.1036	73.2766	74.0929	74.0929	74.2460	73.7763	73.2766	72.9275	72.5660	
alpha	5.7872	5.8001	5.8128	5.8736	5.8851	5.9395	5.9395	5.9497	5.9184	5.8851	5.8618	5.8377	
util living area													
	0.9967	0.9923	0.9809	0.9366	0.8246	0.6290	0.4620	0.5100	0.7672	0.9578	0.9923	0.9974	(86)
MIT	19.9378	20.1042	20.3427	20.6591	20.8841	20.9813	20.9974	20.9955	20.9429	20.6468	20.2414	19.9144	(87)
Th 2	20.0323	20.0347	20.0370	20.0479	20.0499	20.0594	20.0594	20.0611	20.0557	20.0499	20.0458	20.0415	(88)
util rest of house													
	0.9955	0.9896	0.9739	0.9142	0.7708	0.5446	0.3647	0.4085	0.6870	0.9381	0.9891	0.9965	(89)
MIT 2	18.8014	19.0148	19.3174	19.7108	19.9574	20.0496	20.0586	20.0597	20.0201	19.7056	19.1990	18.7784	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.0028	19.2079	19.4991	19.8789	20.1216	20.2147	20.2250	20.2256	20.1837	19.8724	19.3837	18.9797	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0028	19.2079	19.4991	19.8789	20.1216	20.2147	20.2250	20.2256	20.1837	19.8724	19.3837	18.9797	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9937	0.9864	0.9689	0.9094	0.7752	0.5590	0.3820	0.4266	0.6988	0.9334	0.9859	0.9950	(94)
Useful gains	612.7698	692.9346	741.4343	765.5620	683.4013	484.6418	317.0974	333.4054	509.6033	609.0498	596.0231	588.3073	(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													
	1329.7950	1290.5896	1169.4316	975.3785	746.4225	492.1613	317.7523	334.6389	535.5553	821.8307	1093.9432	1322.7786	(97)
Space heating kWh													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98a)
Space heating requirement - total per year (kWh/year)												2514.7347	
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													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2514.7347	
Space heating per m2											(98c) / (4) =	29.5157	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.4000	(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													
	533.4668	401.6241	318.4300	151.0679	46.8878	0.0000	0.0000	0.0000	0.0000	158.3090	358.5024	546.4467	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	577.3450	434.6581	344.6212	163.4934	50.7443	0.0000	0.0000	0.0000	0.0000	171.3301	387.9897	591.3925	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	86.0651	85.7513	85.1456	83.8214	81.8590	80.3000	80.3000	80.3000	80.3000	83.8921	85.5067	86.1302	(217)
Fuel for water heating, kWh/month													
	275.3092	244.3617	261.7324	234.7764	233.6709	215.3709	213.2342	221.3950	223.4520	237.6327	246.8123	272.2571	(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	25.9647	20.8298	18.7550	13.7407	10.6137	8.6715	9.6822	12.5853	16.3470	21.4482	24.2256	26.6863	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5581	-55.6087	-79.6943	-89.3179	-96.0564	-89.5521	-88.4388	-83.6201	-75.0702	-63.4555	-43.4309	-34.2186	(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	-22.8167	-47.9538	-95.2379	-142.9386	-188.9097	-189.7903	-187.5619	-158.8498	-116.4844	-68.5481	-30.4527	-18.0465	(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	2721.5743	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2880.0049	(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)	209.5499	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3791.5175	(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	2721.5743	0.2100	571.5306	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2880.0049	0.2100	604.8010	(264)
Space and water heating			1176.3316	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	209.5499	0.1443	30.2445	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	0.1347	-112.8431	
PV Unit electricity exported	-1267.5902	0.1259	-159.6099	
Total			-272.4530	(269)
Total CO2, kg/year			946.0524	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.1000	(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	2721.5743	1.1300	3075.3790	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2880.0049	1.1300	3254.4056	(278)
Space and water heating			6329.7845	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	209.5499	1.5338	321.4147	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-838.0215	1.4977	-1255.0737	
PV Unit electricity exported	-1267.5902	0.4622	-585.8793	
Total			-1840.9530	(283)
Total Primary energy kWh/year			4940.3470	(286)
Target Primary Energy Rate (TPER)			57.9900	(287)

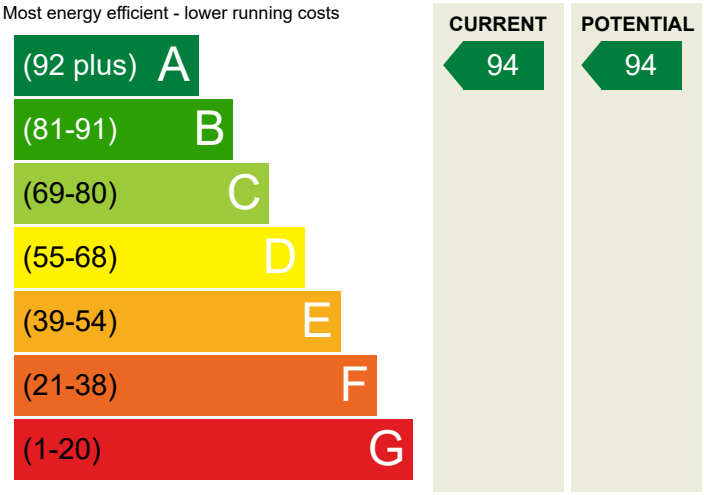
Energy Report

Dwelling Address	Seacourt, Crabtree Lane, Openshaw
Reference	Seacourt-Seacourt (ET)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, End-Terrace
Total Floor Area	85

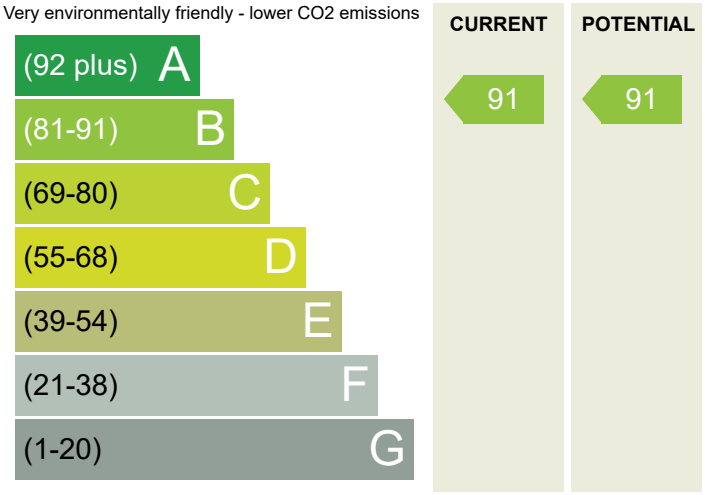
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

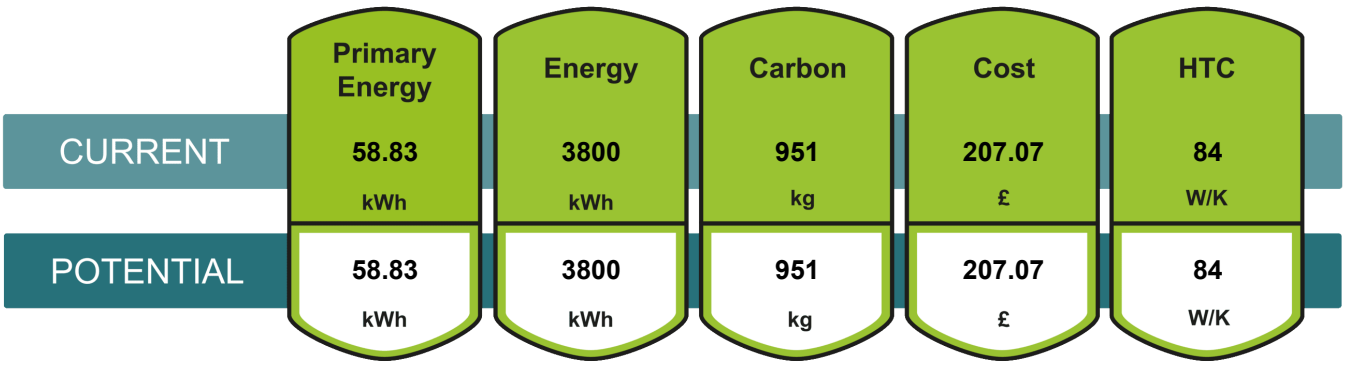
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£21	A 95			A 92

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£63	£63	
Heating	£274	£274	
Hot Water	£169	£169	
New Technologies e.g. Impact of PV	-(£298)	-(£298)	
TOTAL	£207	£207	

Estimated energy use and potential savings

Space Heating
2613
kWh per year

Water Heating
3012
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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

Summary for Input Data

elmhurst energy

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (MT)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	9.68	**TER**	9.90
Environmental	92 A	**% DER < TER**			2.22
CO_2 Emissions (t/year)	0.83	**DFEE**	28.79	**TFEE**	29.27
Compliance Check	See BREL	**% DFEE < TFEE**			1.65
% DPER < TPER	1.46	**DPER**	50.69	**TPER**	51.44

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

Orientation	North	
Property Tenture	ND	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	House, Mid-Terrace	
Position of Flat	Ground-floor flat	
Which Floor	1	
2.0 Number of Storeys	2	
3.0 Date Built	2023	
3.0 Property Age Band	L	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	0.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	1.00 m	42.60 m²	2.30 m
1st Storey:	1.00 m	42.60 m²	2.60 m

8.0 Living Area	15.10	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Cavity Wall	Cavity wall; dense plaster, lightweight aggregate block, filled cavity, any outside structure	0.19	140.00	51.90	35.30	0.00	None	16.60	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall	Filled Cavity with Edge Sealing	Dense plaster both sides. lightweight aggregate blocks, cavity or cavity fill	0.00	140.00	86.80	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
GF Partitions	Plasterboard on timber frame	9.00	47.80
FF Partitions	Plasterboard on timber frame	9.00	91.10

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof	External Plane Roof	Plasterboard, insulated at ceiling level	0.10	9.00	42.60	42.60	None	0.00	Enter Gross Area	0.00

10.2 Internal Ceilings

Summary for Input Data

Description	Storey	Construction	Area (m²)
Internal Ceiling	Lowest occupied	Plasterboard ceiling, carpeted chipboard floor	42.60

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Ground Floor	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.17	None	0.00	75.00	42.60

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor		Plasterboard ceiling, carpeted chipboard floor	9.00	42.60

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Entrance door	Manufacturer	Solid Door				0.00			1.10
French Door	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.30

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Front	Entrance door	External Wall	North	2.10	0
Front	Window	External Wall	North	5.70	0
Side	Window	External Wall	West	1.60	0
Rear	Window	External Wall	South	7.20	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted	Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	10.10	0.05	0.05	HiTherm	No
E3 Sill	Non Gov Approved Schemes	7.30	0.02	0.02	RCDs	No
E4 Jamb	Non Gov Approved Schemes	24.10	0.02	0.02	RCDs	No
E5 Ground floor (normal)	Non Gov Approved Schemes	18.60	0.07	0.07	RCDs	No
E6 Intermediate floor within a dwelling	Non Gov Approved Schemes	18.60	0.00	0.00	RCDs	No
E10 Eaves (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.06	0.06	RCDs	No
E12 Gable (insulation at ceiling level)	Non Gov Approved Schemes	10.20	0.06	0.06	RCDs	No
E16 Corner (normal)	Non Gov Approved Schemes	10.20	0.05	0.05	RCDs	No
E18 Party wall between dwellings	Non Gov Approved Schemes	10.20	0.04	0.04	RCDs	No
P1 Party wall - Ground floor	Non Gov Approved Schemes	8.40	0.11	0.11	RCDs	No
P4 Party wall - Roof (insulation at ceiling level)	Non Gov Approved Schemes	8.40	0.10	0.10	RCDs	No

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	No
Mechanical Ventilation data Type	Database
Type	Mechanical extract ventilation - decentralised
MV Reference Number	500787
Duct Type	Rigid
Wet Rooms	4
SFP from Installer Commissioning Certificate	No

19.1 Mechanical extract ventilation - Decentralised

SFP	Fan/Room Type	Count
0.13	In Room Fan Kitchen	0
0.11	In Room Fan Other Wet Room	1
0.00	In Duct Fan Kitchen	0
0.00	In Duct Fan Other Wet Room	1
0.10	Through Wall Fan Kitchen	1
0.10	Through Wall Fan Other Wet Room	1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0

Summary for Input Data

Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	0	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	Yes	
Designed AP_{50}	4.50	$m^3/(h.m^2)$ @ 50 Pa
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting	80.00	25.00	2000.00	20

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	17956	
Fuel Type	Mains gas	
SAP Code	0	
Model Name	LOGIC COMBI	
Manufacturer	Ideal Boilers	
Controls SAP Code	2106	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	Pump in heated space	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	Yes	
Combi boiler type	Standard Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	

Summary for Input Data

Summer Immersion	No
Cold Water Source	From mains
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower	Combi boiler or unvented hot water system	11.00		No	
En Suite	Combi boiler or unvented hot water system	11.00		No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No

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
2.50	South	30°	None Or Little	No	No	1.00		TBC

34.0 Small-scale Hydro	None	
Electricity Generated	0.00	
Apportioned	0.00	kWh/Year
Connected to dwelling's electricity meter	Yes	
Electricity Generation	Annual	

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

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
Solar water heating			A 96	A 93
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (MT)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	9.68	**TER**	9.90
Environmental	92 A	**% DER < TER**			2.22
CO_2 Emissions (t/year)	0.83	**DFEE**	28.79	**TFEE**	29.27
Compliance Check	See BREL	**% DFEE < TFEE**			1.65
% DPER < TPER	1.46	**DPER**	50.69	**TPER**	51.44

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)
		Air changes per hour	
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			14.5000	1.2357	17.9183			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	51.9000	16.6000	35.3000	0.1900	6.7070	140.0000	4942.0002	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.4373			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000	140.0000	12152.0004	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		23072.7006	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 270.8064 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.5674 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	(39)

Average = Sum(39)m / 12 = 79.0094

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	(40)
HLP (average)												0.9273	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	533.5302	545.8799	521.4106	500.0306	472.2309	450.0108	430.8641	432.4862	447.2024	467.9146	500.0955	521.7618	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	664.5311	768.5467	827.1163	884.3339	910.4493	889.2053	852.5157	812.7990	779.6983	714.0671	656.8618	633.9939	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	
alpha	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	
util living area													
	0.9938	0.9839	0.9621	0.8963	0.7575	0.5620	0.4070	0.4457	0.6763	0.9176	0.9847	0.9954	(86)
MIT	20.1912	20.3669	20.5707	20.7994	20.9446	20.9927	20.9992	20.9986	20.9781	20.7957	20.4460	20.1455	(87)
Th 2	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	(88)
util rest of house													
	0.9918	0.9789	0.9504	0.8670	0.7031	0.4899	0.3283	0.3636	0.6020	0.8874	0.9790	0.9939	(89)
MIT 2	19.4169	19.5895	19.7861	19.9950	20.1112	20.1414	20.1441	20.1440	20.1342	19.9965	19.6687	19.3716	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.5541	19.7273	19.9251	20.1375	20.2589	20.2923	20.2957	20.2954	20.2838	20.1382	19.8065	19.5088	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5541	19.7273	19.9251	20.1375	20.2589	20.2923	20.2957	20.2954	20.2838	20.1382	19.8065	19.5088	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9900	0.9758	0.9468	0.8667	0.7108	0.5026	0.3423	0.3782	0.6145	0.8872	0.9762	0.9924	(94)
Useful gains	657.8792	749.9836	783.1545	766.4780	647.1484	446.9067	291.7933	307.3961	479.1562	633.4866	641.2004	629.1459	(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													
	1205.2199	1171.4949	1060.7118	887.8724	676.2324	449.7427	291.9936	307.7757	488.5788	753.6057	1003.9331	1209.5374	(97)
Space heating kWh													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98a)
Space heating requirement - total per year (kWh/year)												1788.3697	
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													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.3697	
Space heating per m2											(98c) / (4) =	20.9903	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	457.5523	318.2648	232.0254	98.2067	24.3129	0.0000	0.0000	0.0000	0.0000	100.4142	293.4467	485.1812	(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													
	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3122	88.2132	88.0568	87.7814	87.4580	87.3000	87.3000	87.3000	87.3000	87.7885	88.1840	88.3415	(217)
Fuel for water heating, kWh/month													
	307.3652	271.3939	286.6604	247.2654	236.8584	209.7280	203.8599	214.1415	218.9400	247.6734	268.1812	303.1526	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	28.5015	22.8650	20.5874	15.0832	11.6507	9.5187	10.6282	13.8149	17.9442	23.5437	26.5926	29.2937	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8096	-56.1928	-80.9363	-91.0823	-98.1410	-91.5715	-90.4324	-85.4208	-76.4574	-64.3102	-43.7846	-34.4004	(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	-22.7985	-48.2821	-96.9965	-147.3827	-196.4625	-198.0706	-195.3820	-164.2967	-119.1215	-69.2471	-30.4777	-17.9919	(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												2009.4042	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3015.2201	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:
(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962)	24.4958	(230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	230.0237	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3206.0945	(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	2009.4042	0.2100	421.9749	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3015.2201	0.2100	633.1962	(264)
Space and water heating			1055.1711	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	230.0237	0.1443	33.1995	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.5393	0.1346	-114.7289	
PV Unit electricity exported	-1306.5099	0.1256	-164.1146	
Total			-278.8434	(269)
Total CO2, kg/year			824.8543	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.6800	(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	2009.4042	1.1300	2270.6267	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3015.2201	1.1300	3407.1987	(278)
Space and water heating			5677.8254	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	230.0237	1.5338	352.8180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.5393	1.4974	-1276.5576	
PV Unit electricity exported	-1306.5099	0.4611	-602.3944	
Total			-1878.9520	(283)
Total Primary energy kWh/year			4318.8495	(286)
Dwelling Primary energy Rate (DPER)			50.6900	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3937	(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) =	0.3347	(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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			14.5000	1.1450	16.6031			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	51.9000	16.6000	35.3000	0.1800	6.3540			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		35.2811			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 270.8064 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.6581 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	85.3709	85.1274	84.8887	83.7677	83.5579	82.5815	82.5815	82.4007	82.9576	83.5579	83.9822	84.4259	(39)
Average = Sum(39)m / 12 =												83.7667	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0020	0.9991	0.9963	0.9832	0.9807	0.9693	0.9693	0.9671	0.9737	0.9807	0.9857	0.9909	(40)
HLP (average)												0.9832	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 125.7377 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	527.8226	540.5258	516.8856	497.5241	470.9172	449.9636	431.6828	432.7230	446.7406	466.0480	496.3049	516.3275	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	658.8235	763.1926	822.5912	881.8274	909.1356	889.1581	853.3345	813.0358	779.2364	712.2006	653.0711	628.5596	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	75.0734	75.2881	75.4998	76.5102	76.7023	77.6092	77.6092	77.7795	77.2573	76.7023	76.3147	75.9138	
alpha	6.0049	6.0192	6.0333	6.1007	6.1135	6.1739	6.1739	6.1853	6.1505	6.1135	6.0876	6.0609	
util living area													
	0.9948	0.9867	0.9690	0.9115	0.7840	0.5845	0.4246	0.4640	0.7017	0.9294	0.9870	0.9960	(86)
MIT	20.0670	20.2517	20.4741	20.7450	20.9218	20.9892	20.9987	20.9978	20.9688	20.7483	20.3650	20.0385	(87)
Th 2	20.0817	20.0840	20.0864	20.0974	20.0994	20.1090	20.1090	20.1108	20.1053	20.0994	20.0953	20.0909	(88)
util rest of house													
	0.9930	0.9824	0.9589	0.8842	0.7290	0.5076	0.3393	0.3755	0.6240	0.9015	0.9819	0.9946	(89)
MIT 2	19.0045	19.2400	19.5192	19.8507	20.0384	20.1034	20.1086	20.1101	20.0866	19.8628	19.3937	18.9753	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.1928	19.4193	19.6884	20.0092	20.1950	20.2604	20.2664	20.2674	20.2430	20.0197	19.5659	19.1637	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1928	19.4193	19.6884	20.0092	20.1950	20.2604	20.2664	20.2674	20.2430	20.0197	19.5659	19.1637	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9906	0.9783	0.9534	0.8812	0.7352	0.5210	0.3544	0.3912	0.6365	0.8985	0.9780	0.9926	(94)
Useful gains	652.6360	746.5980	784.2210	777.0672	668.4299	463.2190	302.4500	318.0870	496.0143	639.9478	638.6730	623.9345	(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													
	1271.4143	1235.9915	1119.5504	930.5892	709.8248	467.4461	302.7757	318.6784	509.6081	787.0903	1046.9102	1263.3270	(97)
Space heating kWh													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98a)
Space heating requirement - total per year (kWh/year)												2059.1750	
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													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2059.1750	
Space heating per m2											(98c) / (4) =	24.1687	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.4000	(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													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	498.2371	355.9226	270.0055	119.6275	33.3310	0.0000	0.0000	0.0000	0.0000	118.4784	318.1069	514.8355	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.7784	85.3428	84.6240	83.1946	81.3919	80.3000	80.3000	80.3000	80.3000	83.1514	85.0914	85.8637	(217)
Fuel for water heating, kWh/month													
	276.2295	245.5312	263.3458	236.5453	235.0117	215.3709	213.2342	221.3950	223.4520	239.7495	248.0169	273.1020	(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	24.8516	19.9369	17.9510	13.1516	10.1587	8.2997	9.2671	12.0457	15.6462	20.5287	23.1871	25.5423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5246	-55.5516	-79.6070	-89.2217	-95.9610	-89.4674	-88.3442	-83.5114	-74.9602	-63.3699	-43.3852	-34.1899	(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	-22.8502	-48.0109	-95.3252	-143.0347	-189.0051	-189.8750	-187.6565	-158.9585	-116.5943	-68.6337	-30.4984	-18.0752	(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	2228.5444	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2890.9841	(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)	200.5668	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3300.4837	(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	2228.5444	0.2100	467.9943	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2890.9841	0.2100	607.1067	(264)
Space and water heating			1075.1010	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	200.5668	0.1443	28.9480	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-837.0940	0.1347	-112.7193	
PV Unit electricity exported	-1268.5176	0.1259	-159.7347	
Total			-272.4541	(269)
Total CO2, kg/year			843.5242	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9000	(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	2228.5444	1.1300	2518.2552	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2890.9841	1.1300	3266.8121	(278)
Space and water heating			5785.0672	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	200.5668	1.5338	307.6360	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-837.0940	1.4977	-1253.6889	
PV Unit electricity exported	-1268.5176	0.4622	-586.3377	
Total			-1840.0265	(283)
Total Primary energy kWh/year			4382.7775	(286)
Target Primary Energy Rate (TPER)			51.4400	(287)

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (MT)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	9.68	**TER**	9.90
Environmental	92 A	**% DER < TER**			2.22
CO_2 Emissions (t/year)	0.83	**DFEE**	28.79	**TFEE**	29.27
Compliance Check	See BREL	**% DFEE < TFEE**			1.65
% DPER < TPER	1.46	**DPER**	50.69	**TPER**	51.44

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(5)

2. Ventilation rate

			m3 per hour	
Number of open chimneys		0 * 80 =	0.0000	(6a)
Number of open flues		0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire		0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler		0 * 20 =	0.0000	(6d)
Number of flues attached to other heater		0 * 35 =	0.0000	(6e)
Number of blocked chimneys		0 * 20 =	0.0000	(6f)
Number of intermittent extract fans		3 * 10 =	30.0000	(7a)
Number of passive vents		0 * 10 =	0.0000	(7b)
Number of flueless gas fires		0 * 40 =	0.0000	(7c)
			Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =		30.0000 / (5) =	0.1437	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			4.5000	(17)
Infiltration rate			0.3687	(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) =	0.3134	(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	0.3996	0.3918	0.3839	0.3448	0.3369	0.2977	0.2977	0.2899	0.3134	0.3369	0.3526	0.3683	(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	0.5798	0.5767	0.5737	0.5594	0.5568	0.5443	0.5443	0.5420	0.5491	0.5568	0.5622	0.5678	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			14.5000	1.2357	17.9183			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	51.9000	16.6000	35.3000	0.1900	6.7070	140.0000	4942.0002	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.4373			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000	140.0000	12152.0004	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		23072.7006	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							270.8064	(35)
List of Thermal Bridges								

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3 Sill	7.3000	0.0210	0.1533
E4 Jamb	24.1000	0.0160	0.3856
E5 Ground floor (normal)	18.6000	0.0740	1.3764
E6 Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10 Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12 Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16 Corner (normal)	10.2000	0.0470	0.4794
E18 Party wall between dwellings	10.2000	0.0380	0.3876
P1 Party wall - Ground floor	8.4000	0.1080	0.9072
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 44.5674 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	39.9418	39.7282	39.5189	38.5357	38.3517	37.4954	37.4954	37.3368	37.8252	38.3517	38.7239	39.1129	(38)
Heat transfer coeff	84.5092	84.2956	84.0863	83.1030	82.9191	82.0627	82.0627	81.9041	82.3926	82.9191	83.2912	83.6803	(39)

Average = Sum(39)m / 12 = 83.1022

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9919	0.9894	0.9869	0.9754	0.9732	0.9632	0.9632	0.9613	0.9670	0.9732	0.9776	0.9822	(40)
HLP (average)												0.9754	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (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

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 63.9247 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)

Energy content (annual) Total = Sum(45)m = 1061.6535

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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)

Total per year (kWh/year) = Sum(64)m = 902.4055 (64)

12Total per year (kWh/year) 902 (64)

Electric shower(s)

53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 610.7387 (64a)

Heat gains from water heating, kWh/month

36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains	460.4719	474.4241	453.6678	441.2605	418.7444	405.1112	389.7839	388.8551	400.4942	411.9818	435.6011	449.9229	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	591.4728	697.0909	759.3735	825.5637	856.9628	844.3057	811.4355	769.1679	732.9901	658.1344	592.3673	562.1550	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	75.8389	76.0311	76.2203	77.1221	77.2932	78.0998	78.0998	78.2510	77.7871	77.2932	76.9479	76.5901	
alpha	6.0559	6.0687	6.0814	6.1415	6.1529	6.2067	6.2067	6.2167	6.1858	6.1529	6.1299	6.1060	
util living area	0.9970	0.9914	0.9780	0.9294	0.8110	0.6093	0.4434	0.4869	0.7325	0.9475	0.9919	0.9978	(86)
MIT	20.0031	20.1915	20.4213	20.7101	20.9073	20.9869	20.9984	20.9972	20.9615	20.7093	20.3065	19.9731	(87)
Th 2	20.0901	20.0922	20.0942	20.1039	20.1057	20.1141	20.1141	20.1157	20.1109	20.1057	20.1020	20.0982	(88)
util rest of house	0.9960	0.9885	0.9705	0.9061	0.7582	0.5307	0.3550	0.3949	0.6550	0.9249	0.9886	0.9970	(89)
MIT 2	19.1858	19.3741	19.6010	19.8811	20.0482	20.1087	20.1138	20.1150	20.0925	19.8872	19.4971	19.1625	(90)
Living area fraction									fLA = Living area / (4) =			0.1772	(91)
MIT	19.3307	19.5190	19.7464	20.0281	20.2004	20.2644	20.2705	20.2713	20.2465	20.0329	19.6406	19.3062	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3307	19.5190	19.7464	20.0281	20.2004	20.2644	20.2705	20.2713	20.2465	20.0329	19.6406	19.3062	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9948	0.9861	0.9668	0.9038	0.7642	0.5444	0.3707	0.4113	0.6676	0.9227	0.9864	0.9960	(94)
Useful gains	588.3718	687.3789	734.1801	746.1253	654.9106	459.6199	300.8108	316.3232	489.3303	607.2691	584.3005	559.9321	(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	1270.2278	1232.3157	1113.8413	924.7757	704.8474	464.8333	301.2150	317.0792	506.4252	782.1704	1044.5188	1264.0884	(97)
Space heating kWh	507.3008	366.1976	282.4679	128.6283	37.1530	0.0000	0.0000	0.0000	0.0000	130.1266	331.3572	523.8923	(98a)
Space heating requirement - total per year (kWh/year)												2307.1236	
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	507.3008	366.1976	282.4679	128.6283	37.1530	0.0000	0.0000	0.0000	0.0000	130.1266	331.3572	523.8923	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2307.1236	
Space heating per m2											(98c) / (4) =	27.0789	(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	771.3897	607.2642	622.4715	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9301	0.9702	0.9579	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	717.4602	589.1675	596.2463	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	937.7124	901.7125	854.6807	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	158.5816	232.5335	192.2752	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	39.6454	58.1334	48.0688	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												145.8476	(107)
Energy for space heating												27.0789	(99)
Energy for space cooling												1.7118	(108)
Total												28.7907	(109)
Fabric Energy Efficiency (DFEE)												28.8	(109)

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b)	x 2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c)	x 2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

---

2. Ventilation rate

---

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

Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3937 (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) =	0.3347 (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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932	(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	0.5910 0.5875 0.5840 0.5678 0.5647 0.5505 0.5505 0.5479 0.5560 0.5647 0.5709 0.5773	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			14.5000	1.1450	16.6031			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	51.9000	16.6000	35.3000	0.1800	6.3540			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		35.2811			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	270.8064 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3 Sill	7.3000	0.0500	0.3650
E4 Jamb	24.1000	0.0500	1.2050
E5 Ground floor (normal)	18.6000	0.1600	2.9760
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120
E16 Corner (normal)	10.2000	0.0900	0.9180
E18 Party wall between dwellings	10.2000	0.0600	0.6120
P1 Party wall - Ground floor	8.4000	0.0800	0.6720
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		9.3770 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	44.6581 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	85.3709	85.1274	84.8887	83.7677	83.5579	82.5815	82.5815	82.4007	82.9576	83.5579	83.9822	84.4259	(39)
Average = Sum(39)m / 12 =												83.7667	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0020	0.9991	0.9963	0.9832	0.9807	0.9693	0.9693	0.9671	0.9737	0.9807	0.9857	0.9909	(40)
HLP (average)												0.9832	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.5542 (42)

Hot water usage for mixer showers

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

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day)	63.9247 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	69.7418	67.8286	65.7399	63.1402	60.8210	58.4108	57.9100	59.9945	62.1324	64.6075	67.2302	69.6439	(44)
Energy conte	110.4540	96.5870	101.0398	86.4358	81.8767	71.8228	70.0371	74.2857	76.6155	87.6718	95.7818	109.0455	(45)

Energy content (annual)	Total = Sum(45)m = 1061.6535
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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(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

93.8859	82.0990	85.8838	73.4704	69.5952	61.0494	59.5316	63.1429	65.1231	74.5210	81.4145	92.6887	(64)

	Total per year (kWh/year) = Sum(64)m = 902.4055 (64)
12Total per year (kWh/year)	902 (64)
Electric shower(s)	

	53.6916	47.8396	52.2391	49.8511	50.7865	48.4454	50.0603	50.7865	49.8511	52.2391	51.2568	53.6916	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												610.7387	(64a)
Heat gains from water heating, kWh/month													
	36.8944	32.4847	34.5307	30.8304	30.0954	27.3737	27.3980	28.4823	28.7436	31.6900	33.1678	36.5951	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	49.5892	48.3403	46.4122	42.8200	40.4509	38.0190	36.8252	38.2827	39.9216	42.5941	46.0664	49.1869	(72)
Total internal gains													
	460.4719	474.4241	453.6678	441.2605	418.7444	405.1112	389.7839	388.8551	400.4942	411.9818	435.6011	449.9229	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	591.4728	697.0909	759.3735	825.5637	856.9628	844.3057	811.4355	769.1679	732.9901	658.1344	592.3673	562.1550	(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	75.0734	75.2881	75.4998	76.5102	76.7023	77.6092	77.6092	77.7795	77.2573	76.7023	76.3147	75.9138	
alpha	6.0049	6.0192	6.0333	6.1007	6.1135	6.1739	6.1739	6.1853	6.1505	6.1135	6.0876	6.0609	
util living area													
	0.9970	0.9915	0.9785	0.9308	0.8141	0.6125	0.4461	0.4896	0.7358	0.9485	0.9920	0.9978	(86)
MIT	19.9875	20.1768	20.4086	20.7021	20.9034	20.9862	20.9983	20.9970	20.9598	20.7025	20.2959	19.9595	(87)
Th 2	20.0817	20.0840	20.0864	20.0974	20.0994	20.1090	20.1090	20.1108	20.1053	20.0994	20.0953	20.0909	(88)
util rest of house													
	0.9960	0.9887	0.9710	0.9077	0.7613	0.5333	0.3567	0.3967	0.6580	0.9262	0.9888	0.9970	(89)
MIT 2	19.1634	19.3529	19.5821	19.8682	20.0394	20.1033	20.1086	20.1101	20.0860	19.8755	19.4811	19.1430	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.3094	19.4989	19.7286	20.0160	20.1925	20.2598	20.2663	20.2673	20.2409	20.0221	19.6255	19.2877	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3094	19.4989	19.7286	20.0160	20.1925	20.2598	20.2663	20.2673	20.2409	20.0221	19.6255	19.2877	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9948	0.9862	0.9674	0.9053	0.7672	0.5471	0.3726	0.4133	0.6706	0.9239	0.9865	0.9961	(94)
Useful gains	588.3903	687.4973	734.5860	747.3793	657.4960	461.8977	302.3369	317.8614	491.5277	608.0238	584.3833	559.9405	(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													
	1281.3697	1242.7663	1122.9564	931.1608	709.6153	467.3950	302.7688	318.6645	509.4337	787.2878	1051.9186	1273.7931	(97)
Space heating kWh													
	515.5767	373.1407	288.9476	132.3227	38.7768	0.0000	0.0000	0.0000	0.0000	133.3724	336.6254	531.1063	(98a)
Space heating requirement - total per year (kWh/year)												2349.8685	
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													
	515.5767	373.1407	288.9476	132.3227	38.7768	0.0000	0.0000	0.0000	0.0000	133.3724	336.6254	531.1063	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2349.8685	
Space heating per m2											(98c) / (4) =	27.5806	(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	776.2662	611.1032	626.2452	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9278	0.9689	0.9563	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	720.1832	592.1033	598.8617	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	937.7124	901.7125	854.6807	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	156.6210	230.3493	190.3294	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	39.1553	57.5873	47.5823	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												144.3249	(107)

Energy for space heating	27.5806 (99)
Energy for space cooling	1.6940 (108)
Total	29.2746 (109)
Fabric Energy Efficiency (TFEE)	29.3 (109)

Full SAP Calculation Printout

Property Reference	Seacourt	**Issued on Date**	14/04/2025
Assessment Reference	Seacourt (MT)	**Prop Type Ref**	
Property	Seacourt, Crabtree Lane, Openshaw		

SAP Rating	95 A	**DER**	9.68	**TER**	9.90
Environmental	92 A	**% DER < TER**			2.22
CO_2 Emissions (t/year)	0.83	**DFEE**	28.79	**TFEE**	29.27
Compliance Check	See BREL	**% DFEE < TFEE**			1.65
% DPER < TPER	1.46	**DPER**	50.69	**TPER**	51.44

Assessor Details	Mr. Paul Byrne	**Assessor ID**	AU85-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000 (1b)	x	2.3000 (2b)	=	97.9800	(1b) - (3b)
First floor	42.6000 (1c)	x	2.6000 (2c)	=	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	208.7400	(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)
		Air changes per hour	
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			4.5000 (17)
Infiltration rate			0.2250 (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) =	0.1913 (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	0.2438	0.2391	0.2343	0.2104	0.2056	0.1817	0.1817	0.1769	0.1913	0.2056	0.2152	0.2247	(22b)

Mechanical extract ventilation - decentralised

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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

---

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Entrance door			2.1000	1.1000	2.3100			(26)
Window			14.5000	1.2357	17.9183			(27)
Ground Floor			42.6000	0.1700	7.2420	75.0000	3195.0000	(28a)
External Wall	51.9000	16.6000	35.3000	0.1900	6.7070	140.0000	4942.0002	(29a)
External Roof	42.6000		42.6000	0.1000	4.2600	9.0000	383.4000	(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		38.4373			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000	140.0000	12152.0004	(32)
GF Partitions			47.8000			9.0000	430.2000	(32c)
FF Partitions			91.1000			9.0000	819.9000	(32c)
Internal Floor			42.6000			18.0000	766.8000	(32d)
Internal Ceiling			42.6000			9.0000	383.4000	(32e)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		23072.7006	(34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 270.8064 (35)

List of Thermal Bridges

	K1 Element	Length	Psi-value	Total
E2	Other lintels (including other steel lintels)	10.1000	0.0500	0.5050
E3	Sill	7.3000	0.0210	0.1533
E4	Jamb	24.1000	0.0160	0.3856
E5	Ground floor (normal)	18.6000	0.0740	1.3764
E6	Intermediate floor within a dwelling	18.6000	0.0010	0.0186
E10	Eaves (insulation at ceiling level)	8.4000	0.0580	0.4872
E12	Gable (insulation at ceiling level)	10.2000	0.0570	0.5814
E16	Corner (normal)	10.2000	0.0470	0.4794
E18	Party wall between dwellings	10.2000	0.0380	0.3876
P1	Party wall - Ground floor	8.4000	0.1080	0.9072
P4	Party wall - Roof (insulation at ceiling level)	8.4000	0.1010	0.8484

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.1301 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.5674 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	34.4421	(38)
Heat transfer coeff	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	79.0094	(39)

Average = Sum(39)m / 12 = 79.0094

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	0.9273	(40)
HLP (average)												0.9273	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

92.1864	90.8010	88.7822	84.9197	82.0692	78.8904	77.0835	79.0870	81.2832	84.6963	88.6418	91.8332	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 148.9175 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	161.9282	158.6296	154.5221	148.0599	142.8902	137.3011	134.9936	139.0815	143.4156	149.3039	155.8721	161.4771	(44)
Energy conte	256.4547	225.8865	237.4947	202.6865	192.3576	168.8278	163.2630	172.2120	176.8458	202.6039	222.0683	252.8341	(45)
Energy content (annual)										Total = Sum(45)m =		2473.5350	
Distribution loss (46)m = 0.15 x (45)m	38.4682	33.8830	35.6242	30.4030	28.8536	25.3242	24.4895	25.8318	26.5269	30.3906	33.3103	37.9251	(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	14.9863	13.5187	14.9294	14.3664	14.7940	14.2648	14.7067	14.7335	14.2888	14.8247	14.4245	14.9754	(61)
Total heat required for water heating calculated for each month	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(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	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
										Total per year (kWh/year) = Sum(64)m =		2648.3482	(64)
12Total per year (kWh/year)												2648	(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	89.0177	78.4869	82.6993	70.9849	67.6574	59.7014	57.9616	60.9439	62.3734	71.0720	77.4439	87.8112	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)	119.6475	116.7960	111.1550	98.5901	90.9374	82.9186	77.9054	81.9138	86.6298	95.5269	107.5609	118.0258	(72)
Total internal gains	533.5302	545.8799	521.4106	500.0306	472.2309	450.0108	430.8641	432.4862	447.2024	467.9146	500.0955	521.7618	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	664.5311	768.5467	827.1163	884.3339	910.4493	889.2053	852.5157	812.7990	779.6983	714.0671	656.8618	633.9939	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	81.1179	
alpha	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	6.4079	
util living area													
	0.9938	0.9839	0.9621	0.8963	0.7575	0.5620	0.4070	0.4457	0.6763	0.9176	0.9847	0.9954	(86)
MIT	20.1912	20.3669	20.5707	20.7994	20.9446	20.9927	20.9992	20.9986	20.9781	20.7957	20.4460	20.1455	(87)
Th 2	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	20.1443	(88)
util rest of house													
	0.9918	0.9789	0.9504	0.8670	0.7031	0.4899	0.3283	0.3636	0.6020	0.8874	0.9790	0.9939	(89)
MIT 2	19.4169	19.5895	19.7861	19.9950	20.1112	20.1414	20.1441	20.1440	20.1342	19.9965	19.6687	19.3716	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.5541	19.7273	19.9251	20.1375	20.2589	20.2923	20.2957	20.2954	20.2838	20.1382	19.8065	19.5088	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.5541	19.7273	19.9251	20.1375	20.2589	20.2923	20.2957	20.2954	20.2838	20.1382	19.8065	19.5088	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9900	0.9758	0.9468	0.8667	0.7108	0.5026	0.3423	0.3782	0.6145	0.8872	0.9762	0.9924	(94)
Useful gains	657.8792	749.9836	783.1545	766.4780	647.1484	446.9067	291.7933	307.3961	479.1562	633.4866	641.2004	629.1459	(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													
	1205.2199	1171.4949	1060.7118	887.8724	676.2324	449.7427	291.9936	307.7757	488.5788	753.6057	1003.9331	1209.5374	(97)
Space heating kWh													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98a)
Space heating requirement - total per year (kWh/year)												1788.3697	
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													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.3697	
Space heating per m2											(98c) / (4) =	20.9903	(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 %)												89.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	407.2215	283.2556	206.5026	87.4040	21.6385	0.0000	0.0000	0.0000	0.0000	89.3686	261.1676	431.8113	(98)
Space heating efficiency (main heating system 1)													
	89.0000	89.0000	89.0000	89.0000	89.0000	0.0000	0.0000	0.0000	0.0000	89.0000	89.0000	89.0000	(210)
Space heating fuel (main heating system)													
	457.5523	318.2648	232.0254	98.2067	24.3129	0.0000	0.0000	0.0000	0.0000	100.4142	293.4467	485.1812	(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													
	271.4409	239.4052	252.4241	217.0529	207.1516	183.0925	177.9697	186.9455	191.1347	217.4286	236.4929	267.8095	(64)
Efficiency of water heater												87.3000	(216)
(217)m	88.3122	88.2132	88.0568	87.7814	87.4580	87.3000	87.3000	87.3000	87.3000	87.7885	88.1840	88.3415	(217)
Fuel for water heating, kWh/month													
	307.3652	271.3939	286.6604	247.2654	236.8584	209.7280	203.8599	214.1415	218.9400	247.6734	268.1812	303.1526	(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	9.3846	8.4764	9.3846	9.0818	9.3846	9.0818	9.3846	9.3846	9.0818	9.3846	9.0818	9.3846	(231)
Lighting	28.5015	22.8650	20.5874	15.0832	11.6507	9.5187	10.6282	13.8149	17.9442	23.5437	26.5926	29.2937	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.8096	-56.1928	-80.9363	-91.0823	-98.1410	-91.5715	-90.4324	-85.4208	-76.4574	-64.3102	-43.7846	-34.4004	(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	-22.7985	-48.2821	-96.9965	-147.3827	-196.4625	-198.0706	-195.3820	-164.2967	-119.1215	-69.2471	-30.4777	-17.9919	(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												2009.4042	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												87.3000	
Water heating fuel used												3015.2201	(219)
Space cooling fuel												0.0000	(221)

Electricity for pumps and fans:
(MEVDecentralised, Database: total watage = 3.5590, total flow = 37.0000, SFP = 0.0962)

mechanical ventilation fans (SFP = 0.0962)	24.4958	(230a)

central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	110.4958	(231)
Electricity for lighting (calculated in Appendix L)	230.0237	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2159.0492	(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	3206.0945	(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	2009.4042	0.2100	421.9749	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3015.2201	0.2100	633.1962	(264)
Space and water heating			1055.1711	(265)
Pumps, fans and electric keep-hot	110.4958	0.1387	15.3271	(267)
Energy for lighting	230.0237	0.1443	33.1995	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.5393	0.1346	-114.7289	
PV Unit electricity exported	-1306.5099	0.1256	-164.1146	
Total			-278.8434	(269)
Total CO2, kg/year			824.8543	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			9.6800	(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	2009.4042	1.1300	2270.6267	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3015.2201	1.1300	3407.1987	(278)
Space and water heating			5677.8254	(279)
Pumps, fans and electric keep-hot	110.4958	1.5128	167.1581	(281)
Energy for lighting	230.0237	1.5338	352.8180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-852.5393	1.4974	-1276.5576	
PV Unit electricity exported	-1306.5099	0.4611	-602.3944	
Total			-1878.9520	(283)
Total Primary energy kWh/year			4318.8495	(286)
Dwelling Primary energy Rate (DPER)			50.6900	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	42.6000	(1b) x	2.3000	(2b) =	97.9800	(1b) - (3b)
First floor	42.6000	(1c) x	2.6000	(2c) =	110.7600	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	85.2000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		208.7400	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)
	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1437	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3937	(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) =	0.3347	(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	0.4267	0.4183	0.4100	0.3681	0.3598	0.3179	0.3179	0.3096	0.3347	0.3598	0.3765	0.3932 (22b)
Effective ac	0.5910	0.5875	0.5840	0.5678	0.5647	0.5505	0.5505	0.5479	0.5560	0.5647	0.5709	0.5773 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.1000	1.0000	2.1000			(26)
TER Opening Type			14.5000	1.1450	16.6031			(27)
Ground Floor			42.6000	0.1300	5.5380			(28a)
External Wall	51.9000	16.6000	35.3000	0.1800	6.3540			(29a)
External Roof	42.6000		42.6000	0.1100	4.6860			(30)
Total net area of external elements Aum(A, m2)			137.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		35.2811			(33)
Main dwelling								
Party Wall			86.8000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 270.8064 (35)

List of Thermal Bridges

	Length	Psi-value	Total	
K1 Element				
E2 Other lintels (including other steel lintels)	10.1000	0.0500	0.5050	
E3 Sill	7.3000	0.0500	0.3650	
E4 Jamb	24.1000	0.0500	1.2050	
E5 Ground floor (normal)	18.6000	0.1600	2.9760	
E6 Intermediate floor within a dwelling	18.6000	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	8.4000	0.0600	0.5040	
E12 Gable (insulation at ceiling level)	10.2000	0.0600	0.6120	
E16 Corner (normal)	10.2000	0.0900	0.9180	
E18 Party wall between dwellings	10.2000	0.0600	0.6120	
P1 Party wall - Ground floor	8.4000	0.0800	0.6720	
P4 Party wall - Roof (insulation at ceiling level)	8.4000	0.1200	1.0080	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 9.3770 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 44.6581 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.7129	40.4694	40.2307	39.1096	38.8999	37.9235	37.9235	37.7426	38.2996	38.8999	39.3242	39.7678	(38)
Heat transfer coeff	85.3709	85.1274	84.8887	83.7677	83.5579	82.5815	82.5815	82.4007	82.9576	83.5579	83.9822	84.4259	(39)
Average = Sum(39)m / 12 =												83.7667	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0020	0.9991	0.9963	0.9832	0.9807	0.9693	0.9693	0.9671	0.9737	0.9807	0.9857	0.9909	(40)
HLP (average)												0.9832	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5542 (42)

Hot water usage for mixer showers

67.0446	66.0371	64.5689	61.7598	59.6867	57.3748	56.0608	57.5178	59.1151	61.5973	64.4668	66.7878	(42a)

Hot water usage for baths

28.9546	28.5246	27.9190	26.8025	25.9665	25.0394	24.5387	25.1400	25.7947	26.7867	27.9262	28.8567	(42b)

Hot water usage for other uses

40.7872	39.3040	37.8208	36.3377	34.8545	33.3713	33.3713	34.8545	36.3377	37.8208	39.3040	40.7872	(42c)

Average daily hot water use (litres/day) 125.7377 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	136.7864	133.8657	130.3088	124.8999	120.5077	115.7856	113.9708	117.5123	121.2475	126.2049	131.6970	136.4317	(44)
Energy conte	216.6363	190.6230	200.2797	170.9818	162.2265	142.3719	137.8378	145.5048	149.5103	171.2588	187.6266	213.6190	(45)
Energy content (annual)										Total = Sum(45)m =		2088.4764	
Distribution loss (46)m = 0.15 x (45)m	32.4954	28.5934	30.0420	25.6473	24.3340	21.3558	20.6757	21.8257	22.4265	25.6888	28.1440	32.0429	(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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	267.5952	236.6504	251.2386	220.2968	213.1854	191.6869	188.7967	196.4637	198.8253	222.2177	236.9416	264.5779	(62)
WWHRS	-30.6500	-27.1071	-28.3850	-23.5039	-21.9048	-18.7441	-17.5696	-18.6835	-19.3934	-22.8626	-25.9006	-30.0824	(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	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
										Total per year (kWh/year) = Sum(64)m =		2403.6893	(64)
12Total per year (kWh/year)												2404	(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	84.7713	74.8890	79.3327	69.1802	66.6800	59.6674	58.5708	61.1201	62.0409	69.6833	74.7146	83.7681	(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	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	127.7081	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.6053	132.4201	119.6053	123.5921	119.6053	123.5921	119.6053	119.6053	123.5921	119.6053	123.5921	119.6053	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	229.9650	232.3513	226.3378	213.5359	197.3758	182.1876	172.0409	169.6546	175.6681	188.4700	204.6301	219.8183	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	35.7708	(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)													
	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	-102.1665	(71)
Water heating gains (Table 5)													
	113.9399	111.4419	106.6300	96.0836	89.6237	82.8714	78.7242	82.1506	86.1680	93.6603	103.7703	112.5915	(72)
Total internal gains													
	527.8226	540.5258	516.8856	497.5241	470.9172	449.9636	431.6828	432.7230	446.7406	466.0480	496.3049	516.3275	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)
South	7.2000	46.7521	0.6300	0.7000	0.7700	102.8739	(78)
West	1.6000	19.6403	0.6300	0.7000	0.7700	9.6037	(80)

Solar gains	131.0009	222.6668	305.7057	384.3033	438.2184	439.1945	421.6517	380.3128	332.4959	246.1526	156.7662	112.2321	(83)
Total gains	658.8235	763.1926	822.5912	881.8274	909.1356	889.1581	853.3345	813.0358	779.2364	712.2006	653.0711	628.5596	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	75.0734	75.2881	75.4998	76.5102	76.7023	77.6092	77.6092	77.7795	77.2573	76.7023	76.3147	75.9138	
alpha	6.0049	6.0192	6.0333	6.1007	6.1135	6.1739	6.1739	6.1853	6.1505	6.1135	6.0876	6.0609	
util living area													
	0.9948	0.9867	0.9690	0.9115	0.7840	0.5845	0.4246	0.4640	0.7017	0.9294	0.9870	0.9960	(86)
MIT	20.0670	20.2517	20.4741	20.7450	20.9218	20.9892	20.9987	20.9978	20.9688	20.7483	20.3650	20.0385	(87)
Th 2	20.0817	20.0840	20.0864	20.0974	20.0994	20.1090	20.1090	20.1108	20.1053	20.0994	20.0953	20.0909	(88)
util rest of house													
	0.9930	0.9824	0.9589	0.8842	0.7290	0.5076	0.3393	0.3755	0.6240	0.9015	0.9819	0.9946	(89)
MIT 2	19.0045	19.2400	19.5192	19.8507	20.0384	20.1034	20.1086	20.1101	20.0866	19.8628	19.3937	18.9753	(90)
Living area fraction										fLA = Living area / (4) =		0.1772	(91)
MIT	19.1928	19.4193	19.6884	20.0092	20.1950	20.2604	20.2664	20.2674	20.2430	20.0197	19.5659	19.1637	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1928	19.4193	19.6884	20.0092	20.1950	20.2604	20.2664	20.2674	20.2430	20.0197	19.5659	19.1637	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9906	0.9783	0.9534	0.8812	0.7352	0.5210	0.3544	0.3912	0.6365	0.8985	0.9780	0.9926	(94)
Useful gains	652.6360	746.5980	784.2210	777.0672	668.4299	463.2190	302.4500	318.0870	496.0143	639.9478	638.6730	623.9345	(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													
	1271.4143	1235.9915	1119.5504	930.5892	709.8248	467.4461	302.7757	318.6784	509.6081	787.0903	1046.9102	1263.3270	(97)
Space heating kWh													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98a)
Space heating requirement - total per year (kWh/year)												2059.1750	
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													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2059.1750	
Space heating per m2											(98c) / (4) =	24.1687	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.4000	(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													
	460.3711	328.8724	249.4851	110.5358	30.7978	0.0000	0.0000	0.0000	0.0000	109.4740	293.9308	475.7080	(98)
Space heating efficiency (main heating system 1)													
	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)													
	498.2371	355.9226	270.0055	119.6275	33.3310	0.0000	0.0000	0.0000	0.0000	118.4784	318.1069	514.8355	(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													
	236.9452	209.5433	222.8536	196.7929	191.2806	172.9428	171.2271	177.7802	179.4320	199.3551	211.0410	234.4955	(64)
Efficiency of water heater												80.3000	(216)
(217)m	85.7784	85.3428	84.6240	83.1946	81.3919	80.3000	80.3000	80.3000	80.3000	83.1514	85.0914	85.8637	(217)
Fuel for water heating, kWh/month													
	276.2295	245.5312	263.3458	236.5453	235.0117	215.3709	213.2342	221.3950	223.4520	239.7495	248.0169	273.1020	(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	24.8516	19.9369	17.9510	13.1516	10.1587	8.2997	9.2671	12.0457	15.6462	20.5287	23.1871	25.5423	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-39.5246	-55.5516	-79.6070	-89.2217	-95.9610	-89.4674	-88.3442	-83.5114	-74.9602	-63.3699	-43.3852	-34.1899	(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	-22.8502	-48.0109	-95.3252	-143.0347	-189.0051	-189.8750	-187.6565	-158.9585	-116.5943	-68.6337	-30.4984	-18.0752	(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	2228.5444	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	80.3000	
Water heating fuel used	2890.9841	(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)	200.5668	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2105.6117	(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	3300.4837	(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	2228.5444	0.2100	467.9943	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2890.9841	0.2100	607.1067	(264)
Space and water heating			1075.1010	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	200.5668	0.1443	28.9480	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-837.0940	0.1347	-112.7193	
PV Unit electricity exported	-1268.5176	0.1259	-159.7347	
Total			-272.4541	(269)
Total CO2, kg/year			843.5242	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			9.9000	(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	2228.5444	1.1300	2518.2552	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2890.9841	1.1300	3266.8121	(278)
Space and water heating			5785.0672	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	200.5668	1.5338	307.6360	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-837.0940	1.4977	-1253.6889	
PV Unit electricity exported	-1268.5176	0.4622	-586.3377	
Total			-1840.0265	(283)
Total Primary energy kWh/year			4382.7775	(286)
Target Primary Energy Rate (TPER)			51.4400	(287)

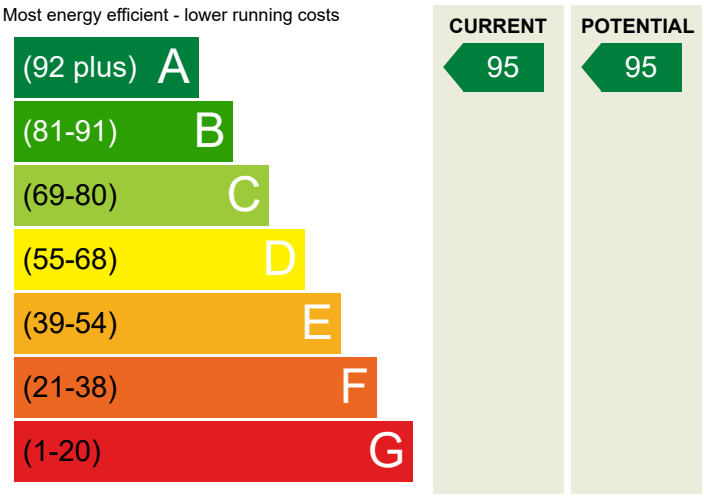
Energy Report

Dwelling Address	Seacourt, Crabtree Lane, Openshaw
Reference	Seacourt-Seacourt (MT)
Assessment Date	03/03/2025
Submission Date	
Property Type	House, Mid-Terrace
Total Floor Area	85

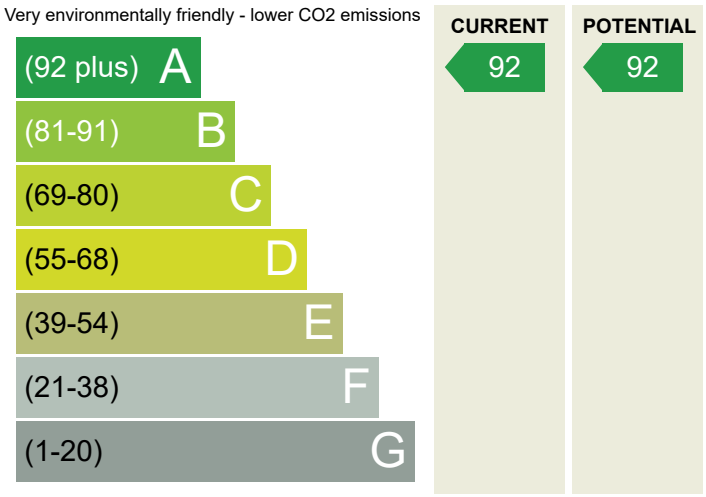
This Energy Report has been generated using the UK's National Calculation Methodology for dwellings, Standard Assessment Procedure (SAP). This methodology is used to assess the energy efficiency of dwellings which is calculated based on a dwelling's heating, hot water, ventilation and lighting usage.

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

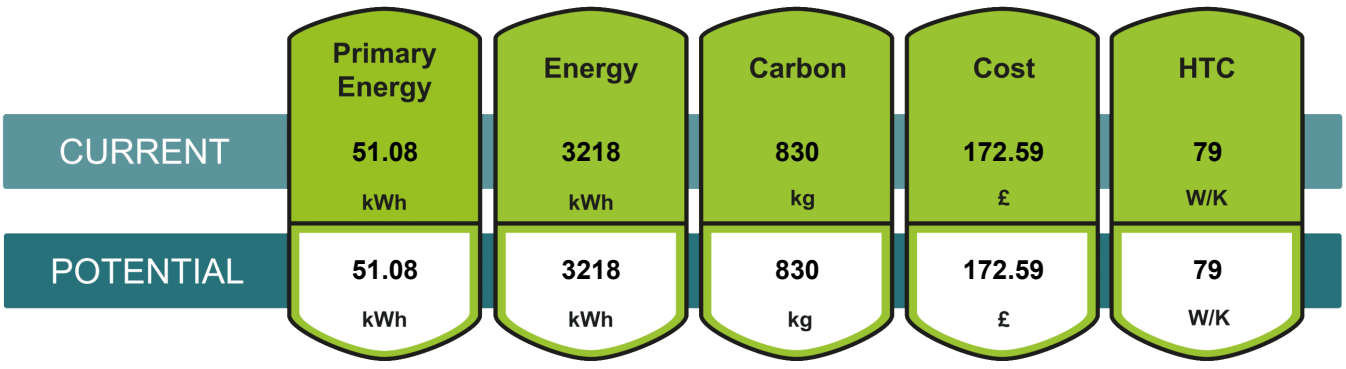
Energy Efficiency Rating



Carbon Dioxide (CO2) Emissions Rating



Additional ratings for your home



Energy Report

Breakdown of property's energy performance

Each feature is assessed as one of the following:

Very Poor | Poor | Average | Good | Very Good

Feature	Description	Energy Performance
Walls	Average thermal transmittance 0.19 W/m²K	Very Good
Roof	Average thermal transmittance 0.1 W/m²K	Very Good
Floor	Average thermal transmittance 0.17 W/m²K	Very Good
Windows	High performance glazing	Good
Main heating	Boiler and radiators, mains gas	Very Good
Main heating controls	Programmer, room thermostat and TRVs	Good
Secondary heating	None	
Hot water	From main system	Very Good
Lighting	Good lighting efficiency	Good
Air tightness	Air permeability [AP50] = 4.5 m³/h.m² (assumed)	Good

Recommendations

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

Recommended measures	Cumulative savings (per year)	Cumulative rating	Typical costs	Incremental savings (per year)	Cumulative CO2 rating
Solar water heating	£21	A 96			A 93

The typical cost is based on average installation prices across the country so may not be representative of the actual costs in your area.

Energy Report

Estimated energy costs of the dwelling

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

	Estimated annual costs	Estimated annual costs after potential improvements	Potential future savings
Lighting	£60	£60	
Heating	£242	£242	
Hot Water	£169	£169	
New Technologies e.g. Impact of PV	-(£298)	-(£298)	
TOTAL	£173	£173	

Estimated energy use and potential savings

Space Heating
2039
kWh per year

Water Heating
3015
kWh per year

Energy Report

About this document

Created by:	
Company/Trading name:	
Phone number:	
Email address:	

Disclaimer

This Energy Report should not under any circumstances be treated as a Condition Survey and cannot be used to indicate that any element of the dwelling (e.g.heating system) is working correctly.
This Energy Report must not be used in situations where an Energy Performance Certificate (EPC) is required.
This Energy Report is generated from a set of data inputs which may not reflect the actual dimensions, services or construction of the dwelling.
The calculation used to generate this report reflects the SAP Methodology current at the time of report generation.

Glossary terms for additional metrics

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