

Summary for Input Data



Plot Reference	A 509		Issued on Date	15/05/2026
Assessment Reference	Be Green 260515	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	83 B	DER	5.10	TER	13.71
Environmental	96 A	% DER < TER			62.80
CO ₂ Emissions (t/year)	0.32	DFEE	35.00	TFEE	35.57
Compliance Check	See BREL	% DFEE < TFEE			1.61
% DPER < TPER	26.37	DPER	53.83	TPER	73.11

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

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

Orientation	Northwest
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, Mid-Terrace
Position of Flat	Top-floor flat
Which Floor	5
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	154.97 kJ/m ² K
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:	22.50 m	70.59 m ²	2.80 m

8.0 Living Area	32.52 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	47.39	32.93	0.00	None	14.46	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	15.60	13.18	0.70	Stairwell Access Corridor 3	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	40.85	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	154.84

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	70.59	70.59	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	40.00	70.59

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 West	2.42	
SE windows	Window	External Wall 1	South East	10.72	
NE windows	Window	External Wall 1	North East	3.74	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	9.16	0.05	0.05	No
E3 Sill	Independently assessed	5.67	0.04	0.04	No
E4 Jamb	Independently assessed	21.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	12.57	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	5.57	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E25 Staggered party wall between dwellings	Independently assessed	5.60	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	14.59	0.00	0.00	No
E14 Flat roof	Independently assessed	22.50	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	14.59	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	5.60	0.00	0.00	No

Y-value 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	2
Manufacturer SFP	0.61
Duct Type	Rigid
MVHR Efficiency	89.00
Wet Rooms	2
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

Summary for Input Data

Number of intermittent extract fans

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m³/(h.m²) @ 50 Pa

Test Method

22.0 Lighting

No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	15.00	1125.00	7

24.0 Main Heating 1

25.0 Main Heating 2

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

SAP Code

	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

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

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	
Shower 2	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 L

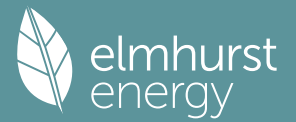
Loss kWh/day

32.0 Photovoltaic Unit

Export Capable Meter?

Connected To Dwelling

Summary for Input Data



Diverter	No										
Battery Capacity [kWh]	0.00										
PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer			
0.36	South West	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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Compliance Check	See BREL	% DFEE < TFEE				1.61	
% DPER < TPER	26.37	DPER	53.83	TPER	73.11		
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	70.5900 (1b)	2.8000 (2b)	197.6520 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	197.6520 (5)

2. Ventilation rate

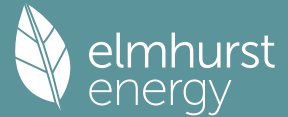
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) =												80.1000 (23c)
Effective ac	0.2477	0.2448	0.2419	0.2274	0.2245	0.2099	0.2099	0.2070	0.2157	0.2245	0.2303	0.2361 (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			14.4600	1.1450	16.5573		(27)
External Wall 1	47.3900	14.4600	32.9300	0.1500	4.9395	70.0000	2305.1000 (29a)
Corridor wall	15.6000	2.4200	13.1800	0.1900	2.5042	70.0000	922.6000 (29a)
External Roof 1	70.5900		70.5900	0.1000	7.0590	9.0000	635.3100 (30)
Total net area of external elements Aum(A, m ²)			133.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.4800		(33)
Main dwelling							
Party Wall 1			40.8500	0.0000	0.0000	70.0000	2859.5000 (32)
Party Floor 1			70.5900			40.0000	2823.6000 (32d)
Internal Wall 1			154.8400			9.0000	1393.5600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10939.6700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							154.9748 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	9.1600	0.0500	0.4580
E3 Sill	5.6700	0.0400	0.2268
E4 Jamb	21.6000	0.0400	0.8640
E7 Party floor between dwellings (in blocks of flats)	12.5700	0.0500	0.6285
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0390	0.2172
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.5900	0.0000	0.0000
E14 Flat roof	22.5000	0.0500	1.1250
P4 Party wall - Roof (insulation at ceiling level)	14.5900	0.0500	0.7295
E16 Corner (normal)	2.8000	0.0390	0.1092
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2146 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.6946 (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	16.1575	15.9679	15.7784	14.8306	14.6410	13.6932	13.6932	13.5036	14.0723	14.6410	15.0201	15.3993	(38)
Heat transfer coeff	54.8521	54.6625	54.4730	53.5252	53.3356	52.3878	52.3878	52.1982	52.7669	53.3356	53.7147	54.0938	(39)
Average = Sum(39)m / 12 =												53.4778	
HLP	0.7771	0.7744	0.7717	0.7583	0.7556	0.7421	0.7421	0.7395	0.7475	0.7556	0.7609	0.7663	(40)
HLP (average)												0.7576	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2604 (42)
Hot water usage for mixer showers	60.5491	59.6221	58.2559	56.1543	54.2714	51.6371	49.5535	51.9893	53.2144	55.8236	58.5407	60.4945	(42a)
Hot water usage for baths	26.2380	25.8419	25.2784	24.4346	23.6741	22.6273	21.8330	22.8042	23.3139	24.3512	25.4297	26.2172	(42b)
Hot water usage for other uses	37.7784	36.4046	35.0309	33.6571	32.2833	30.9096	30.9096	32.2833	33.6571	35.0309	36.4046	37.7784	(42c)
Average daily hot water use (litres/day)												114.4944	(43)
Daily hot water use	124.5654	121.8686	118.5652	114.2460	110.2288	105.1739	102.2961	107.0769	110.1855	115.2056	120.3751	124.4900	(44)
Energy content (annual)	183.3819	161.2568	169.4273	149.2339	142.0410	121.6301	113.0402	126.0315	127.8096	148.4541	162.6909	182.8227	(45)
Distribution loss (46)m = 0.15 x (45)m	27.5073	24.1885	25.4141	22.3851	21.3062	18.2445	16.9560	18.9047	19.1714	22.2681	24.4036	27.4234	(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	238.6587	211.1842	224.7041	202.7276	197.3178	175.1238	168.3170	181.3083	181.3033	203.7309	216.1846	238.0995	(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	238.6587	211.1842	224.7041	202.7276	197.3178	175.1238	168.3170	181.3083	181.3033	203.7309	216.1846	238.0995	(64)
12Total per year (kWh/year)												2438.6598	(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	105.1959	93.5598	100.5560	92.4152	91.4501	83.2370	81.8073	86.1269	85.2916	93.5824	96.8897	105.0100	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.6795	111.4666	100.6795	104.0355	100.6795	104.0355	100.6795	100.6795	104.0355	100.6795	104.0355	100.6795	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.6701	200.7317	195.5366	184.4769	170.5159	157.3946	148.6287	146.5672	151.7623	162.8220	176.7830	189.9043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	(71)
Water heating gains (Table 5)	141.3923	139.2259	135.1559	128.3545	122.9168	115.6069	109.9561	115.7620	118.4606	125.7828	134.5690	141.1425	(72)
Total internal gains	497.6474	508.3297	488.2775	473.7723	451.0176	433.9424	416.1698	419.9141	431.1638	446.1898	472.2929	488.6317	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a	g Specific data	FF Specific data	Access factor	Gains W
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												W/m2	or Table 6b		or Table 6c		Table 6d			
Northeast		3.7400				11.2829		0.3500		0.7000		0.7700		7.1646 (75)						
Southeast		10.7200				36.7938		0.3500		0.7000		0.7700		66.9683 (77)						
Solar gains	74.1329	128.6555	182.3533	236.5398	274.6152	276.8832	265.1747	236.1184	201.0163	143.8961	89.2275	63.1619 (83)								
Total gains	571.7803	636.9853	670.6308	710.3121	725.6328	710.8256	681.3444	656.0325	632.1801	590.0859	561.5204	551.7936 (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	55.3999	55.5920	55.7854	56.7733	56.9750	58.0058	58.0058	58.2165	57.5891	56.9750	56.5729	56.1764								
alpha	4.6933	4.7061	4.7190	4.7849	4.7983	4.8671	4.8671	4.8811	4.8393	4.7983	4.7715	4.7451								
util living area	0.9558	0.9283	0.8853	0.7869	0.6444	0.4652	0.3372	0.3643	0.5583	0.8010	0.9211	0.9610 (86)								
MIT	20.1116	20.3052	20.5276	20.7855	20.9312	20.9888	20.9981	20.9973	20.9730	20.8015	20.4458	20.0871 (87)								
Th 2	20.2733	20.2756	20.2779	20.2897	20.2920	20.3038	20.3038	20.3061	20.2991	20.2920	20.2873	20.2826 (88)								
util rest of house	0.9486	0.9173	0.8681	0.7585	0.6040	0.4168	0.2843	0.3101	0.5069	0.7686	0.9073	0.9545 (89)								
MIT 2	19.2435	19.4847	19.7578	20.0699	20.2299	20.2958	20.3028	20.3046	20.2784	20.0953	19.6709	19.2202 (90)								
Living area fraction	fLA = Living area / (4) =												0.4607 (91)							
MIT	19.6434	19.8627	20.1124	20.3995	20.5530	20.6150	20.6231	20.6237	20.5984	20.4206	20.0279	19.6196 (92)								
Temperature adjustment													0.0000							
adjusted MIT	19.6434	19.8627	20.1124	20.3995	20.5530	20.6150	20.6231	20.6237	20.5984	20.4206	20.0279	19.6196 (93)								
8. Space heating requirement																				
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec								
Utilisation	0.9413	0.9102	0.8639	0.7631	0.6192	0.4386	0.3086	0.3350	0.5292	0.7748	0.9017	0.9475 (94)								
Useful gains	538.1888	579.8075	579.3388	542.0426	449.3027	311.7385	210.2798	219.7553	334.5361	457.2116	506.3222	522.8027 (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	841.6172	817.8995	741.5095	615.5151	472.1799	315.1134	210.7621	220.4709	342.8989	523.7884	694.4174	834.1032 (97)								
Space heating kWh	225.7508	159.9978	120.6550	52.9002	17.0207	0.0000	0.0000	0.0000	0.0000	49.5331	135.4286	231.6076 (98a)								
Space heating requirement - total per year (kWh/year)													992.8938							
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	225.7508	159.9978	120.6550	52.9002	17.0207	0.0000	0.0000	0.0000	0.0000	49.5331	135.4286	231.6076 (98c)								
Space heating requirement after solar contribution - total per year (kWh/year)													992.8938							
Space heating per m2													(98c) / (4) =	14.0656 (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																				
225.7508 159.9978 120.6550 52.9002 17.0207 0.0000 0.0000 0.0000 0.0000 49.5331 135.4286 231.6076 (98)																				
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50																				
307a	338.6262	239.9967	180.9825	79.3503	25.5310	0.0000	0.0000	0.0000	0.0000	74.2997	203.1429	347.4114								
Space heating requirement	338.6262	239.9967	180.9825	79.3503	25.5310	0.0000	0.0000	0.0000	0.0000	74.2997	203.1429	347.4114 (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																				
238.6587 211.1842 224.7041 202.7276 197.3178 175.1238 168.3170 181.3083 181.3033 203.7309 216.1846 238.0995 (64)																				
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50																				
310a	357.9880	316.7764	337.0561	304.0914	295.9767	262.6857	252.4756	271.9624	271.9549	305.5964	324.2769	357.1493								
Water heating fuel	357.9880	316.7764	337.0561	304.0914	295.9767	262.6857	252.4756	271.9624	271.9549	305.5964	324.2769	357.1493 (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	15.6160	14.1048	15.6160	15.1123	15.6160	15.1123	15.6160	15.6160	15.1123	15.6160	15.1123	15.6160 (331)								
Lighting	21.4038	17.1709	15.4605	11.3270	8.7493	7.1483	7.9814	10.3746	13.4755	17.6806	19.9702	21.9987 (332)								
Electricity generated by PVs (Appendix M) (negative quantity)																				
(333a)m	-3.9330	-6.9718	-12.8402	-18.0371	-22.5150	-22.1931	-21.7298	-18.7164	-14.0925	-9.0811	-4.7197	-3.2117 (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													1489.3407 (307)							
Space heating fuel - secondary													0.0000 (309)							
Water heating fuel - community heating													3657.9898 (310)							
Efficiency of water heater													0.0000 (311)							
Electricity used for heat distribution													14.8934 (313)							
Space cooling fuel													0.0000 (321)							
Electricity for pumps and fans:																				
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)																				
mechanical ventilation fans (SFP = 0.7625)														183.8658 (330a)						

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Total electricity for the above, kWh/year	183.8658 (331)
Electricity for lighting (calculated in Appendix L)	172.7409 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-158.0414 (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	5345.8958 (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	2218.6769	0.1567	100.6080 (367)
Electrical energy for heat distribution (space & water)	14.8934	0.0000	7.4850 (372)
Overall CO2 factor for heat network			0.0641 (386)
Total CO2 associated with community systems			330.1134 (373)
Space and water heating			330.1134 (376)
Pumps, fans and electric keep-hot	183.8658	0.1387	25.5044 (378)
Energy for lighting	172.7409	0.1443	24.9319 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.0414	0.1306	-20.6343
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.6343 (380)
Total CO2, kg/year			359.9154 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1000 (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	2218.6769	1.5802	1014.4122 (467)
Electrical energy for heat distribution (space & water)	14.8934	0.0000	79.1601 (472)
Overall CO2 factor for heat network			0.6783 (486)
Total CO2 associated with community systems			3491.2347 (473)
Space and water heating			3491.2347 (476)
Pumps, fans and electric keep-hot	183.8658	1.5128	278.1521 (478)
Energy for lighting	172.7409	1.5338	264.9558 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-158.0414	1.4823	-234.2651
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-234.2651 (480)
Total Primary energy kWh/year			3800.0776 (483)
Dwelling Primary energy Rate (DPER)			53.8300 (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	70.5900 (1b)	x 2.8000 (2b)	= 197.6520 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5900		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	197.6520 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1518 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4018 (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) = 0.3114 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.3970	0.3892	0.3814	0.3425	0.3347	0.2958	0.2958	0.2880	0.3114	0.3347	0.3503	0.3659 (22b)
	0.5788	0.5757	0.5727	0.5587	0.5560	0.5438	0.5438	0.5415	0.5485	0.5560	0.5614	0.5669 (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			14.4600	1.1450	16.5573		(27)
External Wall 1	47.3900	14.4600	32.9300	0.1800	5.9274		(29a)
Corridor wall	15.6000	2.4200	13.1800	0.1800	2.3724		(29a)
External Roof 1	70.5900		70.5900	0.1100	7.7649		(30)
Total net area of external elements Aum(A, m2)			133.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.0420		(33)
Main dwelling							
Party Wall 1			40.8500	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							154.9748 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	9.1600	0.0500	0.4580
E3 Sill	5.6700	0.0500	0.2835
E4 Jamb	21.6000	0.0500	1.0800
E7 Party floor between dwellings (in blocks of flats)	12.5700	0.0700	0.8799
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0700	0.3899
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E16 Corner (normal)	2.8000	0.0900	0.2520
E18 Party wall between dwellings	5.6000	0.0600	0.3360
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.5900	0.0000	0.0000
E14 Flat roof	22.5000	0.0800	1.8000
P4 Party wall - Roof (insulation at ceiling level)	14.5900	0.1200	1.7508
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.4013 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	42.4433 (37)

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

(38)m	Jan 37.7529	Feb 37.5533	Mar 37.3576	Apr 36.4387	May 36.2667	Jun 35.4663	Jul 35.4663	Aug 35.3181	Sep 35.7746	Oct 36.2667	Nov 36.6146	Dec 36.9782 (38)
Heat transfer coeff	80.1961	79.9965	79.8009	78.8819	78.7100	77.9096	77.9096	77.7614	78.2179	78.7100	79.0578	79.4214 (39)
Average = Sum(39)m / 12 =												78.8811
HLP	Jan 1.1361	Feb 1.1333	Mar 1.1305	Apr 1.1175	May 1.1150	Jun 1.1037	Jul 1.1037	Aug 1.1016	Sep 1.1081	Oct 1.1150	Nov 1.1200	Dec 1.1251 (40)
HLP (average)												1.1175
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2604 (42)
Hot water usage for mixer showers												
62.1185	61.1850	59.8247	57.2219	55.3012	53.1592	51.9417	53.2917	54.7716	57.0714	59.7301	61.8805 (42a)	
Hot water usage for baths												
26.8362	26.4377	25.8764	24.8416	24.0667	23.2075	22.7434	23.3007	23.9075	24.8269	25.8831	26.7455 (42b)	
Hot water usage for other uses												
37.7784	36.4046	35.0309	33.6571	32.2833	30.9096	30.9096	32.2833	33.6571	35.0309	36.4046	37.7784 (42c)	
Average daily hot water use (litres/day)												116.4966 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.7331	124.0273	120.7319	115.7206	111.6512	107.2762	105.5946	108.8757	112.3362	116.9292	122.0178	126.4044 (44)
Energy content (annual)	200.7143	176.6132	185.5605	158.4157	150.3040	131.9086	127.7075	134.8109	138.5218	158.6718	173.8367	197.9187 (45)
Distribution loss (46)m = 0.15 x (45)m	30.1071	26.4920	27.8341	23.7624	22.5456	19.7863	19.1561	20.2216	20.7783	23.8008	26.0755	29.6878 (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	249.9569	221.0904	234.8032	206.0699	199.5467	179.5628	176.9502	184.0536	186.1760	207.9145	221.4909	247.1614 (62)
WWHRS	-28.3980	-25.1154	-26.2994	-21.7770	-20.2953	-17.3669	-16.2787	-17.3107	-17.9684	-21.1828	-23.9975	-27.8721 (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	221.5589	195.9750	208.5037	184.2930	179.2513	162.1960	160.6715	166.7428	168.2075	186.7317	197.4933	219.2893 (64)
12Total per year (kWh/year)												2250.9142 (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	106.1316	94.3057	101.0930	90.7966	89.3702	81.9830	81.8569	84.2188	84.1818	92.1525	95.9240	105.2021 (65)

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

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Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.6795	111.4666	100.6795	104.0355	100.6795	104.0355	100.6795	100.6795	104.0355	100.6795	104.0355	100.6795	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.6701	200.7317	195.5366	184.4769	170.5159	157.3946	148.6287	146.5672	151.7623	162.8220	176.7830	189.9043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	(71)
Water heating gains (Table 5)	142.6500	140.3358	135.8777	126.1064	120.1213	113.8653	110.0227	113.1973	116.9192	123.8609	133.2278	141.4007	(72)
Total internal gains	501.9051	512.4396	491.9993	474.5242	451.2221	432.2008	416.2364	417.3494	429.6224	447.2679	473.9517	491.8899	(73)

6. Solar gains

[Jan]												Gains
	Area				Solar flux		g		FF		Access	
	m2				Table 6a		Specific data		Specific data		factor	W
					W/m2		or Table 6b		or Table 6c		Table 6d	
Northeast	3.7400				11.2829		0.6300		0.7000		0.7700	12.8963 (75)
Southeast	10.7200				36.7938		0.6300		0.7000		0.7700	120.5429 (77)
Solar gains	133.4392	231.5800	328.2359	425.7717	494.3073	498.3897	477.3144	425.0131	361.8294	259.0131	160.6095	113.6914 (83)
Total gains	635.3444	744.0196	820.2352	900.2959	945.5294	930.5905	893.5508	842.3625	791.4518	706.2809	634.5613	605.5813 (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	37.8921	37.9866	38.0797	38.5234	38.6075	39.0042	39.0042	39.0785	38.8504	38.6075	38.4377	38.2617	
alpha	3.5261	3.5324	3.5386	3.5682	3.5738	3.6003	3.6003	3.6052	3.5900	3.5738	3.5625	3.5508	
util living area	0.9608	0.9337	0.8910	0.8033	0.6726	0.5079	0.3760	0.4133	0.6156	0.8350	0.9349	0.9660	(86)
MIT	19.4119	19.7065	20.0698	20.4937	20.7897	20.9430	20.9851	20.9790	20.8848	20.4987	19.8937	19.3628	(87)
Th 2	19.9715	19.9738	19.9760	19.9866	19.9886	19.9978	19.9978	19.9995	19.9943	19.9886	19.9846	19.9804	(88)
util rest of house	0.9532	0.9217	0.8714	0.7696	0.6205	0.4373	0.2936	0.3281	0.5444	0.7987	0.9210	0.9595	(89)
MIT 2	18.1510	18.5185	18.9662	19.4763	19.8038	19.9596	19.9912	19.9895	19.9092	19.4970	18.7656	18.0954	(90)
Living area fraction									fLA = Living area / (4) =			0.4607	(91)
MIT	18.7319	19.0658	19.4746	19.9450	20.2580	20.4126	20.4491	20.4454	20.3587	19.9584	19.2853	18.6793	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7319	19.0658	19.4746	19.9450	20.2580	20.4126	20.4491	20.4454	20.3587	19.9584	19.2853	18.6793	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9417	0.9088	0.8604	0.7681	0.6350	0.4672	0.3312	0.3667	0.5713	0.7975	0.9094	0.9487	(94)
Ext temp.	598.3145	676.1317	705.6945	691.5290	600.4268	434.8150	295.9432	308.8559	452.1322	563.2473	577.0581	574.4946	(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	1157.3819	1133.2144	1035.3869	871.2497	673.5980	452.8593	299.8795	314.5723	489.5401	736.6033	963.3417	1149.9657	(97)
Space heating requirement - total per year (kWh/year)	415.9462	307.1596	245.2912	129.3989	54.4394	0.0000	0.0000	0.0000	0.0000	128.9768	278.1242	428.1506	(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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	415.9462	307.1596	245.2912	129.3989	54.4394	0.0000	0.0000	0.0000	0.0000	128.9768	278.1242	428.1506	(98c)
Space heating per m2										(98c) / (4) =		28.1554	(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)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system 1)	415.9462	307.1596	245.2912	129.3989	54.4394	0.0000	0.0000	0.0000	0.0000	128.9768	278.1242	428.1506	(98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	450.6459	332.7839	265.7542	140.1939	58.9809	0.0000	0.0000	0.0000	0.0000	139.7365	301.3264	463.8684	(211)
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	(212)
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	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating requirement	221.5589	195.9750	208.5037	184.2930	179.2513	162.1960	160.6715	166.7428	168.2075	186.7317	197.4933	219.2893	(64)
Efficiency of water heater (217)m	85.4506	85.0632	84.4251	83.2818	81.7297	79.8000	79.8000	79.8000	79.8000	83.2469	84.8274	85.5327	(216)
Fuel for water heating, kWh/month	259.2829	230.3875	246.9688	221.2883	219.3222	203.2531	201.3428	208.9509	210.7864	224.3108	232.8177	256.3807	(219)

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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	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	20.9192	16.7822	15.1105	11.0706	8.5512	6.9864	7.8007	10.1397	13.1704	17.2803	19.5181	21.5006	21.5006	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-15.6475	-23.4689	-35.8634	-42.9531	-48.6539	-46.2758	-45.7136	-41.9877	-35.8423	-27.9668	-17.6958	-13.3690	-13.3690	(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	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	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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-5.0241	-10.8526	-22.1106	-34.0187	-45.7863	-46.3006	-45.7553	-38.3689	-27.6405	-15.7803	-6.7898	-3.9521	-3.9521	(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	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	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	0.0000	(235d)
Annual totals kWh/year														
Space heating fuel - main system 1													2153.2901	(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													2715.0922	(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)													168.8300	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-697.8175	(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													4425.3948	(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	2153.2901	0.2100	452.1909	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2715.0922	0.2100	570.1694	(264)
Space and water heating			1022.3603	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	168.8300	0.1443	24.3674	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.4378	0.1333	-52.7147	
PV Unit electricity exported	-302.3797	0.1252	-37.8572	
Total			-90.5719	(269)
Total CO2, kg/year			968.0851	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.7100	(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	2153.2901	1.1300	2433.2179	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2715.0922	1.1300	3068.0542	(278)
Space and water heating			5501.2720	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	168.8300	1.5338	258.9571	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-395.4378	1.4926	-590.2333	
PV Unit electricity exported	-302.3797	0.4595	-138.9517	
Total			-729.1851	(283)
Total Primary energy kWh/year			5161.1449	(286)
Target Primary Energy Rate (TPER)			73.1100	(287)

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Plot Reference	A 509			Issued on Date	15/05/2026
Assessment Reference	Be Green 260515	Plot Type Ref			
Plot Address				SAP Version	10.2
SAP Rating	83 B	DER	5.10	TER	13.71
Environmental	96 A	% DER < TER			62.80
CO ₂ Emissions (t/year)	0.32	DFEE	35.00	TFEE	35.57
Compliance Check	See BREL	% DFEE < TFEE			1.61
% DPER < TPER	26.37	DPER	53.83	TPER	73.11
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			
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.5900		
Dwelling volume			

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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1518 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.3018 (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) = 0.2339 (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	0.2982	0.2924	0.2865	0.2573	0.2514	0.2222	0.2222	0.2163	0.2339	0.2514	0.2631	0.2748 (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	0.5445	0.5427	0.5410	0.5331	0.5316	0.5247	0.5247	0.5234	0.5274	0.5316	0.5346	0.5378 (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			14.4600	1.1450	16.5573		(27)
External Wall 1	47.3900	14.4600	32.9300	0.1500	4.9395	70.0000	2305.1000 (29a)
Corridor wall	15.6000	2.4200	13.1800	0.1900	2.5042	70.0000	922.6000 (29a)
External Roof 1	70.5900		70.5900	0.1000	7.0590	9.0000	635.3100 (30)
Total net area of external elements A _{um} (A, m ²)			133.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.4800		(33)
Main dwelling							
Party Wall 1			40.8500	0.0000	0.0000	70.0000	2859.5000 (32)
Party Floor 1			70.5900			40.0000	2823.6000 (32a)
Internal Wall 1			154.8400			9.0000	1393.5600 (32c)
Heat capacity C _m = Sum (A x k)							(28)...(30) + (32) + (32a)...(32e) = 10939.6700 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							154.9748 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					9.1600	0.0500	0.4580
E3 Sill					5.6700	0.0400	0.2268

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E4 Jamb	21.6000	0.0400	0.8640
E7 Party floor between dwellings (in blocks of flats)	12.5700	0.0500	0.6285
E7 Party floor between dwellings (in blocks of flats)	5.5700	0.0390	0.2172
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.5900	0.0000	0.0000
E14 Flat roof	22.5000	0.0500	1.1250
P4 Party wall - Roof (insulation at ceiling level)	14.5900	0.0500	0.7295
E16 Corner (normal)	2.8000	0.0390	0.1092
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.2146 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 38.6946 (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	35.5126	35.4000	35.2896	34.7711	34.6741	34.2226	34.2226	34.1389	34.3965	34.6741	34.8704	35.0755 (38)
Average = Sum(39)m / 12 =	74.2071	74.0945	73.9842	73.4657	73.3687	72.9171	72.9171	72.8335	73.0911	73.3687	73.5649	73.7701 (39)
												73.4652

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0512	1.0496	1.0481	1.0407	1.0394	1.0330	1.0330	1.0318	1.0354	1.0394	1.0421	1.0451 (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	2.2604 (42)											
Hot water usage for mixer showers	0.0000 (42a)											
Hot water usage for baths	26.2380	25.8419	25.2784	24.4346	23.6741	22.6273	21.8330	22.8042	23.3139	24.3512	25.4297	26.2172 (42b)
Hot water usage for other uses	37.7784	36.4046	35.0309	33.6571	32.2833	30.9096	30.9096	32.2833	33.6571	35.0309	36.4046	37.7784 (42c)
Average daily hot water use (litres/day)	58.6728 (43)											
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	64.0163	62.2465	60.3093	58.0917	55.9575	53.5368	52.7426	55.0876	56.9710	59.3821	61.8343	63.9955 (44)
Energy content (annual)	94.2431	82.3647	86.1807	75.8823	72.1069	61.9136	58.2821	64.8391	66.0836	76.5198	83.5711	93.9821 (45)
Distribution loss (46)m = 0.15 x (45)m	915.9692											
Water storage loss (or HIU loss):	0.0000 (46)											
Total storage loss	0.0000 (56)											
If cylinder contains dedicated solar storage	0.0000 (57)											
Primary loss	0.0000 (59)											
Combi loss	0.0000 (61)											
Total heat required for water heating calculated for each month	80.1067	70.0100	73.2536	64.5000	61.2908	52.6265	49.5398	55.1132	56.1710	65.0419	71.0355	79.8848 (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	80.1067	70.0100	73.2536	64.5000	61.2908	52.6265	49.5398	55.1132	56.1710	65.0419	71.0355	79.8848 (64)
12Total per year (kWh/year)	779 (64)											
Electric shower(s)	49.7466	44.3246	48.4008	46.1883	47.0550	44.8859	46.3821	47.0550	46.1883	48.4008	47.4907	49.7466 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	565.8644 (64a)											
Heat gains from water heating, kWh/month	32.4633	28.5837	30.4136	27.6721	27.0865	24.3781	23.9805	25.5420	25.5898	28.3607	29.6315	32.4078 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.6795	111.4666	100.6795	104.0355	100.6795	104.0355	100.6795	100.6795	104.0355	100.6795	104.0355	100.6795 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.6701	200.7317	195.5366	184.4769	170.5159	157.3946	148.6287	146.5672	151.7623	162.8220	176.7830	189.9043 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145 (71)
Water heating gains (Table 5)	43.6335	42.5352	40.8785	38.4334	36.4065	33.8585	32.2318	34.3307	35.5414	38.1192	41.1549	43.5589 (72)
Total internal gains	399.8886	411.6390	394.0001	383.8512	364.5074	352.1940	338.4455	338.4828	348.2446	358.5261	378.8788	391.0482 (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					3.7400	11.2829	0.3500	0.7000			0.7700	7.1646 (75)
Southeast					10.7200	36.7938	0.3500	0.7000			0.7700	66.9683 (77)
Solar gains	74.1329	128.6555	182.3533	236.5398	274.6152	276.8832	265.1747	236.1184	201.0163	143.8961	89.2275	63.1619 (83)
Total gains	474.0215	540.2945	576.3534	620.3910	639.1226	629.0772	603.6202	574.6012	549.2610	502.4223	468.1063	454.2101 (84)

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7. Mean internal temperature (heating season)											
Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	40.9502	41.0124	41.0736	41.3635	41.4182	41.6747	41.6747	41.7225	41.5755	41.4182	41.3077
alpha	3.7300	3.7342	3.7382	3.7576	3.7612	3.7783	3.7783	3.7815	3.7717	3.7612	3.7538
util living area	0.9827	0.9709	0.9521	0.9046	0.8150	0.6603	0.5075	0.5489	0.7555	0.9178	0.9704
MIT	19.2766	19.5101	19.8314	20.2676	20.6391	20.8851	20.9675	20.9560	20.8000	20.3252	19.7306
Th 2	20.0409	20.0422	20.0435	20.0495	20.0507	20.0560	20.0560	20.0569	20.0539	20.0507	20.0484
util rest of house	0.9791	0.9650	0.9420	0.8836	0.7730	0.5861	0.4084	0.4496	0.6903	0.8955	0.9634
MIT 2	18.4723	18.7035	19.0197	19.4441	19.7854	19.9907	20.0436	20.0390	19.9286	19.5064	18.9281
Living area fraction	18.8428	19.0751	19.3937	19.8235	20.1787	20.4027	20.4693	20.4614	20.3300	19.8836	19.2978
MIT	18.8428	19.0751	19.3937	19.8235	20.1787	20.4027	20.4693	20.4614	20.3300	19.8836	19.2978
Temperature adjustment	18.8428	19.0751	19.3937	19.8235	20.1787	20.4027	20.4693	20.4614	20.3300	19.8836	19.2978
adjusted MIT	18.8428	19.0751	19.3937	19.8235	20.1787	20.4027	20.4693	20.4614	20.3300	19.8836	19.2978

8. Space heating requirement											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.9734	0.9576	0.9337	0.8778	0.7792	0.6147	0.4530	0.4936	0.7108	0.8908	0.9564
Useful gains	461.4087	517.3864	538.1589	544.5916	497.9777	386.6862	273.4162	283.6456	390.4403	447.5762	447.7188
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	1079.1824	1050.2963	953.9259	802.5013	622.0719	423.1191	282.1354	295.8090	455.3602	681.1251	897.3298
Space heating kWh	459.6236	358.1155	309.3307	185.6949	92.3261	0.0000	0.0000	0.0000	0.0000	173.7604	323.7199
Space heating requirement - total per year (kWh/year)											
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
Solar heating contribution - total per year (kWh/year)											
Space heating kWh	459.6236	358.1155	309.3307	185.6949	92.3261	0.0000	0.0000	0.0000	0.0000	173.7604	323.7199
Space heating requirement after solar contribution - total per year (kWh/year)											
Space heating per m2											

8c. Space cooling requirement											
Calculated for June, July and August. See Table 10b											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	685.4212	539.5869	553.5348	0.0000	0.0000	0.0000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7974	0.8665	0.8427	0.0000	0.0000	0.0000
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	546.5744	467.5610	466.4803	0.0000	0.0000	0.0000
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	697.2443	669.5585	637.4725	0.0000	0.0000	0.0000
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	108.4824	150.2861	127.2182	0.0000	0.0000	0.0000
Cooled fraction											
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
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	27.1206	37.5715	31.8046	0.0000	0.0000	0.0000
Space cooling requirement											
Energy for space heating											
Energy for space cooling											
Total											
Fabric Energy Efficiency (DFEE)											

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											
Ground floor											
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)						70.5900					
Dwelling volume											

2. Ventilation rate											
m3 per hour											
Number of open chimneys											
Number of open flues											
Number of chimneys / flues attached to closed fire											
Number of flues attached to solid fuel boiler											
Number of flues attached to other heater											
Number of blocked chimneys											
Number of intermittent extract fans											
Number of passive vents											
Number of flueless gas fires											

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Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											Air changes per hour	(8)
Pressure test												30.0000 / (5) =	0.1518
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000	(17)
Number of sides sheltered												0.4018	(18)
												3	(19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3114 (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)
	0.3970	0.3892	0.3814	0.3425	0.3347	0.2958	0.2958	0.2880	0.3114	0.3347	0.3503	0.3659	(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	0.5788	0.5757	0.5727	0.5587	0.5560	0.5438	0.5438	0.5415	0.5485	0.5560	0.5614	0.5669	(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			14.4600	1.1450	16.5573		(27)
External Wall 1	47.3900	14.4600	32.9300	0.1800	5.9274		(29a)
Corridor wall	15.6000	2.4200	13.1800	0.1800	2.3724		(29a)
External Roof 1	70.5900		70.5900	0.1100	7.7649		(30)
Total net area of external elements Aum(A, m2)			133.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	35.0420		(33)
Main dwelling							
Party Wall 1			40.8500	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							154.9748 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				9.1600	0.0500	0.4580	
E3 Sill				5.6700	0.0500	0.2835	
E4 Jamb				21.6000	0.0500	1.0800	
E7 Party floor between dwellings (in blocks of flats)				12.5700	0.0700	0.8799	
E7 Party floor between dwellings (in blocks of flats)				5.5700	0.0700	0.3899	
E9 Balcony between dwellings, wall insulation continuous				4.3600	0.0200	0.0872	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E18 Party wall between dwellings				5.6000	0.0600	0.3360	
E25 Staggered party wall between dwellings				5.6000	0.0600	0.3360	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.5900	0.0000	0.0000	
E14 Flat roof				22.5000	0.0800	1.8000	
P4 Party wall - Roof (insulation at ceiling level)				14.5900	0.1200	1.7508	
E16 Corner (normal)				2.8000	0.0900	0.2520	
E17 Corner (inverted - internal area greater than external area)				5.6000	-0.0900	-0.5040	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							7.4013 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	42.4433 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2604 (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	26.8362	26.4377	25.8764	24.8416	24.0667	23.2075	22.7434	23.3007	23.9075	24.8269	25.8831	26.7455 (42b)
Hot water usage for other uses	37.7784	36.4046	35.0309	33.6571	32.2833	30.9096	30.9096	32.2833	33.6571	35.0309	36.4046	37.7784 (42c)
Average daily hot water use (litres/day)												59.2254 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	64.6146	62.8423	60.9073	58.4987	56.3500	54.1171	53.6529	55.5840	57.5646	59.8578	62.2877	64.5239 (44)
Energy content (annual)	102.3337	89.4866	93.6122	80.0818	75.8580	66.5432	64.8886	68.8246	70.9829	81.2264	88.7402	101.0288 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(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	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	86.9837	76.0636	79.5704	68.0695	64.4793	56.5617	55.1553	58.5009	60.3355	69.0425	75.4292	85.8745 (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	86.9837	76.0636	79.5704	68.0695	64.4793	56.5617	55.1553	58.5009	60.3355	69.0425	75.4292	85.8745 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											836.0660 (64)
												836 (64)

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Electric shower(s)	49.7466	44.3246	48.4008	46.1883	47.0550	44.8859	46.3821	47.0550	46.1883	48.4008	47.4907	49.7466 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												565.8644 (64a)
Heat gains from water heating, kWh/month	34.1826	30.0970	31.9928	28.5644	27.8836	25.3619	25.3843	26.3890	26.6309	29.3608	30.7300	33.9053 (65)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	113.0182	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	100.6795	111.4666	100.6795	104.0355	100.6795	104.0355	100.6795	100.6795	104.0355	100.6795	104.0355	100.6795	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	198.6701	200.7317	195.5366	184.4769	170.5159	157.3946	148.6287	146.5672	151.7623	162.8220	176.7830	189.9043	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	34.3018	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	-90.4145	(71)
Water heating gains (Table 5)	45.9443	44.7873	43.0011	39.6728	37.4779	35.2249	34.1187	35.4691	36.9874	39.4635	42.6805	45.5716	(72)
Total internal gains	402.1994	413.8910	396.1226	385.0906	365.5788	353.5604	340.3324	339.6212	349.6906	359.8704	380.4044	393.0608	(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					3.7400	11.2829	0.6300	0.7000			0.7700			12.8963 (75)
Southeast					10.7200	36.7938	0.6300	0.7000			0.7700			120.5429 (77)
Solar gains	133.4392	231.5800	328.2359	425.7717	494.3073	498.3897	477.3144	425.0131	361.8294	259.0131	160.6095			113.6914 (83)
Total gains	535.6386	645.4710	724.3586	810.8623	859.8861	851.9501	817.6468	764.6343	711.5200	618.8835	541.0139			506.7522 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	37.8921	37.9866	38.0797	38.5234	38.6075	39.0042	39.0042	39.0785	38.8504	38.6075	38.4377	38.2617	
alpha	3.5261	3.5324	3.5386	3.5682	3.5738	3.6003	3.6003	3.6052	3.5900	3.5738	3.5625	3.5508	
util living area	0.9759	0.9545	0.9191	0.8399	0.7147	0.5467	0.4084	0.4512	0.6640	0.8756	0.9577	0.9798	(86)
MIT	19.2209	19.5352	19.9278	20.4013	20.7426	20.9278	20.9805	20.9721	20.8525	20.3938	19.7292	19.1694	(87)
Th 2	19.9715	19.9738	19.9760	19.9866	19.9886	19.9978	19.9978	19.9995	19.9943	19.9886	19.9846	19.9804	(88)
util rest of house	0.9710	0.9457	0.9033	0.8096	0.6636	0.4731	0.3200	0.3598	0.5923	0.8448	0.9479	0.9757	(89)
MIT 2	18.3664	18.6755	19.0572	19.5092	19.8093	19.9595	19.9910	19.9890	19.9074	19.5151	18.8778	18.3222	(90)
Living area fraction	18.7601	19.0715	19.4583	19.9202	20.2393	20.4056	20.4469	20.4419	20.3428	19.9199	19.2701	18.7125	(91)
MIT	18.7601	19.0715	19.4583	19.9202	20.2393	20.4056	20.4469	20.4419	20.3428	19.9199	19.2701	18.7125	(92)
Temperature adjustment	18.7601	19.0715	19.4583	19.9202	20.2393	20.4056	20.4469	20.4419	20.3428	19.9199	19.2701	18.7125	(93)
adjusted MIT	18.7601	19.0715	19.4583	19.9202	20.2393	20.4056	20.4469	20.4419	20.3428	19.9199	19.2701	18.7125	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9636	0.9361	0.8939	0.8074	0.6770	0.5040	0.3602	0.4011	0.6185	0.8424	0.9393	0.9690	(94)
Useful gains	516.1287	604.2502	647.5289	654.7112	582.1047	429.3514	294.5371	306.6708	440.0805	521.3768	508.1855	491.0314	(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	1159.6422	1133.6738	1034.0801	869.2941	672.1273	452.3106	299.7069	314.3045	488.2958	733.5681	962.1382	1152.6050	(97)
Space heating kWh	478.7740	355.7727	287.5942	154.4997	66.9768	0.0000	0.0000	0.0000	0.0000	157.8703	326.8460	492.2107	(98a)
Space heating requirement - total per year (kWh/year)												2320.5443	
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	478.7740	355.7727	287.5942	154.4997	66.9768	0.0000	0.0000	0.0000	0.0000	157.8703	326.8460	492.2107	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2320.5443	
Space heating per m ²										(98c) / (4) =		32.8736	(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	732.3501	576.5309	590.9864	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8736	0.9213	0.9015	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	639.7803	531.1684	532.7503	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	957.5145	919.4009	859.3969	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	228.7686	288.8450	243.0251	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	57.1922	72.2112	60.7563	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												190.1597	(107)

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Energy for space heating
Energy for space cooling
Total
Fabric Energy Efficiency (TFEE)

32.8736 (99)
2.6939 (108)
35.5674 (109)
35.6 (109)