

Summary for Input Data

Plot Reference	A 208		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	84 B	DER	4.31	TER	12.04
Environmental	97 A	% DER < TER			64.20
CO ₂ Emissions (t/year)	0.26	DFEE	23.66	TFEE	24.90
Compliance Check	See BREL	% DFEE < TFEE			4.98
% DPER < TPER	28.45	DPER	46.06	TPER	64.38

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

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

Orientation	Southwest	
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	178.96	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	15.68 m	64.69 m ²	2.80 m

8.0 Living Area	33.09	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	21.00	13.67	0.00	None	7.33	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	22.89	20.47	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	48.89	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	137.37

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	64.69

Description	Storey Index	Construction	Kappa (kJ/m ² K)	Area (m ²)
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Party Floor 1 Lowest occupied Precast concrete planks floor, screed, carpeted 40.00 64.69

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	South West	2.42	
Windows	Window	External Wall 1	North East	7.33	

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	4.41	0.05	0.05	No
E3 Sill	Independently assessed	0.91	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	8.28	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	16.35	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	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	2.80	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
E25 Staggered 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	34.92	0.00	0.00	No

Y-value 0.06 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

Summary for Input Data

21.0 Fixed Cooling System		No	
22.0 Pressure Testing		Yes	
Designed AP ₅₀	3.00	m ² /(h.m ²) @ 50 Pa	
Test Method	Blower Door		
22.0 Lighting		No	
No Fixed Lighting	No		
	Name	Efficacy	Power
	Lighting 1	75.00	15.00
			Capacity
			1125.00
			Count
			6
24.0 Main Heating 1		None	
25.0 Main Heating 2		None	
26.0 Heat Networks		Space and Water Combined	
Space Community Heating			
Distribution Loss	Calculated		
Distribution Loss Value	1.50		
SAP Code	2306		
	Heat Source	Fuel Type	Heating Use
	Heat source 1	Heat pump	Electricity
	Heat source 2	None	Space and Water
	Heat source 3	None	
	Heat source 4	None	
	Heat source 5	None	
			Efficiency
			232.00
			Percentage Of Heat
			100.00
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
27.0 Secondary Heating		None	
28.0 Water Heating		Community Heating	
Water Heating	Community Heating		
SAP Code	901		
Flue Gas Heat Recovery System	No		
Waste Water Heat Recovery Instantaneous System 1	No		
Waste Water Heat Recovery Instantaneous System 2	No		
Waste Water Heat Recovery Storage System	No		
Solar Panel	No		
Water use <= 125 litres/person/day	Yes		
Cold Water Source	From header tank		
Bath Count	1		
28.1 Showers			
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]
Shower	Combi boiler or unvented hot water system	8.00	
			Connected
			No
			Connected To
28.3 Waste Water Heat Recovery System			
29.0 Hot Water Cylinder		Internal Store	
Insulation Type	Measured Loss		
Cylinder Volume	180.00		
Loss	1.20		
			L
			kWh/day
32.0 Photovoltaic Unit		Multiple Dwellings – Not Connected	
Export Capable Meter?	No		
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

Summary for Input Data



0.31

South East

Horizontal

Modest

No

0.80

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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CO ₂ Emissions (t/year)	0.26	DFEE	23.66	TFEE	24.90
Compliance Check	See BREL	% DFEE < TFEE			4.98
% DPER < TPER	28.45	DPER	46.06	TPER	64.38
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	64.6900 (1b)	2.8000 (2b)	181.1320 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.6900		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	181.1320 (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			7.3300	1.1450	8.3931		(27)
External Wall 1	21.0000	7.3300	13.6700	0.1500	2.0505	70.0000	956.9000 (29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846	70.0000	1432.9000 (29a)
Total net area of external elements Aum(A, m ²)			43.8900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	16.5482	(33)
Main dwelling							
Party Wall 1			48.8900	0.0000	0.0000	70.0000	3422.3000 (32)
Party Floor 1			64.6900			40.0000	2587.6000 (32d)
Party Ceiling 1			64.6900			30.0000	1940.7000 (32b)
Internal Wall 1			137.3700			9.0000	1236.3300 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11576.7299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		178.9570 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	4.4100	0.0500	0.2205
E3 Sill	0.9100	0.0400	0.0364
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	8.2800	0.0500	0.4140
E7 Party floor between dwellings (in blocks of flats)	16.3500	0.0360	0.5886
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0500	0.3360
E16 Corner (normal)	2.8000	0.0360	0.1008
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E18 Party wall between dwellings	2.8000	0.0360	0.1008
E25 Staggered party wall between dwellings	2.8000	0.0360	0.1008
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	34.9200	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			2.6819 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	19.2301 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	14.5381	14.3643	14.1906	13.3220	13.1483	12.2797	12.2797	12.1060	12.6272	13.1483	13.4957	13.8432	(38)
Heat transfer coeff	33.7682	33.5945	33.4207	32.5522	32.3784	31.5099	31.5099	31.3361	31.8573	32.3784	32.7259	33.0733	(39)
Average = Sum(39)m / 12 =												32.5087	
HLP	0.5220	0.5193	0.5166	0.5032	0.5005	0.4871	0.4871	0.4844	0.4925	0.5005	0.5059	0.5113	(40)
HLP (average)												0.5025	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.1107 (42)
Hot water usage for mixer showers	58.1026	57.2131	55.9021	53.8854	52.0785	49.5507	47.5513	49.8887	51.0643	53.5680	56.1754	58.0502	(42a)
Hot water usage for baths	25.1827	24.8026	24.2618	23.4519	22.7220	21.7172	20.9549	21.8871	22.3763	23.3718	24.4069	25.1627	(42b)
Hot water usage for other uses	36.2454	34.9274	33.6094	32.2913	30.9733	29.6553	29.6553	30.9733	32.2913	33.6094	34.9274	36.2454	(42c)
Average daily hot water use (litres/day)												109.8668	(43)
Daily hot water use	119.5307	116.9430	113.7732	109.6286	105.7738	100.9232	98.1616	102.7491	105.7319	110.5492	115.5097	119.4583	(44)
Energy conte	175.9698	154.7392	162.5796	143.2024	136.3003	116.7143	108.4714	120.9376	122.6437	142.4538	156.1152	175.4333	(45)
Energy content (annual)										Total = Sum(45)m =		1715.5608	
Distribution loss (46)m = 0.15 x (45)m	26.3955	23.2109	24.3869	21.4804	20.4450	17.5071	16.2707	18.1406	18.3966	21.3681	23.4173	26.3150	(46)
Water storage loss (or HIU loss):													
Store volume												110.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												1.0294	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.0327	(55)
Total storage loss	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(56)
If cylinder contains dedicated solar storage	32.0144	28.9162	32.0144	30.9817	32.0144	30.9817	32.0144	32.0144	30.9817	32.0144	30.9817	32.0144	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	231.2466	204.6667	217.8564	196.6961	191.5771	170.2080	163.7482	176.2144	176.1374	197.7306	209.6089	230.7101	(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	231.2466	204.6667	217.8564	196.6961	191.5771	170.2080	163.7482	176.2144	176.1374	197.7306	209.6089	230.7101	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2366.4006	(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	102.7314	91.3927	98.2792	90.4097	89.5413	81.6025	80.2882	84.4332	83.5740	91.5873	94.7033	102.5530	(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	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.6645	115.8785	104.6645	108.1533	104.6645	108.1533	104.6645	104.6645	108.1533	104.6645	108.1533	104.6645	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	184.6018	186.5174	181.6902	171.4136	158.4413	146.2491	138.1040	136.1884	141.0156	151.2922	164.2645	176.4567	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	(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)	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	(71)
Water heating gains (Table 5)	138.0799	136.0011	132.0956	125.5691	120.3512	113.3367	107.9142	113.4855	116.0750	123.1013	131.5323	137.8401	(72)
Total internal gains	482.0062	493.0571	473.1104	459.7961	438.1170	422.3992	405.3427	408.9984	419.9039	433.7180	458.6102	473.6213	(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

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Northeast	7.3300				11.2829		0.3500		0.7000		0.7700		14.0419 (75)	
Solar gains	14.0419	28.5827	51.4969	84.5727	113.6823	121.1974	113.3776	90.3860	62.7498	34.9303	17.6683	11.4673	(83)	
Total gains	496.0481	521.6398	524.6073	544.3688	551.7993	543.5966	518.7204	499.3844	482.6537	468.6483	476.2785	485.0887	(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	95.2304	95.7229	96.2204	98.7879	99.3179	102.0556	102.0556	102.6214	100.9426	99.3179	98.2635	97.2312		
alpha	7.3487	7.3815	7.4147	7.5859	7.6212	7.8037	7.8037	7.8414	7.7295	7.6212	7.5509	7.4821		
util living area	0.9286	0.8960	0.8434	0.7052	0.5432	0.3709	0.2673	0.2886	0.4549	0.7012	0.8618	0.9328	(86)	
MIT	20.7411	20.8156	20.8942	20.9749	20.9966	20.9999	21.0000	21.0000	20.9993	20.9796	20.8881	20.7406	(87)	
Th 2	20.5007	20.5032	20.5056	20.5179	20.5204	20.5327	20.5327	20.5351	20.5277	20.5204	20.5154	20.5105	(88)	
util rest of house	0.9187	0.8828	0.8253	0.6807	0.5159	0.3438	0.2389	0.2595	0.4239	0.6728	0.8441	0.9233	(89)	
MIT 2	20.2068	20.2982	20.3925	20.4933	20.5174	20.5326	20.5327	20.5351	20.5272	20.5012	20.3958	20.2152	(90)	
Living area fraction									fLA = Living area / (4) =			0.5115	(91)	
MIT	20.4801	20.5629	20.6491	20.7396	20.7625	20.7716	20.7717	20.7729	20.7687	20.7459	20.6476	20.4839	(92)	
Temperature adjustment												0.0000		
adjusted MIT	20.4801	20.5629	20.6491	20.7396	20.7625	20.7716	20.7717	20.7729	20.7687	20.7459	20.6476	20.4839	(93)	

8. Space heating requirement														

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9182	0.8845	0.8307	0.6921	0.5297	0.3577	0.2534	0.2744	0.4397	0.6863	0.8491	0.9228	(94)	
Useful gains	455.4814	461.3777	435.8046	376.7629	292.3090	194.4254	131.4480	137.0264	212.2377	321.6367	404.3972	447.6373	(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	546.3717	526.1860	472.8743	385.4049	293.4298	194.4664	131.4502	137.0303	212.4471	328.5090	443.3580	538.5640	(97)	
Space heating kWh	67.6223	43.5512	27.5799	6.2223	0.8339	0.0000	0.0000	0.0000	0.0000	5.1130	28.0518	67.6495	(98a)	
Space heating requirement - total per year (kWh/year)												246.6239		
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	67.6223	43.5512	27.5799	6.2223	0.8339	0.0000	0.0000	0.0000	0.0000	5.1130	28.0518	67.6495	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												246.6239		
Space heating per m2										(98c) / (4) =		3.8124	(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														
	67.6223	43.5512	27.5799	6.2223	0.8339	0.0000	0.0000	0.0000	0.0000	5.1130	28.0518	67.6495	(98)	
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50														
307a	101.4335	65.3268	41.3698	9.3334	1.2508	0.0000	0.0000	0.0000	0.0000	7.6695	42.0777	101.4742		
Space heating requirement	101.4335	65.3268	41.3698	9.3334	1.2508	0.0000	0.0000	0.0000	0.0000	7.6695	42.0777	101.4742	(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														
	231.2466	204.6667	217.8564	196.6961	191.5771	170.2080	163.7482	176.2144	176.1374	197.7306	209.6089	230.7101	(64)	
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50														
310a	346.8700	307.0000	326.7846	295.0441	287.3656	255.3120	245.6223	264.3215	264.2061	296.5960	314.4134	346.0652		
Water heating fuel	346.8700	307.0000	326.7846	295.0441	287.3656	255.3120	245.6223	264.3215	264.2061	296.5960	314.4134	346.0652	(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	14.7800	13.3497	14.7800	14.3032	14.7800	14.3032	14.7800	14.7800	14.3032	14.7800	14.3032	14.7800	(331)	
Lighting	22.7374	18.2408	16.4238	12.0328	9.2945	7.5937	8.4787	11.0210	14.3152	18.7823	21.2145	23.3694	(332)	
Electricity generated by PVs (Appendix M) (negative quantity)														
(333a)m	-3.4062	-6.0529	-11.1793	-15.7523	-19.7096	-19.4462	-19.0413	-16.3795	-12.3031	-7.8993	-4.0922	-2.7802	(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												369.9358	(307)	
Space heating fuel - secondary												0.0000	(309)	
Water heating fuel - community heating												3549.6009	(310)	
Efficiency of water heater												0.0000	(311)	
Electricity used for heat distribution												3.6994	(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)													174.0226 (330a)	
Total electricity for the above, kWh/year													174.0226 (331)	
Electricity for lighting (calculated in Appendix L)													183.5042 (332)	

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

PV generation	-138.0421 (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	4139.0213 (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	1689.4555	0.1588	25.3243 (367)
Electrical energy for heat distribution (space & water)	3.6994	0.0000	5.5849 (372)
Overall CO2 factor for heat network			0.0628 (386)
Total CO2 associated with community systems			246.3154 (373)
Space and water heating			246.3154 (376)
Pumps, fans and electric keep-hot	174.0226	0.1387	24.1391 (378)
Energy for lighting	183.5042	0.1443	26.4853 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-138.0421	0.1305	-18.0164
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-18.0164 (380)
Total CO2, kg/year			278.9234 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.3100 (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	1689.4555	1.5879	253.2011 (467)
Electrical energy for heat distribution (space & water)	3.6994	0.0000	59.8487 (472)
Overall CO2 factor for heat network			0.6734 (486)
Total CO2 associated with community systems			2639.5340 (473)
Space and water heating			2639.5340 (476)
Pumps, fans and electric keep-hot	174.0226	1.5128	263.2613 (478)
Energy for lighting	183.5042	1.5338	281.4648 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-138.0421	1.4821	-204.5946
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-204.5946 (480)
Total Primary energy kWh/year			2979.6656 (483)
Dwelling Primary energy Rate (DPER)			46.0600 (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			
Ground floor	64.6900 (1b)	x 2.8000 (2b)	= 181.1320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.1320 (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) =	0.1104 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3604	(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) =	0.2793	(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)

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Adj infilt rate	0.3561	0.3492	0.3422	0.3073	0.3003	0.2654	0.2654	0.2584	0.2793	0.3003	0.3142	0.3282 (22b)
Effective ac	0.5634	0.5610	0.5585	0.5472	0.5451	0.5352	0.5352	0.5334	0.5390	0.5451	0.5494	0.5539 (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			7.3300	1.1450	8.3931		(27)
External Wall 1	21.0000	7.3300	13.6700	0.1800	2.4606		(29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846		(29a)
Total net area of external elements Aum(A, m2)			43.8900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.9583		(33)
Main dwelling							
Party Wall 1			48.8900	0.0000	0.0000		(32)

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

178.9570 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	4.4100	0.0500	0.2205
E3 Sill	0.9100	0.0500	0.0455
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	8.2800	0.0700	0.5796
E7 Party floor between dwellings (in blocks of flats)	16.3500	0.0700	1.1445
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0200	0.1344
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	34.9200	0.0000	0.0000

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

3.4265 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 20.3848 (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	33.6774	33.5302	33.3859	32.7083	32.5815	31.9912	31.9912	31.8819	32.2186	32.5815	32.8380	33.1061 (38)
Heat transfer coeff	54.0623	53.9151	53.7708	53.0931	52.9663	52.3761	52.3761	52.2668	52.6034	52.9663	53.2228	53.4910 (39)
Average = Sum(39)m / 12 =												53.0925

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.8357	0.8334	0.8312	0.8207	0.8188	0.8096	0.8096	0.8080	0.8132	0.8188	0.8227	0.8269 (40)
HLP (average)												0.8207
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.1107 (42)
Hot water usage for mixer showers	59.6086	58.7128	57.4075	54.9099	53.0667	51.0113	49.8430	51.1385	52.5585	54.7655	57.3167	59.3802 (42a)	
Hot water usage for baths	25.7569	25.3744	24.8357	23.8425	23.0987	22.2741	21.8286	22.3636	22.9460	23.8284	24.8421	25.6698 (42b)	
Hot water usage for other uses	36.2454	34.9274	33.6094	32.2913	30.9733	29.6553	29.6553	30.9733	32.2913	33.6094	34.9274	36.2454 (42c)	
Average daily hot water use (litres/day)												111.7882 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	121.6109	119.0145	115.8525	111.0437	107.1388	102.9407	101.3269	104.4753	107.7959	112.2032	117.0861	121.2954 (44)	
Energy content (annual)	192.6019	169.4751	178.0610	152.0133	144.2294	126.5776	122.5461	129.3623	132.9231	152.2587	166.8106	189.9193 (45)	
Distribution loss (46)m = 0.15 x (45)m	28.8903	25.4213	26.7091	22.8020	21.6344	18.9866	18.3819	19.4043	19.9385	22.8388	25.0216	28.4879 (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													
241.8446	213.9524	227.3036	199.6675	193.4721	174.2318	171.7888	178.6050	180.5773	201.5014	214.4648	239.1620 (62)		
WWHRS	-27.2506	-24.1000	-25.2368	-20.8971	-19.4753	-16.6652	-15.6209	-16.6113	-17.2424	-20.3269	-23.0279	-26.7459 (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	214.5940	189.8518	202.0669	178.7704	173.9968	157.5666	156.1679	161.9937	163.3348	181.1745	191.4369	212.4161 (64)	
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2183.3703 (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	103.4343	91.9323	98.5994	88.6678	87.3504	80.2104	80.1407	82.4071	82.3203	90.0202	93.5879	102.5423 (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	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
104.6645	115.8785	104.6645	108.1533	104.6645	108.1533	104.6645	104.6645	104.6645	108.1533	104.6645	108.1533	104.6645 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												

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Cooking gains	184.6018	186.5174	181.6902	171.4136	158.4413	146.2491	138.1040	136.1884	141.0156	151.2922	164.2645	176.4567 (68)
Pumps, fans	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534 (69)
Losses e.g. evaporation	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)
Water heating gains (Table 5)	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268 (71)
Total internal gains	139.0246	136.8040	132.5261	123.1497	117.4065	111.4033	107.7160	110.7622	114.3337	120.9948	129.9832	137.8257 (72)
	485.9509	496.8600	476.5408	460.3766	438.1723	420.4658	405.1445	406.2752	418.1627	434.6116	460.0611	476.6069 (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

Northeast					7.3300	11.2829	0.6300	0.7000			0.7700			25.2754 (75)

Solar gains	25.2754	51.4488	92.6944	152.2308	204.6281	218.1552	204.0798	162.6947	112.9496	62.8745	31.8030	20.6412	(83)	
Total gains	511.2263	548.3088	569.2352	612.6075	642.8004	638.6210	609.2243	568.9699	531.1123	497.4861	491.8641	497.2481	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	59.4825	59.6449	59.8049	60.5683	60.7133	61.3975	61.3975	61.5259	61.1321	60.7133	60.4207	60.1178
util living area	4.9655	4.9763	4.9870	5.0379	5.0476	5.0932	5.0932	5.1017	5.0755	5.0476	5.0280	5.0079
	0.9734	0.9600	0.9337	0.8536	0.7079	0.5153	0.3766	0.4195	0.6486	0.8741	0.9529	0.9763 (86)
MIT	20.0649	20.2111	20.4266	20.7231	20.9130	20.9858	20.9976	20.9960	20.9571	20.7312	20.3724	20.0444 (87)
Th 2	20.2225	20.2244	20.2264	20.2354	20.2371	20.2450	20.2450	20.2464	20.2419	20.2371	20.2337	20.2301 (88)
util rest of house	0.9680	0.9522	0.9206	0.8269	0.6633	0.4580	0.3128	0.3522	0.5882	0.8452	0.9425	0.9715 (89)
MIT 2	19.1390	19.3233	19.5919	19.9522	20.1604	20.2355	20.2439	20.2445	20.2102	19.9695	19.5342	19.1190 (90)
Living area fraction	19.6126	19.7775	20.0189	20.3465	20.5454	20.6193	20.6295	20.6289	20.5922	20.3591	19.9629	19.5923 (91)
MIT	19.6126	19.7775	20.0189	20.3465	20.5454	20.6193	20.6295	20.6289	20.5922	20.3591	19.9629	19.5923 (92)
Temperature adjustment	19.6126	19.7775	20.0189	20.3465	20.5454	20.6193	20.6295	20.6289	20.5922	20.3591	19.9629	0.0000
adjusted MIT	19.6126	19.7775	20.0189	20.3465	20.5454	20.6193	20.6295	20.6289	20.5922	20.3591	19.9629	19.5923 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9630	0.9469	0.9166	0.8310	0.6819	0.4867	0.3454	0.3866	0.6168	0.8502	0.9382	0.9667 (94)
Ext temp.	492.3040	519.1800	521.7831	509.0940	438.3081	310.8256	210.4228	219.9419	327.6001	422.9631	461.4549	480.6875 (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	827.8329	802.1189	726.9201	607.7325	468.5063	315.2685	211.0472	221.0315	341.5141	516.9041	684.6022	823.3509 (97)
Space heating requirement - total per year (kWh/year)	249.6335	190.1350	152.6219	71.0197	22.4674	0.0000	0.0000	0.0000	0.0000	69.8921	160.6661	254.9416 (98a)
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)	249.6335	190.1350	152.6219	71.0197	22.4674	0.0000	0.0000	0.0000	0.0000	69.8921	160.6661	254.9416 (98c)
Space heating requirement after solar 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 (99)
Space heating per m2	(98c) / (4) =											18.1075

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	249.6335	190.1350	152.6219	71.0197	22.4674	0.0000	0.0000	0.0000	0.0000	69.8921	160.6661	254.9416 (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)	270.4589	205.9967	165.3542	76.9444	24.3418	0.0000	0.0000	0.0000	0.0000	75.7227	174.0694	276.2097 (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	214.5940	189.8518	202.0669	178.7704	173.9968	157.5666	156.1679	161.9937	163.3348	181.1745	191.4369	212.4161 (64)
Water heating requirement	84.3998	84.0631	83.4389	82.1677	80.7358	79.8000	79.8000	79.8000	79.8000	82.1169	83.6695	79.8000 (216)
Efficiency of water heater (217)m	254.2588	225.8443	242.1735	217.5676	215.5139	197.4519	195.6991	202.9996	204.6803	220.6300	228.8014	84.4701 (217)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	251.4690 (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	21.7472	17.4464	15.7086	11.5088	8.8897	7.2630	8.1095	10.5410	13.6917	17.9643	20.2906	22.3516 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-14.3977	-21.6221	-33.0789	-39.6620	-44.9641	-42.7842	-42.2773	-38.8263	-33.1211	-25.8019	-16.2965	-12.2990 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												

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(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-4.5461	-9.8308	-20.0496	-30.8764	-41.5826	-42.0546	-41.5466	-34.8140	-25.0557	-14.2888	-6.1426	-3.5743	(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												1269.0978	(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												2657.0894	(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)												175.5125	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-639.4931	(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												3548.2066	(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	1269.0978	0.2100	266.5105	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2657.0894	0.2100	557.9888	(264)
Space and water heating			824.4993	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	175.5125	0.1443	25.3319	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.1312	0.1333	-48.6651	
PV Unit electricity exported	-274.3619	0.1252	-34.3438	
Total			-83.0089	(269)
Total CO2, kg/year			778.7515	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400	(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	1269.0978	1.1300	1434.0805	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2657.0894	1.1300	3002.5110	(278)
Space and water heating			4436.5915	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	175.5125	1.5338	269.2069	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-365.1312	1.4925	-544.9621	
PV Unit electricity exported	-274.3619	0.4595	-126.0559	
Total			-671.0179	(283)
Total Primary energy kWh/year			4164.8813	(286)
Target Primary Energy Rate (TPER)			64.3800	(287)

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Plot Reference	A 208				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	84 B	DER	4.31	TER	12.04		
Environmental	97 A	% DER < TER				64.20	
CO ₂ Emissions (t/year)	0.26	DFEE	23.66	TFEE	24.90		
Compliance Check	See BREL	% DFEE < TFEE				4.98	
% DPER < TPER	28.45	DPER	46.06	TPER	64.38		
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	64.6900 (1b)	2.8000 (2b)	181.1320 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.6900		181.1320 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 181.1320 (5)

2. Ventilation rate

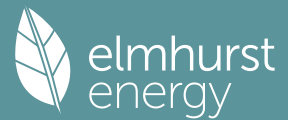
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1104 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2604 (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) = 0.2018 (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	0.2573	0.2523	0.2472	0.2220	0.2170	0.1917	0.1917	0.1867	0.2018	0.2170	0.2271	0.2371 (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	0.5331	0.5318	0.5306	0.5246	0.5235	0.5184	0.5184	0.5174	0.5204	0.5235	0.5258	0.5281 (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			7.3300	1.1450	8.3931		(27)
External Wall 1	21.0000	7.3300	13.6700	0.1500	2.0505	70.0000	956.9000 (29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846	70.0000	1432.9000 (29a)
Total net area of external elements Aum(A, m ²)			43.8900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.5482		(33)
Main dwelling							
Party Wall 1			48.8900	0.0000	0.0000	70.0000	3422.3000 (32)
Party Floor 1			64.6900			40.0000	2587.6000 (32a)
Party Ceiling 1			64.6900			30.0000	1940.7000 (32b)
Internal Wall 1			137.3700			9.0000	1236.3300 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11576.7299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							178.9570 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				4.4100	0.0500	0.2205	
E3 Sill				0.9100	0.0400	0.0364	

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E4 Jamb													12.6000	0.0400	0.5040	
E7 Party floor between dwellings (in blocks of flats)													8.2800	0.0500	0.4140	
E7 Party floor between dwellings (in blocks of flats)													16.3500	0.0360	0.5886	
E9 Balcony between dwellings, wall insulation continuous													6.7200	0.0500	0.3360	
E16 Corner (normal)													2.8000	0.0360	0.1008	
E17 Corner (inverted - internal area greater than external area)													2.8000	0.0000	0.0000	
E18 Party wall between dwellings													5.6000	0.0500	0.2800	
E18 Party wall between dwellings													2.8000	0.0360	0.1008	
E25 Staggered party wall between dwellings													2.8000	0.0360	0.1008	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)													34.9200	0.0000	0.0000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)																2.6819 (36)
Point Thermal bridges																0.0000
Total fabric heat loss															(33) + (36) + (36a) =	19.2301 (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	31.8658	31.7889	31.7136	31.3598	31.2936	30.9855	30.9855	30.9284	31.1041	31.2936	31.4275	31.5675	(38)			
Average = Sum(39)m / 12 =	51.0959	51.0190	50.9437	50.5899	50.5237	50.2156	50.2156	50.1585	50.3343	50.5237	50.6576	50.7976	(39)			
													50.5896			
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
HLP (average)	0.7899	0.7887	0.7875	0.7820	0.7810	0.7762	0.7762	0.7754	0.7781	0.7810	0.7831	0.7852	(40)			
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31				

4. Water heating energy requirements (kWh/year)																

Assumed occupancy																2.1107 (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																
	25.1827	24.8026	24.2618	23.4519	22.7220	21.7172	20.9549	21.8871	22.3763	23.3718	24.4069	25.1627	(42b)			
Hot water usage for other uses																
	36.2454	34.9274	33.6094	32.2913	30.9733	29.6553	29.6553	30.9733	32.2913	33.6094	34.9274	36.2454	(42c)			
Average daily hot water use (litres/day)													56.3007	(43)		
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
	61.4281	59.7299	57.8711	55.7432	53.6953	51.3725	50.6102	52.8604	54.6676	56.9812	59.3343	61.4081	(44)			
Energy conte	90.4327	79.0348	82.6966	72.8146	69.1918	59.4106	55.9258	62.2177	63.4117	73.4260	80.1923	90.1823	(45)			
Energy content (annual)																
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 (or HIU 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																
	76.8678	67.1796	70.2921	61.8924	58.8131	50.4990	47.5369	52.8850	53.8999	62.4121	68.1634	76.6550	(62)			
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)			
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)			
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)			
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)			
Output from w/h	76.8678	67.1796	70.2921	61.8924	58.8131	50.4990	47.5369	52.8850	53.8999	62.4121	68.1634	76.6550	(64)			
													747.0964	(64)		
12Total per year (kWh/year)													747	(64)		
Electric shower(s)																
	47.7366	42.5337	46.4451	44.3220	45.1537	43.0723	44.5080	45.1537	44.3220	46.4451	45.5718	47.7366	(64a)			
													543.0007	(64a)		
Heat gains from water heating, kWh/month																
	31.1511	27.4283	29.1843	26.5536	25.9917	23.3928	23.0112	24.5097	24.5555	27.2143	28.4338	31.0979	(65)			

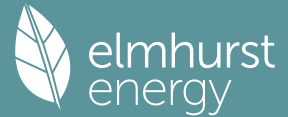
5. Internal gains (see Table 5 and 5a)																

Metabolic gains (Table 5), Watts																
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec				
	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	(66)			
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5																
	104.6645	115.8785	104.6645	108.1533	104.6645	108.1533	104.6645	104.6645	108.1533	104.6645	108.1533	104.6645	(67)			
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5																
	184.6018	186.5174	181.6902	171.4136	158.4413	146.2491	138.1040	136.1884	141.0156	151.2922	164.2645	176.4567	(68)			
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5																
	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	(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)																
	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	(71)			
Water heating gains (Table 5)																
	41.8698	40.8159	39.2262	36.8800	34.9351	32.4900	30.9291	32.9431	34.1049	36.5784	39.4914	41.7982	(72)			
Total internal gains	385.7961	397.8720	380.2410	371.1070	352.7009	341.5525	328.3576	328.4560	337.9338	347.1951	366.5693	377.5795	(73)			

6. Solar gains																

[Jan]																
			Area	Solar flux												
			m2	Table 6a	g											
				W/m2	Specific data	Specific data	Specific data	Specific data	Specific data	Specific data	Specific data	Specific data				
					or Table 6b	or Table 6c	or Table 6c	or Table 6c	or Table 6c	or Table 6c	or Table 6c	or Table 6c				
Northeast			7.3300	11.2829		0.3500		0.7000			0.7700					14.0419 (75)
Solar gains	14.0419	28.5827	51.4969	84.5727	113.6823	121.1974	113.3776	90.3860	62.7498	34.9303	17.6683	11.4673	(83)			
Total gains	399.8380	426.4546	431.7379	455.6797	466.3832	462.7498	441.7352	418.8420	400.6836	382.1254	384.2376	389.0468	(84)			

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	62.9358	63.0306	63.1237	63.5652	63.6485	64.0391	64.0391	64.1119	63.8880	63.6485	63.4802	63.3053	
alpha	5.1957	5.2020	5.2082	5.2377	5.2432	5.2693	5.2693	5.2741	5.2592	5.2432	5.2320	5.2204	
util living area	0.9896	0.9838	0.9737	0.9353	0.8429	0.6599	0.4936	0.5400	0.7747	0.9405	0.9805	0.9909 (86)	
MIT	19.9315	20.0615	20.2564	20.5650	20.8204	20.9625	20.9932	20.9893	20.9136	20.6114	20.2342	19.9063 (87)	
Th 2	20.2621	20.2632	20.2642	20.2689	20.2698	20.2740	20.2740	20.2747	20.2724	20.2698	20.2680	20.2661 (88)	
util rest of house	0.9873	0.9803	0.9677	0.9199	0.8071	0.5964	0.4152	0.4596	0.7180	0.9234	0.9756	0.9889 (89)	
MIT 2	19.2796	19.4090	19.6021	19.9040	20.1374	20.2530	20.2714	20.2704	20.2185	19.9523	19.5846	19.2578 (90)	
Living area fraction									fLA = Living area / (4) =				0.5115 (91)
MIT	19.6131	19.7428	19.9368	20.2421	20.4868	20.6159	20.6406	20.6381	20.5741	20.2894	19.9169	19.5895 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6131	19.7428	19.9368	20.2421	20.4868	20.6159	20.6406	20.6381	20.5741	20.2894	19.9169	19.5895 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9848	0.9773	0.9645	0.9193	0.8184	0.6271	0.4552	0.5004	0.7427	0.9239	0.9727	0.9867 (94)
Useful gains	393.7689	416.7838	416.4043	418.8942	381.6973	290.1854	201.0690	209.6092	297.5938	353.0587	373.7587	383.8638 (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	782.4345	757.2633	684.5196	573.7968	443.9414	302.0938	202.9021	212.5789	325.8681	489.5468	649.2737	781.7515 (97)
Space heating kWh	289.1673	228.8023	199.4778	111.5299	46.3096	0.0000	0.0000	0.0000	0.0000	101.5472	198.3708	296.0284 (98a)
Space heating requirement - total per year (kWh/year)												1471.2333
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	289.1673	228.8023	199.4778	111.5299	46.3096	0.0000	0.0000	0.0000	0.0000	101.5472	198.3708	296.0284 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1471.2333
Space heating per m2										(98c) / (4) =		22.7428 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	472.0265	371.5953	381.2047	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8586	0.9220	0.8992	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	405.3018	342.6246	342.7722	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	493.5773	471.4571	446.7056	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	63.5584	95.8513	77.3265	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	fc = cooled area / (4) =											1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	15.8896	23.9628	19.3316	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												59.1840 (107)
Energy for space cooling												22.7428 (99)
Total												0.9149 (108)
Fabric Energy Efficiency (DFEE)												23.6577 (109)
												23.7 (109)

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	64.6900 (1b)	x 2.8000 (2b)	= 181.1320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	64.6900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 181.1320 (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) = 0.1104 (8)

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Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.3604 (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) = 0.2793 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.3561	0.3492	0.3422	0.3073	0.3003	0.2654	0.2654	0.2584	0.2793	0.3003	0.3142	0.3282 (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	0.5634	0.5610	0.5585	0.5472	0.5451	0.5352	0.5352	0.5334	0.5390	0.5451	0.5494	0.5539 (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			7.3300	1.1450	8.3931		(27)
External Wall 1	21.0000	7.3300	13.6700	0.1800	2.4606		(29a)
Corridor wall	22.8900	2.4200	20.4700	0.1800	3.6846		(29a)
Total net area of external elements Aum(A, m2)			43.8900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 16.9583		(33)
Main dwelling							
Party Wall 1			48.8900	0.0000	0.0000		(32)

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

178.9570 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	4.4100	0.0500	0.2205
E3 Sill	0.9100	0.0500	0.0455
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	8.2800	0.0700	0.5796
E7 Party floor between dwellings (in blocks of flats)	16.3500	0.0700	1.1445
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0200	0.1344
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	34.9200	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.4265 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss		(33) + (36) + (36a) =	20.3848 (37)

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

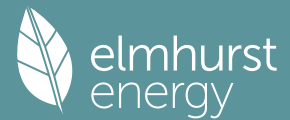
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	33.6774	33.5302	33.3859	32.7083	32.5815	31.9912	31.9912	31.8819	32.2186	32.5815	32.8380	33.1061 (38)
Average = Sum(39)m / 12 =	54.0623	53.9151	53.7708	53.0931	52.9663	52.3761	52.3761	52.2668	52.6034	52.9663	53.2228	53.4910 (39)
												53.0925

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8357	0.8334	0.8312	0.8207	0.8188	0.8096	0.8096	0.8080	0.8132	0.8188	0.8227	0.8269 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.1107 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	25.7569	25.3744	24.8357	23.8425	23.0987	22.2741	21.8286	22.3636	22.9460	23.8284	24.8421	25.6698 (42b)
Hot water usage for other uses	36.2454	34.9274	33.6094	32.2913	30.9733	29.6553	29.6553	30.9733	32.2913	33.6094	34.9274	36.2454 (42c)
Average daily hot water use (litres/day)												56.8310 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	62.0023	60.3017	58.4450	56.1338	54.0721	51.9294	51.4840	53.3369	55.2373	57.4377	59.7694	61.9152 (44)
Energy content (annual)	98.1964	85.8689	89.8278	76.8444	72.7914	63.8533	62.2654	66.0422	68.1131	77.9425	85.1525	96.9442 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m = 943.8421		
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	83.4670	72.9885	76.3537	65.3177	61.8727	54.2753	52.9256	56.1359	57.8962	66.2511	72.3796	82.4026 (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 (64)
Output from w/h	83.4670	72.9885	76.3537	65.3177	61.8727	54.2753	52.9256	56.1359	57.8962	66.2511	72.3796	82.4026 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m = 802.2658		802 (64)
Electric shower(s)	47.7366	42.5337	46.4451	44.3220	45.1537	43.0723	44.5080	45.1537	44.3220	46.4451	45.5718	47.7366 (64a)
Heat gains from water heating, kWh/month	32.8009	28.8806	30.6997	27.4099	26.7566	24.3369	24.3584	25.3224	25.5545	28.1741	29.4879	32.5348 (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	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336	105.5336 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	104.6645	115.8785	104.6645	108.1533	104.6645	108.1533	104.6645	104.6645	108.1533	104.6645	108.1533	104.6645 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	184.6018	186.5174	181.6902	171.4136	158.4413	146.2491	138.1040	136.1884	141.0156	151.2922	164.2645	176.4567 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534	33.5534 (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)	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268	-84.4268 (71)
Water heating gains (Table 5)	44.0872	42.9770	41.2630	38.0694	35.9632	33.8012	32.7398	34.0355	35.4924	37.8684	40.9554	43.7296 (72)
Total internal gains	388.0136	400.0330	382.2778	372.2963	353.7290	342.8637	330.1683	329.5484	339.3214	348.4851	368.0333	379.5108 (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	
Northeast	7.3300		11.2829		0.6300		0.7000		0.7700		25.2754 (75)	
Solar gains	25.2754	51.4488	92.6944	152.2308	204.6281	218.1552	204.0798	162.6947	112.9496	62.8745	31.8030	20.6412 (83)
Total gains	413.2890	451.4818	474.9722	524.5272	558.3571	561.0189	534.2480	492.2432	452.2710	411.3596	399.8363	400.1520 (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	59.4825	59.6449	59.8049	60.5683	60.7133	61.3975	61.3975	61.5259	61.1321	60.7133	60.4207	60.1178
alpha	4.9655	4.9763	4.9870	5.0379	5.0476	5.0932	5.0932	5.1017	5.0755	5.0476	5.0280	5.0079
util living area	0.9887	0.9811	0.9652	0.9064	0.7783	0.5792	0.4280	0.4819	0.7322	0.9300	0.9786	0.9903 (86)
MIT	19.8595	20.0185	20.2579	20.6132	20.8656	20.9762	20.9958	20.9925	20.9261	20.6100	20.1932	19.8381 (87)
Th 2	20.2225	20.2244	20.2264	20.2354	20.2371	20.2450	20.2450	20.2464	20.2419	20.2371	20.2337	20.2301 (88)
util rest of house	0.9862	0.9770	0.9574	0.8861	0.7362	0.5173	0.3561	0.4059	0.6718	0.9104	0.9733	0.9881 (89)
MIT 2	19.1767	19.3352	19.5718	19.9179	20.1417	20.2323	20.2435	20.2436	20.1973	19.9220	19.5163	19.1615 (90)
Living area fraction	19.5260	19.6847	19.9227	20.2735	20.5120	20.6128	20.6283	20.6267	20.5701	20.2740	19.8625	19.5076 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5260	19.6847	19.9227	20.2735	20.5120	20.6128	20.6283	20.6267	20.5701	20.2740	19.8625	19.5076 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9835	0.9735	0.9538	0.8872	0.7520	0.5479	0.3928	0.4446	0.6990	0.9115	0.9701	0.9856 (94)
Useful gains	406.4531	439.5158	453.0262	465.3491	419.9033	307.4080	209.8571	218.8552	316.1531	374.9409	387.8945	394.4032 (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	823.1502	797.1185	721.7510	603.8569	466.7386	314.9278	210.9856	220.9141	340.3499	512.3938	679.2569	818.8169 (97)
Space heating kWh	310.0226	240.3090	199.9312	99.7256	34.8455	0.0000	0.0000	0.0000	0.0000	102.2650	209.7809	315.7638 (98a)
Space heating requirement - total per year (kWh/year)												1512.6437
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	310.0226	240.3090	199.9312	99.7256	34.8455	0.0000	0.0000	0.0000	0.0000	102.2650	209.7809	315.7638 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1512.6437
Space heating per m ²												23.3830 (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	492.3350	387.5829	397.2274	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9103	0.9532	0.9315	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	448.1936	369.4505	370.0268	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	608.2159	579.2832	532.3147	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	115.2160	156.1156	120.7422	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	28.8040	39.0289	30.1856	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												98.0185 (107)
Energy for space heating												23.3830 (99)
Energy for space cooling												1.5152 (108)
Total												24.8982 (109)
Fabric Energy Efficiency (TFEE)												24.9 (109)

