

Summary for Input Data



Plot Reference	A 203		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	83 B	DER	5.22	TER	14.06
Environmental	96 A	% DER < TER			62.87
CO ₂ Emissions (t/year)	0.25	DFEE	28.78	TFEE	28.57
Compliance Check	See BREL	% DFEE < TFEE			-0.75
% DPER < TPER	26.25	DPER	55.60	TPER	75.39

Assessor Details	Mr. Robert Tanner	Assessor ID	W344-0001
Client			

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

Orientation	Northeast
Property Tenture	1
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	2026
4.0 Sheltered Sides	3
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	185.52 kJ/m ² K
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements	Ground floor:	Heat Loss Perimeter 20.80 m	Internal Floor Area 50.89 m ²	Average Storey Height 2.80 m
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8.0 Living Area	29.08 m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	18.14	9.80	0.00	None	8.34	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	40.10	37.68	0.90	Stairwell Access Corridor 4	2.42	Enter Gross Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	21.92	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	113.43

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	50.89

Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
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Summary for Input Data

Party Floor 1 Lowest occupied Precast concrete planks floor, screed, carpeted 40.00 50.89

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Door	Manufacturer	Door to Corridor				0.00			1.00
Window	Manufacturer	Window	Double Low-E Soft 0.1			0.35		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	North East	2.42	
Windows	Window	External Wall 1	South West	8.34	

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
E1 Steel lintel with perforated steel base plate	Independently assessed	5.08	0.05	0.05	No
E3 Sill	Independently assessed	1.59	0.04	0.04	No
E4 Jamb	Independently assessed	12.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	6.24	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	28.64	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	6.72	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.04	0.04	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	15.66	0.00	0.00	No

Y-value 0.05 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500625
Configuration	1
Manufacturer SFP	0.63
Duct Type	Rigid
MVHR Efficiency	90.00
Wet Rooms	1
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

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

Summary for Input Data

22.0 Pressure Testing

Designed AP₅₀

Test Method

Yes

3.00

Blower Door

m³/(h.m²) @ 50 Pa

22.0 Lighting

No Fixed Lighting

No

Name
Lighting 1

Efficacy
75.00

Power
15.00

Capacity
1125.00

Count
5

24.0 Main Heating 1

None

25.0 Main Heating 2

None

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

SAP Code

Space and Water Combined

Calculated

1.50

2306

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water	232.00	100.00					
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating

None

28.0 Water Heating

Water Heating

SAP Code

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

Cold Water Source

Bath Count

Community Heating

901

No

No

No

No

No

Yes

From header tank

1

28.1 Showers

Description

Shower Type

Flow Rate
[l/min]

Rated Power
[kW]

Connected

Connected To

Shower

Combi boiler or unvented hot water system

8.00

No

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Insulation Type

Cylinder Volume

Loss

Internal Store

Measured Loss

180.00

1.20

L

kWh/day

32.0 Photovoltaic Unit

Export Capable Meter?

Connected To Dwelling

Diverter

Battery Capacity [kWh]

Multiple Dwellings – Not Connected

No

Yes

No

0.00

PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.24	South East	Horizontal	Modest		No	0.80		

Summary for Input Data



34.0 Small-scale Hydro

None

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Environmental	96 A	% DER < TER				62.87	
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Compliance Check	See BREL	% DFEE < TFEE				-0.75	
% DPER < TPER	26.25	DPER	55.60	TPER	75.39		
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.8900 (1b)	2.8000 (2b)	142.4920 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	142.4920 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (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	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	18.1400	8.3400	9.8000	0.1500	1.4700	70.0000	686.0000 (29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824	70.0000	2637.5999 (29a)
Total net area of external elements Aum(A, m ²)			58.2400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.2220		(33)
Main dwelling							
Party Wall 1			21.9200	0.0000	0.0000	70.0000	1534.4000 (32)
Party Floor 1			50.8900			40.0000	2035.6000 (32d)
Party Ceiling 1			50.8900			30.0000	1526.7000 (32b)
Internal Wall 1			113.4300			9.0000	1020.8700 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9441.1699 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							185.5211 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E3 Sill	1.5900	0.0400	0.0636
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	6.2400	0.0500	0.3120
E7 Party floor between dwellings (in blocks of flats)	28.6400	0.0360	1.0310
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0500	0.3360
E16 Corner (normal)	2.8000	0.0500	0.1400
E16 Corner (normal)	2.8000	0.0360	0.1008
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0360	0.1008
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.6600	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			2.9822 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss		(33) + (36) + (36a) =	23.2043 (37)

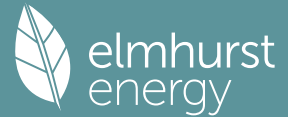
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	11.4367	11.3001	11.1634	10.4801	10.3434	9.6602	9.6602	9.5235	9.9335	10.3434	10.6168	10.8901	(38)
Average = Sum(39)m / 12 =	34.6410	34.5043	34.3677	33.6844	33.5477	32.8644	32.8644	32.7278	33.1377	33.5477	33.8210	34.0943	(39)
												33.6502	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.6807	0.6780	0.6753	0.6619	0.6592	0.6458	0.6458	0.6431	0.6512	0.6592	0.6646	0.6700	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													1.7163 (42)
Hot water usage for mixer showers													
Hot water usage for baths	51.6577	50.8668	49.7013	47.9083	46.3018	44.0544	42.2768	44.3549	45.4001	47.6261	49.9443	51.6111	(42a)
Hot water usage for other uses	22.4027	22.0645	21.5834	20.8630	20.2136	19.3198	18.6417	19.4709	19.9061	20.7918	21.7126	22.3850	(42b)
Average daily hot water use (litres/day)	32.2069	31.0357	29.8646	28.6934	27.5223	26.3511	26.3511	27.5223	28.6934	29.8646	31.0357	32.2069	(42c)
												97.6760	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	106.2673	103.9671	101.1493	97.4647	94.0377	89.7253	87.2696	91.3481	93.9996	98.2825	102.6926	106.2030	(44)
Energy content (annual)	156.4439	137.5695	144.5403	127.3132	121.1771	103.7643	96.4354	107.5183	109.0349	126.6469	138.7925	155.9669	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU loss):	23.4666	20.6354	21.6810	19.0970	18.1766	15.5646	14.4653	16.1278	16.3552	18.9970	20.8189	23.3950	(46)
Store volume													110.0000 (47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)													0.0152 (51)
Volume factor from Table 2a													1.0294 (52)
Temperature factor from Table 2b													0.6000 (53)
Enter (49) or (54) in (55)													1.0327 (55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	211.7207	187.4970	199.8171	180.8069	176.4539	157.2580	151.7122	162.7951	162.5285	181.9237	192.2862	211.2437	(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	211.7207	187.4970	199.8171	180.8069	176.4539	157.2580	151.7122	162.7951	162.5285	181.9237	192.2862	211.2437	(64)
12Total per year (kWh/year)													2176.0430 (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)
													0.0000 (64a)
Heat gains from water heating, kWh/month	96.2390	85.6838	92.2811	85.1266	84.5128	77.2966	76.2862	79.9713	79.0490	86.3315	88.9434	96.0804	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	78.3269	86.7191	78.3269	80.9378	78.3269	80.9378	78.3269	78.3269	80.9378	78.3269	80.9378	78.3269	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.5452	151.0970	147.1865	138.8615	128.3526	118.4758	111.8775	110.3257	114.2362	122.5612	133.0700	142.9469	(68)
Pumps, fans	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	(69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Water heating gains (Table 5)	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	(71)
Total internal gains	129.3535	127.5057	124.0337	118.2314	113.5925	107.3563	102.5352	107.4883	109.7903	116.0370	123.5326	129.1404	(72)
	405.9706	414.0667	398.2921	386.7756	369.0170	355.5149	341.4846	344.8858	353.7092	365.6700	386.2853	399.1591	(73)

6. Solar gains													
[Jan]													
	Area	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	W/m2	Specific data	factor	W							
				or Table 6b	Table 6d								
Southwest	8.3400	36.7938	0.3500	0.7000	0.7700	52.1003	(79)						

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Solar gains	52.1003	88.7461	121.4263	150.4531	168.5200	167.3014	161.2964	147.8176	131.4790	98.0834	62.4042	44.5870 (83)
Total gains	458.0709	502.8128	519.7184	537.2287	537.5370	522.8162	502.7809	492.7034	485.1883	463.7534	448.6895	443.7461 (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	75.7065	76.0063	76.3086	77.8565	78.1737	79.7990	79.7990	80.1322	79.1408	78.1737	77.5419	76.9203
alpha	6.0471	6.0671	6.0872	6.1904	6.2116	6.3199	6.3199	6.3421	6.2761	6.2116	6.1695	6.1280
util living area	0.9371	0.8975	0.8402	0.7203	0.5719	0.4015	0.2875	0.3054	0.4690	0.7158	0.8798	0.9437 (86)
MIT	20.5576	20.6908	20.8170	20.9386	20.9864	20.9988	20.9999	20.9998	20.9968	20.9495	20.7757	20.5422 (87)
Th 2	20.3579	20.3603	20.3627	20.3746	20.3770	20.3890	20.3890	20.3914	20.3842	20.3770	20.3722	20.3674 (88)
util rest of house	0.9268	0.8826	0.8190	0.6905	0.5360	0.3635	0.2476	0.2651	0.4280	0.6810	0.8607	0.9344 (89)
MIT 2	19.8570	20.0190	20.1692	20.3150	20.3656	20.3882	20.3889	20.3913	20.3819	20.3304	20.1328	19.8465 (90)
Living area fraction	20.2573	20.4029	20.5394	20.6713	20.7203	20.7371	20.7380	20.7390	20.7333	20.6842	20.5001	20.2441 (92)
MIT	20.2573	20.4029	20.5394	20.6713	20.7203	20.7371	20.7380	20.7390	20.7333	20.6842	20.5001	20.2441 (93)
Temperature adjustment												0.0000
adjusted MIT	20.2573	20.4029	20.5394	20.6713	20.7203	20.7371	20.7380	20.7390	20.7333	20.6842	20.5001	20.2441 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9251	0.8836	0.8251	0.7048	0.5559	0.3852	0.2704	0.2881	0.4513	0.6985	0.8648	0.9324 (94)
Useful gains	423.7548	444.3016	428.8102	378.6543	298.8237	201.3911	135.9686	141.9686	218.9731	323.9229	388.0229	413.7524 (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	552.7779	534.9161	482.5004	396.5101	302.6118	201.6925	135.9941	142.0064	219.8112	338.3024	453.2062	547.0120 (97)
Space heating kWh	95.9931	60.8929	39.9455	12.8562	2.8184	0.0000	0.0000	0.0000	0.0000	10.6984	46.9320	99.1452 (98a)
Space heating requirement - total per year (kWh/year)												369.2817
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	95.9931	60.8929	39.9455	12.8562	2.8184	0.0000	0.0000	0.0000	0.0000	10.6984	46.9320	99.1452 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												369.2817
Space heating per m2										(98c) / (4) =		7.2565 (99)

9b. Energy requirements

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (301)
Fraction of space heat from community system												1.0000 (302)
Fraction of heat from community Heat pump-Space and Water												1.0000 (303a)
Factor for control and charging method (Table 4c(3)) for space heating												1.0000 (305)
Factor for charging method (Table 4c(3)) for water heating												1.0000 (305a)
Distribution loss factor (Table 12c) for community heating system												1.5000 (306)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating:												
Space heating requirement	95.9931	60.8929	39.9455	12.8562	2.8184	0.0000	0.0000	0.0000	0.0000	10.6984	46.9320	99.1452 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	143.9897	91.3394	59.9183	19.2843	4.2276	0.0000	0.0000	0.0000	0.0000	16.0476	70.3979	148.7178
Space heating requirement	143.9897	91.3394	59.9183	19.2843	4.2276	0.0000	0.0000	0.0000	0.0000	16.0476	70.3979	148.7178 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement	211.7207	187.4970	199.8171	180.8069	176.4539	157.2580	151.7122	162.7951	162.5285	181.9237	192.2862	211.2437 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	317.5810	281.2454	299.7257	271.2104	264.6809	235.8870	227.5683	244.1927	243.7928	272.8855	288.4293	316.8655
Water heating fuel	317.5810	281.2454	299.7257	271.2104	264.6809	235.8870	227.5683	244.1927	243.7928	272.8855	288.4293	316.8655 (310)
Cooling System Energy Efficiency Ratio												0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	11.6271	10.5019	11.6271	11.2520	11.6271	11.2520	11.6271	11.6271	11.2520	11.6271	11.2520	11.6271 (311)
Lighting	16.6518	13.3587	12.0280	8.8122	6.8068	5.5612	6.2094	8.0712	10.4837	13.7552	15.5365	17.1146 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.6444	-4.7054	-8.7052	-12.2907	-15.4050	-15.2111	-14.8934	-12.7967	-9.5945	-6.1466	-3.1787	-2.1579 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335a)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (333b)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(334b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (334b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)												
(335b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (335b)
Annual totals kWh/year												
Space heating fuel - community heating												553.9225 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3264.0645 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												5.5392 (313)
Space cooling fuel												0.0000 (321)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)												
mechanical ventilation fans (SFP = 0.7875)												136.8992 (330a)
Total electricity for the above, kWh/year												136.8992 (331)
Electricity for lighting (calculated in Appendix L)												134.3895 (332)

Energy saving/generation technologies (Appendices M ,N and Q)

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PV generation	-107.7295 (333)
Wind generation	0.0000 (334)
Hydro-electric generation (Appendix N)	0.0000 (335a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (335)
Appendix Q - special features	
Energy saved or generated	-0.0000 (336)
Energy used	0.0000 (337)
Total delivered energy for all uses	3981.5462 (338)

12b. Carbon dioxide emissions - Community heating scheme

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Efficiency of heat source Heat pump			232.0000 (367)
Space and Water heating from Heat pump	1645.6841	0.1582	37.7678 (367)
Electrical energy for heat distribution (space & water)	5.5392	0.0000	5.4694 (372)
Overall CO2 factor for heat network			0.0632 (386)
Total CO2 associated with community systems			241.2187 (373)
Space and water heating			241.2187 (376)
Pumps, fans and electric keep-hot	136.8992	0.1387	18.9896 (378)
Energy for lighting	134.3895	0.1443	19.3966 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.7295	0.1305	-14.0567
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.0567 (380)
Total CO2, kg/year			265.5482 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2200 (384)

13b. Primary energy - Community heating scheme

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Efficiency of heat source Heat pump			232.0000 (467a)
Space and Water heating from Heat pump	1645.6841	1.5856	378.5677 (467)
Electrical energy for heat distribution (space & water)	5.5392	0.0000	58.4070 (472)
Overall CO2 factor for heat network			0.6747 (486)
Total CO2 associated with community systems			2575.9491 (473)
Space and water heating			2575.9491 (476)
Pumps, fans and electric keep-hot	136.8992	1.5128	207.1011 (478)
Energy for lighting	134.3895	1.5338	206.1311 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.7295	1.4820	-159.6549
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-159.6549 (480)
Total Primary energy kWh/year			2829.5264 (483)
Dwelling Primary energy Rate (DPER)			55.6000 (484)

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	50.8900 (1b)	x 2.8000 (2b)	= 142.4920 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 142.4920 (5)

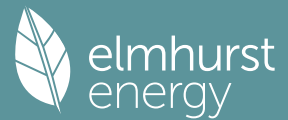
2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1404 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3904	(18)
Number of sides sheltered		3	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =		0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =		0.3025 (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												

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Effective ac	0.3857	0.3782	0.3706	0.3328	0.3252	0.2874	0.2874	0.2798	0.3025	0.3252	0.3403	0.3555 (22b)
	0.5744	0.5715	0.5687	0.5554	0.5529	0.5413	0.5413	0.5392	0.5458	0.5529	0.5579	0.5632 (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			2.4200	1.0000	2.4200		(26)
TER Opening Type			8.3400	1.1450	9.5496		(27)
External Wall 1	18.1400	8.3400	9.8000	0.1800	1.7640		(29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824		(29a)
Total net area of external elements Aum(A, m2)			58.2400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26) ... (30) + (32) =	20.5160	(33)
Main dwelling							
Party Wall 1			21.9200	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							185.5211 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				5.0800	0.0500	0.2540	
E3 Sill				1.5900	0.0500	0.0795	
E4 Jamb				12.6000	0.0500	0.6300	
E7 Party floor between dwellings (in blocks of flats)				6.2400	0.0700	0.4368	
E7 Party floor between dwellings (in blocks of flats)				28.6400	0.0700	2.0048	
E9 Balcony between dwellings, wall insulation continuous				6.7200	0.0200	0.1344	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E18 Party wall between dwellings				2.8000	0.0600	0.1680	
E18 Party wall between dwellings				2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				15.6600	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							4.3795 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	24.8955 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	27.0092	26.8734	26.7403	26.1149	25.9979	25.4532	25.4532	25.3523	25.6630	25.9979	26.2346	26.4820 (38)
Average = Sum(39)m / 12 =	51.9047	51.7689	51.6358	51.0104	50.8934	50.3487	50.3487	50.2478	50.5585	50.8934	51.1301	51.3776 (39)
												51.0098
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0199	1.0173	1.0147	1.0024	1.0001	0.9894	0.9894	0.9874	0.9935	1.0001	1.0047	1.0096 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7163 (42)
Hot water usage for mixer showers												
Hot water usage for baths	52.9967	52.2002	51.0397	48.8191	47.1804	45.3530	44.3142	45.4660	46.7286	48.6907	50.9589	52.7936 (42a)
Hot water usage for other uses	22.9135	22.5732	22.0940	21.2104	20.5488	19.8152	19.4189	19.8948	20.4129	21.1979	22.0997	22.8361 (42b)
Average daily hot water use (litres/day)	32.2069	31.0357	29.8646	28.6934	27.5223	26.3511	26.3511	27.5223	28.6934	29.8646	31.0357	32.2069 (42c)
												99.3846 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	108.1171	105.8092	102.9983	98.7230	95.2515	91.5193	90.0843	92.8831	95.8349	99.7532	104.0944	107.8366 (44)
Energy content (annual)	171.2310	150.6709	158.3045	135.1468	128.2268	112.5336	108.9491	115.0087	118.1740	135.3642	148.3015	168.8460 (45)
Distribution loss (46)m = 0.15 x (45)m	25.6847	22.6006	23.7457	20.2720	19.2340	16.8800	16.3424	17.2513	17.7261	20.3046	22.2452	25.3269 (46)
Water storage loss (or HIU loss):												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	220.4737	195.1481	207.5472	182.8010	177.4695	160.1878	158.1918	164.2513	165.8282	184.6069	195.9557	218.0887 (62)
WWHRS	-24.2279	-21.4273	-22.4374	-18.5791	-17.3151	-14.8166	-13.8882	-14.7687	-15.3298	-18.0722	-20.4736	-23.7792 (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	196.2458	173.7208	185.1097	164.2219	160.1545	145.3712	144.3036	149.4826	150.4984	166.5347	175.4821	194.3095 (64)
Total per year (kWh/year)												2005.4349 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	96.3285	85.6799	92.0304	83.0597	82.0296	75.5408	75.6197	77.6345	77.4162	84.4027	87.4336	95.5354 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	78.3269	86.7191	78.3269	80.9378	78.3269	80.9378	78.3269	78.3269	80.9378	78.3269	80.9378	78.3269 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	149.5452	151.0970	147.1865	138.8615	128.3526	118.4758	111.8775	110.3257	114.2362	122.5612	133.0700	142.9469 (68)

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Pumps, fans	31.5816 3.0000	31.5816 3.0000	31.5816 3.0000	31.5816 3.0000	31.5816 3.0000	31.5816 0.0000	31.5816 0.0000	31.5816 0.0000	31.5816 0.0000	31.5816 3.0000	31.5816 3.0000	31.5816 (69) 3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531 (71)
Water heating gains (Table 5)	129.4737	127.4998	123.6967	115.3607	110.2548	104.9178	101.6394	104.3475	107.5225	113.4445	121.4356	128.4078 (72)
Total internal gains	409.0908	417.0608	400.9551	386.9049	368.6793	353.0763	340.5887	341.7450	351.4415	366.0776	387.1884	401.4266 (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	
Southwest	8.3400				36.7938		0.6300		0.7000		0.7700		93.7806 (79)	
Solar gains	93.7806	159.7430	218.5674	270.8156	303.3360	301.1424	290.3334	266.0717	236.6622	176.5501	112.3275	80.2566 (83)		
Total gains	502.8713	576.8038	619.5224	657.7204	672.0153	654.2187	630.9222	607.8167	588.1037	542.6276	499.5159	481.6832 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	50.5262	50.6587	50.7893	51.4120	51.5302	52.0877	52.0877	52.1922	51.8715	51.5302	51.2917	51.0446
alpha	4.3684	4.3772	4.3860	4.4275	4.4353	4.4725	4.4725	4.4795	4.4581	4.4353	4.4194	4.4030
util living area	0.9589	0.9287	0.8824	0.7889	0.6526	0.4818	0.3490	0.3772	0.5682	0.8057	0.9266	0.9646 (86)
MIT	19.9511	20.1873	20.4483	20.7307	20.9048	20.9807	20.9963	20.9948	20.9597	20.7477	20.3216	19.9106 (87)
Th 2	20.0667	20.0690	20.0711	20.0814	20.0833	20.0922	20.0922	20.0939	20.0888	20.0833	20.0794	20.0754 (88)
util rest of house	0.9504	0.9150	0.8608	0.7534	0.6011	0.4174	0.2780	0.3043	0.5015	0.7653	0.9103	0.9572 (89)
MIT 2	18.8755	19.1674	19.4843	19.8184	20.0035	20.0801	20.0907	20.0916	20.0612	19.8464	19.3457	18.8316 (90)
Living area fraction									fLA = Living area / (4) =			0.5714 (91)
MIT	19.4901	19.7502	20.0352	20.3397	20.5186	20.5947	20.6082	20.6077	20.5746	20.3614	19.9034	19.4482 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4901	19.7502	20.0352	20.3397	20.5186	20.5947	20.6082	20.6077	20.5746	20.3614	19.9034	19.4482 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9442	0.9097	0.8599	0.7639	0.6262	0.4534	0.3185	0.3458	0.5377	0.7783	0.9068	0.9512 (94)
Ext temp.	474.8245	524.7422	532.6994	502.4321	420.8098	296.6416	200.9684	210.2084	316.2421	422.3301	452.9375	458.1916 (95)
Heat loss rate W	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)
Space heating kWh	788.4399	768.7788	698.8997	583.5448	448.8062	301.8272	201.8085	211.4289	327.3483	496.7923	654.6370	783.4132 (97)
Space heating requirement - total per year (kWh/year)	233.3299	163.9927	123.6530	58.4012	20.8293	0.0000	0.0000	0.0000	0.0000	55.3999	145.2236	241.9649 (98a)
Solar heating kWh												1042.7944
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	233.3299	163.9927	123.6530	58.4012	20.8293	0.0000	0.0000	0.0000	0.0000	55.3999	145.2236	241.9649 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1042.7944
Space heating per m2										(98c) / (4) =		20.4911 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	233.3299	163.9927	123.6530	58.4012	20.8293	0.0000	0.0000	0.0000	0.0000	55.3999	145.2236	241.9649 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	252.7951	177.6735	133.9686	63.2732	22.5670	0.0000	0.0000	0.0000	0.0000	60.0216	157.3387	262.1505 (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	196.2458	173.7208	185.1097	164.2219	160.1545	145.3712	144.3036	149.4826	150.4984	166.5347	175.4821	194.3095 (64)
Efficiency of water heater (217)m	84.4489	83.9307	83.1760	81.9797	80.7418	79.8000	79.8000	79.8000	79.8000	81.8713	83.6385	79.8000 (216)
Fuel for water heating, kWh/month	232.3840	206.9812	222.5517	200.3204	198.3538	182.1694	180.8316	187.3216	188.5945	203.4103	209.8101	84.5528 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	16.2748	13.0562	11.7557	8.6127	6.6527	5.4353	6.0688	7.8885	10.2464	13.4438	15.1847	16.7271 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-11.3902	-17.1431	-26.2907	-31.6122	-35.9305	-34.2352	-33.8370	-31.0302	-26.4036	-20.4977	-12.9073	-9.7263 (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)												

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(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	-3.5124	-7.6001	-15.5042	-23.8786	-32.1537	-32.5054	-32.1051	-26.9007	-19.3627	-11.0406	-4.7450	-2.7609	(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												1129.7881	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2442.5370	(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)												131.3469	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-503.0731	(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												3286.5988	(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	1129.7881	0.2100	237.2555	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2442.5370	0.2100	512.9328	(264)
Space and water heating			750.1883	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	131.3469	0.1443	18.9574	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-291.0039	0.1332	-38.7682	
PV Unit electricity exported	-212.0693	0.1252	-26.5472	
Total			-65.3154	(269)
Total CO2, kg/year			715.7596	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.0600	(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	1129.7881	1.1300	1276.6605	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2442.5370	1.1300	2760.0668	(278)
Space and water heating			4036.7274	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	131.3469	1.5338	201.4642	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-291.0039	1.4923	-434.2617	
PV Unit electricity exported	-212.0693	0.4595	-97.4395	
Total			-531.7012	(283)
Total Primary energy kWh/year			3836.5912	(286)
Target Primary Energy Rate (TPER)			75.3900	(287)

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Plot Reference	A 203			Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref			
Plot Address				SAP Version	10.2
SAP Rating	83 B	DER	5.22	TER	14.06
Environmental	96 A	% DER < TER			62.87
CO ₂ Emissions (t/year)	0.25	DFEE	28.78	TFEE	28.57
Compliance Check	See BREL	% DFEE < TFEE			-0.75
% DPER < TPER	26.25	DPER	55.60	TPER	75.39
Assessor Details	Mr. Robert Tanner			Assessor ID	W344-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	50.8900 (1b)	2.8000 (2b)	142.4920 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8900		142.4920 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	142.4920 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1404 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2904 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2250 (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	0.2869	0.2813	0.2757	0.2475	0.2419	0.2138	0.2138	0.2082	0.2250	0.2419	0.2532	0.2644 (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	0.5412	0.5396	0.5380	0.5306	0.5293	0.5229	0.5229	0.5217	0.5253	0.5293	0.5320	0.5350 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
External Wall 1	18.1400	8.3400	9.8000	0.1500	1.4700	70.0000	686.0000 (29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824	70.0000	2637.5999 (29a)
Total net area of external elements Aum(A, m ²)			58.2400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	20.2220		(33)
Main dwelling							
Party Wall 1			21.9200	0.0000	0.0000	70.0000	1534.4000 (32)
Party Floor 1			50.8900			40.0000	2035.6000 (32a)
Party Ceiling 1			50.8900			30.0000	1526.7000 (32b)
Internal Wall 1			113.4300			9.0000	1020.8700 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	9441.1699 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							185.5211 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				5.0800	0.0500	0.2540	
E3 Sill				1.5900	0.0400	0.0636	

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	25.4466	25.3714	25.2977	24.9517	24.8870	24.5857	24.5857	24.5298	24.7017	24.8870	25.0180	25.1549 (38)
Heat transfer coeff												
	48.6508	48.5757	48.5020	48.1560	48.0913	47.7899	47.7899	47.7341	47.9060	48.0913	48.2222	48.3591 (39)
Average = Sum(39)m / 12 =												48.1557
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9560	0.9545	0.9531	0.9463	0.9450	0.9391	0.9391	0.9380	0.9414	0.9450	0.9476	0.9503 (40)
HLP (average)												0.9463
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												1.7163 (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	22.4027	22.0645	21.5834	20.8630	20.2136	19.3198	18.6417	19.4709	19.9061	20.7918	21.7126	22.3850 (42b)
Hot water usage for other uses	32.2069	31.0357	29.8646	28.6934	27.5223	26.3511	26.3511	27.5223	28.6934	29.8646	31.0357	32.2069 (42c)
Average daily hot water use (litres/day)												50.0516 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	54.6096	53.1003	51.4480	49.5564	47.7359	45.6709	44.9928	46.9932	48.5995	50.6564	52.7483	54.5919 (44)
Energy content (annual)	80.3948	70.2624	73.5182	64.7330	61.5125	52.8169	49.7183	55.3118	56.3730	65.2758	71.2911	80.1722 (45)
Distribution loss (46)m = 0.15 x (45)m										Total =	Sum(45)m =	781.3802
Water storage loss (or HIU 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 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	68.3356	59.7231	62.4904	55.0231	52.2857	44.8943	42.2606	47.0150	47.9171	55.4845	60.5975	68.1463 (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	68.3356	59.7231	62.4904	55.0231	52.2857	44.8943	42.2606	47.0150	47.9171	55.4845	60.5975	68.1463 (64)
12Total per year (kWh/year)										Total per year (kWh/year) =	Sum(64)m =	664.1731 (64)
Electric shower(s)	42.4415	37.8157	41.2933	39.4057	40.1451	38.2946	39.5710	40.1451	39.4057	41.2933	40.5168	42.4415 (64a)
												482.7694 (64a)
Heat gains from water heating, kWh/month	27.6943	24.3847	25.9459	23.6072	23.1077	20.7972	20.4579	21.7900	21.8307	24.1944	25.2786	27.6470 (65)

6. Solar gains

7. Mean internal temperature (heating season)

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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	53.9055	53.9889	54.0709	54.4594	54.5327	54.8766	54.8766	54.9407	54.7436	54.5327	54.3846	54.2306
alpha	4.5937	4.5993	4.6047	4.6306	4.6355	4.6584	4.6584	4.6627	4.6496	4.6355	4.6256	4.6154
util living area	0.9857	0.9746	0.9567	0.9092	0.8154	0.6455	0.4823	0.5165	0.7298	0.9145	0.9730	0.9880 (86)
MIT	19.7492	19.9449	20.1928	20.5228	20.7884	20.9471	20.9889	20.9847	20.9043	20.5768	20.1129	19.7110 (87)
Th 2	20.1202	20.1214	20.1226	20.1283	20.1294	20.1344	20.1344	20.1353	20.1325	20.1294	20.1272	20.1250 (88)
util rest of house	0.9825	0.9689	0.9467	0.8875	0.7720	0.5725	0.3917	0.4253	0.6627	0.8899	0.9659	0.9852 (89)
MIT 2	18.9846	19.1780	19.4213	19.7405	19.9792	20.1064	20.1306	20.1298	20.0765	19.7965	19.3498	18.9506 (90)
Living area fraction									fLA = Living area /	(4) =		0.5714 (91)
MIT	19.4215	19.6162	19.8621	20.1876	20.4416	20.5868	20.6211	20.6183	20.5495	20.2424	19.7859	19.3851 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4215	19.6162	19.8621	20.1876	20.4416	20.5868	20.6211	20.6183	20.5495	20.2424	19.7859	19.3851 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9793	0.9649	0.9432	0.8892	0.7885	0.6117	0.4432	0.4770	0.6964	0.8934	0.9626	0.9823 (94)
Useful gains	358.3500	397.1523	406.1028	401.7144	358.7893	271.8181	189.5940	197.7233	282.5377	339.7187	346.7894	345.5309 (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	735.6738	714.8490	648.0896	543.5637	420.3935	286.1076	192.1675	201.3576	308.9718	463.7148	611.7403	734.3402 (97)
Space heating kWh	280.7289	213.4922	180.0382	102.1315	45.8335	0.0000	0.0000	0.0000	0.0000	92.2531	190.7647	289.2741 (98a)
Space heating requirement - total per year (kWh/year)												1394.5160
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	280.7289	213.4922	180.0382	102.1315	45.8335	0.0000	0.0000	0.0000	0.0000	92.2531	190.7647	289.2741 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1394.5160
Space heating per m2										(98c) / (4) =		27.4026 (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	449.2251	353.6453	362.7792	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8566	0.9187	0.9041	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	384.8253	324.8851	327.9947	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	489.4557	471.7527	457.6931	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	75.3339	109.2695	96.4956	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	18.8335	27.3174	24.1239	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												70.2748 (107)
Energy for space heating												27.4026 (99)
Energy for space cooling												1.3809 (108)
Total												28.7835 (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	50.8900 (1b)	x	142.4920 (1b) - (3b)
Ground floor		2.8000 (2b)	=
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.8900		142.4920 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	142.4920 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1404 (8)
Pressure test	Yes

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Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Blower Door
5.0000 (17)
0.3904 (18)
3 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = $1 - [0.075 \times (19)] = 0.7750$ (20)
(21) = (18) x (20) = 0.3025 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.3857	0.3782	0.3706	0.3328	0.3252	0.2874	0.2874	0.2798	0.3025	0.3252	0.3403	0.3555	(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	0.5744	0.5715	0.5687	0.5554	0.5529	0.5413	0.5413	0.5392	0.5458	0.5529	0.5579	0.5632	(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			2.4200	1.0000	2.4200			(26)
TER Opening Type			8.3400	1.1450	9.5496			(27)
External Wall 1	18.1400	8.3400	9.8000	0.1800	1.7640			(29a)
Corridor wall	40.1000	2.4200	37.6800	0.1800	6.7824			(29a)
Total net area of external elements Aum(A, m2)			58.2400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 20.5160			(33)
Main dwelling								
Party Wall 1			21.9200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							185.5211	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540	
E3 Sill	1.5900	0.0500	0.0795	
E4 Jamb	12.6000	0.0500	0.6300	
E7 Party floor between dwellings (in blocks of flats)	6.2400	0.0700	0.4368	
E7 Party floor between dwellings (in blocks of flats)	28.6400	0.0700	2.0048	
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0200	0.1344	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.6600	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.3795	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 24.8955	(37)

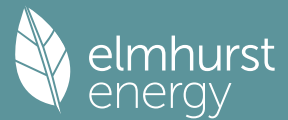
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	27.0092	26.8734	26.7403	26.1149	25.9979	25.4532	25.4532	25.3523	25.6630	25.9979	26.2346	26.4820	(38)
Heat transfer coeff	51.9047	51.7689	51.6358	51.0104	50.8934	50.3487	50.3487	50.2478	50.5585	50.8934	51.1301	51.3776	(39)
Average = Sum(39)m / 12 =												51.0098	
HLP	1.0199	1.0173	1.0147	1.0024	1.0001	0.9894	0.9894	0.9874	0.9935	1.0001	1.0047	1.0096	(40)
HLP (average)												1.0024	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7163	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.9135	22.5732	22.0940	21.2104	20.5488	19.8152	19.4189	19.8948	20.4129	21.1979	22.0997	22.8361	22.8361	(42b)
Hot water usage for other uses	32.2069	31.0357	29.8646	28.6934	27.5223	26.3511	26.3511	27.5223	28.6934	29.8646	31.0357	32.2069	32.2069	(42c)
Average daily hot water use (litres/day)													50.5235	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy content (annual)	55.1204	53.6090	51.9586	49.9039	48.0711	46.1663	45.7700	47.4171	49.1063	51.0625	53.1354	55.0430	55.0430	(44)
Distribution loss (46)m = 0.15 x (45)m	87.2973	76.3385	79.8584	68.3159	64.7129	56.7669	55.3549	58.7122	60.5530	69.2913	75.7012	86.1840	86.1840	(45)
Water storage loss (or HIU loss):										Total = Sum(45)m =		839.0865		
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
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	0.0000	(56)
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	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	74.2027	64.8877	67.8797	58.0685	55.0060	48.2518	47.0517	49.9054	51.4701	58.8976	64.3460	73.2564	73.2564	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
12Total per year (kWh/year)	74.2027	64.8877	67.8797	58.0685	55.0060	48.2518	47.0517	49.9054	51.4701	58.8976	64.3460	73.2564	73.2564	(64)
Electric shower(s)										Total per year (kWh/year) = Sum(64)m =		713.2235	713	(64)
	42.4415	37.8157	41.2933	39.4057	40.1451	38.2946	39.5710	40.1451	39.4057	41.2933	40.5168	42.4415	42.4415	(64a)
Heat gains from water heating, kWh/month													482.7694	(64a)
	29.1610	25.6759	27.2932	24.3686	23.7878	21.6366	21.6557	22.5126	22.7189	25.0477	26.2157	28.9245	28.9245	(65)

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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	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164	85.8164 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	78.3269	86.7191	78.3269	80.9378	78.3269	80.9378	78.3269	78.3269	80.9378	78.3269	80.9378	78.3269 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.5452	151.0970	147.1865	138.8615	128.3526	118.4758	111.8775	110.3257	114.2362	122.5612	133.0700	142.9469 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816	31.5816 (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)	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531	-68.6531 (71)
Water heating gains (Table 5)	39.1950	38.2081	36.6845	33.8452	31.9728	30.0508	29.1071	30.2589	31.5541	33.6663	36.4107	38.8770 (72)
Total internal gains	315.8120	324.7691	310.9428	302.3894	287.3973	278.2094	268.0564	267.6564	275.4730	283.2993	299.1635	308.8957 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Southwest	8.3400		36.7938		0.6300		0.7000		0.7700		93.7806 (79)	
Solar gains	93.7806	159.7430	218.5674	270.8156	303.3360	301.1424	290.3334	266.0717	236.6622	176.5501	112.3275	80.2566 (83)
Total gains	409.5926	484.5122	529.5102	573.2050	590.7333	579.3518	558.3898	533.7281	512.1352	459.8494	411.4910	389.1523 (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	50.5262	50.6587	50.7893	51.4120	51.5302	52.0877	52.0877	52.1922	51.8715	51.5302	51.2917	51.0446
alpha	4.3684	4.3772	4.3860	4.4275	4.4353	4.4725	4.4725	4.4795	4.4581	4.4353	4.4194	4.4030
util living area	0.9797	0.9588	0.9242	0.8446	0.7161	0.5375	0.3929	0.4272	0.6365	0.8684	0.9603	0.9833 (86)
MIT	19.7304	19.9933	20.2918	20.6355	20.8622	20.9703	20.9941	20.9914	20.9372	20.6440	20.1364	19.6865 (87)
Th 2	20.0667	20.0690	20.0711	20.0814	20.0833	20.0922	20.0922	20.0939	20.0888	20.0833	20.0794	20.0754 (88)
util rest of house	0.9751	0.9500	0.9082	0.8137	0.6651	0.4680	0.3137	0.3458	0.5666	0.8352	0.9503	0.9795 (89)
MIT 2	18.9242	19.1821	19.4708	19.7967	19.9908	20.0774	20.0903	20.0909	20.0542	19.8132	19.3333	18.8877 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.3849	19.6456	19.9400	20.2760	20.4888	20.5876	20.6068	20.6055	20.5587	20.2879	19.7922	19.3441 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.3849	19.6456	19.9400	20.2760	20.4888	20.5876	20.6068	20.6055	20.5587	20.2879	19.7922	19.3441 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9710	0.9453	0.9057	0.8207	0.6885	0.5065	0.3588	0.3921	0.6036	0.8433	0.9466	0.9758 (94)
Useful gains	397.7045	458.0164	479.5569	470.4475	406.7153	293.4596	200.3730	209.2930	309.1363	387.7821	389.5245	379.7222 (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	782.9779	763.3662	693.9839	580.2966	447.2904	301.4701	201.7351	211.3173	326.5443	493.0510	648.9548	778.0681 (97)
Space heating kWh	286.6435	205.1951	159.5337	79.0913	30.1879	0.0000	0.0000	0.0000	0.0000	78.3201	186.7898	296.3693 (98a)
Space heating requirement - total per year (kWh/year)	1322.1308											
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	286.6435	205.1951	159.5337	79.0913	30.1879	0.0000	0.0000	0.0000	0.0000	78.3201	186.7898	296.3693 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1322.1308											
Space heating per m ²	(98c) / (4) = 25.9802 (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	473.2779	372.5805	381.8836	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9191	0.9574	0.9467	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	434.9796	356.6968	361.5153	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	647.0592	624.1852	596.8834	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	152.6973	199.0114	175.1139	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	38.1743	49.7528	43.7785	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	131.7057 (107)											
Energy for space heating	25.9802 (99)											
Energy for space cooling	2.5880 (108)											
Total	28.5682 (109)											
Fabric Energy Efficiency (TFEE)	28.6 (109)											