

Summary for Input Data

Plot Reference	A 415	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	82 B	DER	5.21	TER	13.94
Environmental	96 A	% DER < TER			62.63
CO ₂ Emissions (t/year)	0.34	DFEE	35.05	TFEE	36.27
Compliance Check	See BREL	% DFEE < TFEE			3.38
% DPER < TPER	26.28	DPER	55.00	TPER	74.61

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	4	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	168.69	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:	32.85 m	72.81 m ²	2.80 m

8.0 Living Area	35.90	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	49.94	35.48	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	42.04	39.62	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	7.90	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	152.88

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	72.81

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



Party Floor 1 Lowest occupied Precast concrete planks floor, screed, carpeted 40.00 72.81

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

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	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	26.95	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	30.03	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	8.72	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	5.60	0.00	0.00	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	0.05	0.05	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	5.64	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	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
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	m³/(h.m²) @ 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
			7
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
			Efficiency
			Percentage Of Heat
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water
Heat source 2	None		
Heat source 3	None		
Heat source 4	None		
Heat source 5	None		
27.0 Secondary Heating		None	
28.0 Water Heating		Community Heating	
Water 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 mains		
Bath Count	1		
28.1 Showers			
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]
Shower 1	Combi boiler or unvented hot water system	8.00	
Shower 2	Combi boiler or unvented hot water system	8.00	
			Connected
			Connected To
			No
			No
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		

Summary for Input Data



PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.35	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
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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				3.38
% DPER < TPER	26.28		DPER	55.00		TPER	74.61
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	72.8100 (1b)	2.8000 (2b)	203.8680 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	203.8680 (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	2	(19)

Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (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	49.9400	14.4600	35.4800	0.1500	5.3220	70.0000	2483.5999 (29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.4309		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000	70.0000	553.0000 (32)
Party Floor 1			72.8100			40.0000	2912.4000 (32d)
Party Ceiling 1			72.8100			30.0000	2184.3000 (32b)
Internal Wall 1			152.8800			9.0000	1375.9200 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12282.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		168.6941 (35)
List of Thermal Bridges		

Full SAP Calculation Printout



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)	26.9500	0.0500	1.3475
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0360	1.0811
E9 Balcony between dwellings, wall insulation continuous	8.7200	0.0500	0.4360
E16 Corner (normal)	5.6000	0.0500	0.2800
E16 Corner (normal)	5.6000	0.0360	0.2016
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0360	0.1008
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.6400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.1358 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	36.5666 (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	17.6306	17.4162	17.2017	16.1295	15.9151	14.8429	14.8429	14.6284	15.2718	15.9151	16.3440	16.7729	(38)
Heat transfer coeff	54.1973	53.9828	53.7684	52.6962	52.4817	51.4095	51.4095	51.1951	51.8384	52.4817	52.9106	53.3395	(39)
Average = Sum(39)m / 12 =												52.6425	
HLP	0.7444	0.7414	0.7385	0.7237	0.7208	0.7061	0.7061	0.7031	0.7120	0.7208	0.7267	0.7326	(40)
HLP (average)												0.7230	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3124 (42)
Hot water usage for mixer showers	62.9905	62.0438	60.6644	58.0252	56.0774	53.9054	52.6708	54.0397	55.5404	57.8725	60.5685	62.7491	(42a)
Hot water usage for baths	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447	27.1192	(42b)
Hot water usage for other uses	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178	38.3110	(42c)
Average daily hot water use (litres/day)												118.1323	(43)
Daily hot water use	128.5126	125.7687	122.4271	117.3454	113.2188	108.7824	107.0772	110.4044	113.9135	118.5710	123.7310	128.1793	(44)
Energy conte	203.5325	179.0930	188.1659	160.6400	152.4143	133.7607	129.5006	136.7038	140.4668	160.8998	176.2775	200.6977	(45)
Energy content (annual)										Total = Sum(45)m =		1962.1526	
Distribution loss (46)m = 0.15 x (45)m	30.5299	26.8639	28.2249	24.0960	22.8621	20.0641	19.4251	20.5056	21.0700	24.1350	26.4416	30.1047	(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	258.8093	229.0204	243.4427	214.1337	207.6911	187.2544	184.7774	191.9806	193.9605	216.1766	229.7712	255.9745	(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	258.8093	229.0204	243.4427	214.1337	207.6911	187.2544	184.7774	191.9806	193.9605	216.1766	229.7712	255.9745	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2612.9924	(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	111.8960	99.4904	106.7866	96.2077	94.8992	87.2704	87.2804	89.6754	89.5001	97.7206	101.4072	110.9534	(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	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	103.5773	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	(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)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	(71)
Water heating gains (Table 5)	150.3979	148.0511	143.5304	133.6219	127.5527	121.2089	117.3124	120.5315	124.3058	131.3449	140.8434	149.1310	(72)
Total internal gains	515.4253	526.2906	505.3439	487.5446	463.7039	447.3549	431.0152	432.1199	444.6750	459.6050	486.8749	505.1678	(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		10.7200			11.2829		0.3500		0.7000		0.7700		20.5360 (75)	
Southeast		3.7400			36.7938		0.3500		0.7000		0.7700		23.3639 (77)	

Solar gains	43.9000	81.5991	129.7659	191.1555	241.8297	252.2739	238.1448	198.4755	150.7311	95.0696	53.8242	36.7654 (83)		
Total gains	559.3252	607.8897	635.1098	678.7001	705.5337	699.6288	669.1600	630.5953	595.4061	554.6745	540.6992	541.9332 (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	62.9522	63.2023	63.4544	64.7455	65.0101	66.3659	66.3659	66.6439	65.8168	65.0101	64.4831	63.9646		
alpha	5.1968	5.2135	5.2303	5.3164	5.3340	5.4244	5.4244	5.4429	5.3878	5.3340	5.2989	5.2643		
util living area	0.9670	0.9477	0.9120	0.8143	0.6587	0.4661	0.3374	0.3724	0.5847	0.8353	0.9394	0.9708 (86)		
MIT	20.1985	20.3546	20.5583	20.8119	20.9483	20.9935	20.9991	20.9985	20.9788	20.8172	20.4969	20.1831 (87)		
Th 2	20.3018	20.3044	20.3070	20.3199	20.3225	20.3355	20.3355	20.3381	20.3303	20.3225	20.3173	20.3121 (88)		
util rest of house	0.9611	0.9387	0.8973	0.7871	0.6185	0.4192	0.2867	0.3193	0.5330	0.8050	0.9277	0.9655 (89)		
MIT 2	19.3708	19.5670	19.8190	20.1279	20.2766	20.3310	20.3350	20.3373	20.3144	20.1413	19.7562	19.3597 (90)		
Living area fraction									fLA = Living area /	(4) =		0.4931 (91)		
MIT	19.7789	19.9554	20.1835	20.4652	20.6078	20.6576	20.6624	20.6633	20.6420	20.4746	20.1214	19.7657 (92)		
Temperature adjustment												0.0000		
adjusted MIT	19.7789	19.9554	20.1835	20.4652	20.6078	20.6576	20.6624	20.6633	20.6420	20.4746	20.1214	19.7657 (93)		

8. Space heating requirement														

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9559	0.9336	0.8944	0.7931	0.6357	0.4420	0.3117	0.3454	0.5574	0.8122	0.9239	0.9605 (94)		
Useful gains	534.6487	567.5391	568.0294	538.3062	448.5381	309.2659	208.5883	217.8153	331.8932	450.4900	499.5326	520.5345 (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	838.9136	812.7304	735.7414	609.4408	467.4958	311.4195	208.8480	218.2589	339.1258	518.2351	688.9694	830.2661 (97)		
Space heating kWh	226.3731	164.7685	124.7777	51.2169	14.1045	0.0000	0.0000	0.0000	0.0000	50.4024	136.3945	230.4403 (98a)		
Space heating requirement - total per year (kWh/year)												998.4780		
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	226.3731	164.7685	124.7777	51.2169	14.1045	0.0000	0.0000	0.0000	0.0000	50.4024	136.3945	230.4403 (98c)		
Space heating requirement after solar contribution - total per year (kWh/year)												998.4780		
Space heating per m2										(98c) / (4) =		13.7135 (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														
226.3731 164.7685 124.7777 51.2169 14.1045 0.0000 0.0000 0.0000 0.0000 50.4024 136.3945 230.4403 (98)														
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50														
307a 339.5597 247.1528 187.1666 76.8254 21.1568 0.0000 0.0000 0.0000 0.0000 75.6036 204.5917 345.6605														
Space heating requirement														
339.5597 247.1528 187.1666 76.8254 21.1568 0.0000 0.0000 0.0000 0.0000 75.6036 204.5917 345.6605 (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														
258.8093 229.0204 243.4427 214.1337 207.6911 187.2544 184.7774 191.9806 193.9605 216.1766 229.7712 255.9745 (64)														
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50														
310a 388.2140 343.5306 365.1640 321.2005 311.5367 280.8816 277.1662 287.9709 290.9407 324.2649 344.6568 383.9618														
Water heating fuel														
388.2140 343.5306 365.1640 321.2005 311.5367 280.8816 277.1662 287.9709 290.9407 324.2649 344.6568 383.9618 (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 16.1071 14.5484 16.1071 15.5875 16.1071 15.5875 16.1071 16.1071 15.5875 16.1071 15.5875 16.1071 (331)														
Lighting 22.1766 17.7909 16.0187 11.7360 9.0652 7.4064 8.2696 10.7492 13.9621 18.3190 20.6913 22.7930 (332)														
Electricity generated by PVs (Appendix M) (negative quantity)														
(333a)m -3.8367 -6.8113 -12.5669 -17.6877 -22.1125 -21.8089 -21.3521 -18.3737 -13.8126 -8.8812 -4.6070 -3.1321 (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													1497.7170 (307)	
Space heating fuel - secondary													0.0000 (309)	
Water heating fuel - community heating													3919.4886 (310)	
Efficiency of water heater													0.0000 (311)	
Electricity used for heat distribution													14.9772 (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)													189.6482 (330a)	
Total electricity for the above, kWh/year													189.6482 (331)	
Electricity for lighting (calculated in Appendix L)													178.9780 (332)	

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

PV generation	-154.9829 (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	5630.8489 (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	2335.0024	0.1568	101.2181 (367)
Electrical energy for heat distribution (space & water)	14.9772	0.0000	7.8694 (372)
Overall CO2 factor for heat network			0.0641 (386)
Total CO2 associated with community systems			347.0686 (373)
Space and water heating			347.0686 (376)
Pumps, fans and electric keep-hot	189.6482	0.1387	26.3065 (378)
Energy for lighting	178.9780	0.1443	25.8321 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-154.9829	0.1305	-20.2303
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.2303 (380)
Total CO2, kg/year			378.9769 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.2100 (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	2335.0024	1.5805	1020.2889 (467)
Electrical energy for heat distribution (space & water)	14.9772	0.0000	83.2808 (472)
Overall CO2 factor for heat network			0.6780 (486)
Total CO2 associated with community systems			3672.9692 (473)
Space and water heating			3672.9692 (476)
Pumps, fans and electric keep-hot	189.6482	1.5128	286.8998 (478)
Energy for lighting	178.9780	1.5338	274.5224 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-154.9829	1.4822	-229.7139
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-229.7139 (480)
Total Primary energy kWh/year			4004.6775 (483)
Dwelling Primary energy Rate (DPER)			55.0000 (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	72.8100 (1b)	x 2.8000 (2b)	= 203.8680 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 203.8680 (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) = 0.1472 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3972 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3376 (21)

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

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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	0.4304	0.4220	0.4135	0.3713	0.3629	0.3207	0.3207	0.3123	0.3376	0.3629	0.3798	0.3967 (22b)
	0.5926	0.5890	0.5855	0.5689	0.5658	0.5514	0.5514	0.5488	0.5570	0.5658	0.5721	0.5787 (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	49.9400	14.4600	35.4800	0.1800	6.3864		(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316		(29a)
Total net area of external elements Aum(A, m2)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26) ... (30) + (32) =	32.4953		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							168.6941 (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)	26.9500	0.0700	1.8865
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0700	2.1021
E9 Balcony between dwellings, wall insulation continuous	8.7200	0.0200	0.1744
E16 Corner (normal)	5.6000	0.0900	0.5040
E16 Corner (normal)	5.6000	0.0900	0.5040
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
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)	5.6400	0.0000	0.0000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.8245 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	39.3198 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	39.8700	39.6280	39.3908	38.2767	38.0682	37.0979	37.0979	36.9182	37.4717	38.0682	38.4899	38.9308 (38)
Heat transfer coeff	79.1897	78.9477	78.7105	77.5964	77.3880	76.4177	76.4177	76.2380	76.7914	77.3880	77.8097	78.2505 (39)
Average = Sum(39)m / 12 =												77.5954
HLP	1.0876	1.0843	1.0810	1.0657	1.0629	1.0495	1.0495	1.0471	1.0547	1.0629	1.0687	1.0747 (40)
HLP (average)												1.0657
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

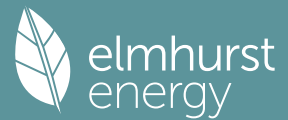
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3124 (42)
Hot water usage for mixer showers	62.9905	62.0438	60.6644	58.0252	56.0774	53.9054	52.6708	54.0397	55.5404	57.8725	60.5685	62.7491 (42a)
Hot water usage for baths	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447	27.1192 (42b)
Hot water usage for other uses	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178	38.3110 (42c)
Average daily hot water use (litres/day)												118.1323 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	128.5126	125.7687	122.4271	117.3454	113.2188	108.7824	107.0772	110.4044	113.9135	118.5710	123.7310	128.1793 (44)
Distribution loss (46)m = 0.15 x (45)m	203.5325	179.0930	188.1659	160.6400	152.4143	133.7607	129.5006	136.7038	140.4668	160.8998	176.2775	200.6977 (45)
Water storage loss (or HIU loss):	Total = Sum(45)m = 1962.1526											
Store volume	30.5299	26.8639	28.2249	24.0960	22.8621	20.0641	19.4251	20.5056	21.0700	24.1350	26.4416	30.1047 (46)
a) If manufacturer declared loss factor is known (kWh/day):												
Temperature factor from Table 2b	1.5520 (48)											
Enter (49) or (54) in (55)	0.5400 (49)											
Total storage loss	0.8381 (55)											
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 (56)
Primary 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 (57)
Combi 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)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
WWHRS	252.7752	223.5702	237.4085	208.2942	201.6570	181.4149	178.7433	185.9464	188.1210	210.1424	223.9317	249.9404 (62)
PV diverter	-28.7966	-25.4680	-26.6686	-22.0826	-20.5802	-17.6106	-16.5072	-17.5537	-18.2206	-21.4801	-24.3344	-28.2633 (63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	223.9786	198.1023	210.7400	186.2115	181.0768	163.8042	162.2361	168.3927	169.9003	188.6623	199.5973	221.6771 (64)
Electric shower(s)	Total per year (kWh/year) = Sum(64)m = 2274.3793 (64)											
	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												
	107.0687	95.1302	101.9593	91.5361	90.0719	82.5988	82.4531	84.8481	84.8286	92.8933	96.7356	106.1261 (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	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	103.5773	114.6749	103.5773	107.0299	103.5773	107.0299	103.5773	103.5773	107.0299	103.5773	107.0299	103.5773 (67)

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Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618 (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)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947 (71)
Water heating gains (Table 5)	143.9095	141.5628	137.0421	127.1335	121.0644	114.7205	110.8241	114.0432	117.8174	124.8566	134.3551	142.6427 (72)
Total internal gains	511.9370	522.8023	501.8556	484.0563	460.2156	440.8666	424.5269	425.6316	438.1867	456.1166	483.3866	501.6794 (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				10.7200	11.2829	0.6300	0.7000	0.7700	36.9648 (75)			
Southeast				3.7400	36.7938	0.6300	0.7000	0.7700	42.0551 (77)			
Solar gains	79.0199	146.8784	233.5786	344.0799	435.2935	454.0930	428.6606	357.2558	271.3159	171.1253	96.8836	66.1777 (83)
Total gains	590.9569	669.6806	735.4342	828.1362	895.5091	894.9596	853.1875	782.8874	709.5027	627.2419	580.2703	567.8572 (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	43.0844	43.2164	43.3467	43.9690	44.0874	44.6473	44.6473	44.7525	44.4300	44.0874	43.8485	43.6015
alpha	3.8723	3.8811	3.8898	3.9313	3.9392	3.9765	3.9765	3.9835	3.9620	3.9392	3.9232	3.9068
util living area	0.9751	0.9589	0.9271	0.8440	0.7027	0.5229	0.3882	0.4377	0.6691	0.8833	0.9577	0.9783 (86)
MIT	19.4981	19.7332	20.0738	20.5143	20.8168	20.9571	20.9897	20.9836	20.8881	20.4921	19.9368	19.4673 (87)
Th 2	20.0110	20.0137	20.0163	20.0289	20.0313	20.0422	20.0422	20.0443	20.0380	20.0313	20.0265	20.0215 (88)
util rest of house	0.9698	0.9504	0.9121	0.8136	0.6511	0.4526	0.3063	0.3512	0.5978	0.8531	0.9476	0.9737 (89)
MIT 2	18.2780	18.5747	18.9996	19.5360	19.8710	20.0141	20.0378	20.0367	19.9552	19.5251	18.8435	18.2464 (90)
Living area fraction	18.8796	19.1459	19.5292	20.0184	20.3373	20.4790	20.5072	20.5036	20.4152	20.0019	19.3825	18.8484 (92)
MIT	18.8796	19.1459	19.5292	20.0184	20.3373	20.4790	20.5072	20.5036	20.4152	20.0019	19.3825	18.8484 (93)
Temperature adjustment	18.8796	19.1459	19.5292	20.0184	20.3373	20.4790	20.5072	20.5036	20.4152	20.0019	19.3825	18.8484 (93)
adjusted MIT	18.8796	19.1459	19.5292	20.0184	20.3373	20.4790	20.5072	20.5036	20.4152	20.0019	19.3825	18.8484 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9620	0.9412	0.9034	0.8132	0.6682	0.4853	0.3464	0.3933	0.6271	0.8520	0.9393	0.9665 (94)
Ext temp.	568.5300	630.3254	664.3831	673.4382	598.3372	434.3397	295.5760	307.9365	444.9014	534.4413	545.0626	548.8232 (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	1154.5534	1124.6830	1025.5379	862.7462	668.4270	449.2631	298.5759	312.8501	484.9500	727.5955	955.6992	1146.2455 (97)
Space heating requirement - total per year (kWh/year)	436.0014	332.2083	268.6992	136.3017	52.1468	0.0000	0.0000	0.0000	0.0000	143.7067	295.6584	444.4821 (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)	436.0014	332.2083	268.6992	136.3017	52.1468	0.0000	0.0000	0.0000	0.0000	143.7067	295.6584	444.4821 (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	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)

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
436.0014	332.2083	268.6992	136.3017	52.1468	0.0000	0.0000	0.0000	0.0000	0.0000	143.7067	295.6584	444.4821 (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)	472.3742	359.9223	291.1151	147.6725	56.4971	0.0000	0.0000	0.0000	0.0000	155.6952	320.3233	481.5624 (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	223.9786	198.1023	210.7400	186.2115	181.0768	163.8042	162.2361	168.3927	169.9003	188.6623	199.5973	221.6771 (64)
Water heating requirement	85.5265	85.2100	84.6058	83.3711	81.6503	79.8000	79.8000	79.8000	79.8000	83.4572	84.9392	79.8000 (216)
Efficiency of water heater (217)m	261.8822	232.4870	249.0846	223.3527	221.7711	205.2685	203.3034	211.0184	212.9077	226.0587	234.9884	259.0053 (219)
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	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa	21.5213	17.2652	15.5454	11.3892	8.7974	7.1875	8.0253	10.4315	13.5495	17.7777	20.0799	22.1195 (232)
Lighting	Electricity generated by PVs (Appendix M) (negative quantity)											

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(233a)m	-13.7740	-20.8393	-32.1185	-38.8067	-44.2557	-42.1987	-41.6854	-38.1432	-32.3476	-24.9750	-15.6385	-11.7487	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-3.9941	-8.6614	-17.7125	-27.3537	-36.9195	-37.3745	-36.9360	-30.9265	-22.2184	-12.6275	-5.4079	-3.1395	(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												2285.1621	(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												2741.1281	(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)												173.6894	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-599.8028	(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												4686.1768	(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	2285.1621	0.2100	479.8840 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2741.1281	0.2100	575.6369 (264)
Space and water heating			1055.5209 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	173.6894	0.1443	25.0688 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-356.5312	0.1331	-47.4671
PV Unit electricity exported	-243.2716	0.1251	-30.4309
Total			-77.8980 (269)
Total CO2, kg/year			1014.6209 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9400 (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	2285.1621	1.1300	2582.2332 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2741.1281	1.1300	3097.4747 (278)
Space and water heating			5679.7079 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	173.6894	1.5338	266.4106 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-356.5312	1.4920	-531.9319
PV Unit electricity exported	-243.2716	0.4591	-111.6929
Total			-643.6249 (283)
Total Primary energy kWh/year			5432.5945 (286)
Target Primary Energy Rate (TPER)			74.6100 (287)

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Plot Reference	A 415				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.21	TER	13.94		
Environmental	96 A	% DER < TER				62.63	
CO ₂ Emissions (t/year)	0.34	DFEE	35.05	TFEE	36.27		
Compliance Check	See BREL	% DFEE < TFEE				3.38	
% DPER < TPER	26.28	DPER	55.00	TPER	74.61		
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	72.8100 (1b)	2.8000 (2b)	203.8680 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8100		203.8680 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	203.8680 (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	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) = 0.1472 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2972 (18)
Number of sides sheltered	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2526 (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	0.3220	0.3157	0.3094	0.2778	0.2715	0.2400	0.2400	0.2336	0.2526	0.2715	0.2842	0.2968 (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	0.5519	0.5498	0.5479	0.5386	0.5369	0.5288	0.5288	0.5273	0.5319	0.5369	0.5404	0.5440 (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	49.9400	14.4600	35.4800	0.1500	5.3220	70.0000	2483.5999 (29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.4309		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000	70.0000	553.0000 (32)
Party Floor 1			72.8100			40.0000	2912.4000 (32d)
Party Ceiling 1			72.8100			30.0000	2184.3000 (32b)
Internal Wall 1			152.8800			9.0000	1375.9200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12282.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							168.6941 (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

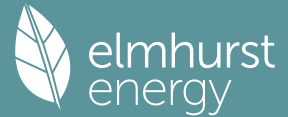
Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)m \times (5)$												
(38)m	Jan 37.1268	Feb 36.9914	Mar 36.8586	Apr 36.2349	May 36.1182	Jun 35.5750	Jul 35.5750	Aug 35.4744	Sep 35.7842	Oct 36.1182	Nov 36.3543	Dec 36.6011 (38)
Heat transfer coeff	73.6935	73.5580	73.4252	72.8015	72.6848	72.1416	72.1416	72.0410	72.3509	72.6848	72.9209	73.1677 (39)
Average = Sum(39)m / 12 =												72.8010
HLP	Jan 1.0121	Feb 1.0103	Mar 1.0084	Apr 0.9999	May 0.9983	Jun 0.9908	Jul 0.9908	Aug 0.9894	Sep 0.9937	Oct 0.9983	Nov 1.0015	Dec 1.0049 (40)
HLP (average)												0.9999
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy											2.3124 (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 (42a)	
Hot water usage for baths												
	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447 (42b)	
Hot water usage for other uses												
	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178 (42c)	
Average daily hot water use (litres/day)											60.0572 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	65.5221	63.7249	61.7627	59.3202	57.1414	54.8771	54.4065	56.3647	58.3731	60.6985	63.1625	65.4301 (44)
Energy content (annual)												
	103.7710	90.7434	94.9269	81.2064	76.9233	67.4777	65.7999	69.7913	71.9799	82.3673	89.9866	102.4478 (45)
Distribution loss (46)m = 0.15 x (45)m											Total = Sum(45)m = 997.4216	
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												
	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806 (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												
	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806 (64)
12Total per year (kWh/year)											Total per year (kWh/year) = Sum(64)m = 847.8084 (64)	
Electric shower(s)											848 (64)	
	50.4449	44.9468	49.0802	46.8366	47.7155	45.5159	47.0331	47.7155	46.8366	49.0802	48.1573	50.4449 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											573.8073 (64a)	
Heat gains from water heating, kWh/month												
	34.6626	30.5197	32.4420	28.9655	28.2751	25.7180	25.7408	26.7595	27.0049	29.7731	31.1615	34.3814 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.5773	114.6749	103.5773	107.0299	103.5773	107.0299	103.5773	103.5773	107.0299	103.5773	107.0299	103.5773 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618 (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)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947 (71)
Water heating gains (Table 5)	46.5895	45.4162	43.6049	40.2299	38.0041	35.7195	34.5978	35.9671	37.5068	40.0176	43.2798	46.2115 (72)
Total internal gains	411.6169	423.6556	405.4184	394.1526	374.1554	361.8655	348.3006	347.5555	357.8760	368.2776	389.3114	402.2483 (73)

[Jan					Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
Northeast					10.7200	11.2829	0.3500	0.7000	0.7700	20.5360 (75)		
Southeast					3.7400	36.7938	0.3500	0.7000	0.7700	23.3639 (77)		
Solar gains	43.9000	81.5991	129.7659	191.1555	241.8297	252.2739	238.1448	198.4755	150.7311	95.0696	53.8242	36.7654 (83)
Total gains	455.5168	505.2547	535.1843	585.3081	615.9851	614.1394	586.4454	546.0309	508.6071	463.3472	443.1356	439.0137 (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	46.2977	46.3830	46.4669	46.8649	46.9402	47.2936	47.2936	47.3597	47.1568	46.9402	46.7882	46.6304	
alpha	4.0865	4.0922	4.0978	4.1243	4.1293	4.1529	4.1529	4.1573	4.1438	4.1293	4.1192	4.1087	
util living area	0.9891	0.9822	0.9694	0.9291	0.8405	0.6777	0.5210	0.5745	0.7980	0.9442	0.9811	0.9906 (86)	
MIT	19.3998	19.5881	19.8793	20.3064	20.6743	20.9061	20.9755	20.9635	20.8076	20.3445	19.8095	19.3677 (87)	
Th 2	20.0732	20.0748	20.0763	20.0834	20.0848	20.0910	20.0910	20.0921	20.0886	20.0848	20.0821	20.0792 (88)	
util rest of house	0.9867	0.9783	0.9622	0.9117	0.8007	0.6036	0.4220	0.4742	0.7363	0.9269	0.9762	0.9885 (89)	
MIT 2	18.6109	18.7985	19.0870	19.5061	19.8456	20.0386	20.0820	20.0776	19.9674	19.5498	19.0248	18.5835 (90)	
Living area fraction	fLA = Living area / (4) =												0.4931 (91)
MIT	18.9999	19.1878	19.4776	19.9007	20.2542	20.4663	20.5226	20.5144	20.3817	19.9416	19.4117	18.9702 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.9999	19.1878	19.4776	19.9007	20.2542	20.4663	20.5226	20.5144	20.3817	19.9416	19.4117	18.9702 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9830	0.9734	0.9565	0.9076	0.8088	0.6356	0.4701	0.5224	0.7578	0.9237	0.9716	0.9852 (94)
Useful gains	447.7653	491.8340	511.8902	531.2388	498.1973	390.3582	275.7081	285.2416	385.4321	427.9960	430.5519	432.5118 (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	1083.2855	1050.9824	952.8861	800.8708	621.7607	423.2077	282.9800	296.4080	454.4853	678.9956	897.7797	1080.7002 (97)
Space heating kWh	472.8270	375.7477	328.1010	194.1351	91.9312	0.0000	0.0000	0.0000	0.0000	186.7438	336.4040	482.2522 (98a)
Space heating requirement - total per year (kWh/year)												2468.1418
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	472.8270	375.7477	328.1010	194.1351	91.9312	0.0000	0.0000	0.0000	0.0000	186.7438	336.4040	482.2522 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2468.1418
Space heating per m2												(98c) / (4) = 33.8984 (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	678.1314	533.8481	547.5119	0.0000	0.0000	0.0000	0.0000 (100)	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8059	0.8751	0.8426	0.0000	0.0000	0.0000	0.0000 (101)	
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	546.4859	467.1821	461.3386	0.0000	0.0000	0.0000	0.0000 (102)	
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	678.0227	647.6976	602.4804	0.0000	0.0000	0.0000	0.0000 (103)	
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	94.7065	134.3035	105.0095	0.0000	0.0000	0.0000	0.0000 (104)	
Cooled fraction	fC = cooled area / (4) =												1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)	
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.6766	33.5759	26.2524	0.0000	0.0000	0.0000	0.0000 (107)	
Space cooling requirement													83.5049 (107)
Energy for space heating													33.8984 (99)
Energy for space cooling													1.1469 (108)
Total													35.0453 (109)
Fabric Energy Efficiency (DFEE)													35.0 (109)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	72.8100 (1b)	x 2.8000 (2b)	= 203.8680 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.8100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	203.8680 (5)

2. Ventilation rate

m3 per hour		
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Air changes per hour		

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1472 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3972 (18)
 Number of sides sheltered 2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.3376 (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	0.4304	0.4220	0.4135	0.3713	0.3629	0.3207	0.3207	0.3123	0.3376	0.3629	0.3798	0.3967	(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	0.5926	0.5890	0.5855	0.5689	0.5658	0.5514	0.5514	0.5488	0.5570	0.5658	0.5721	0.5787	(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	49.9400	14.4600	35.4800	0.1800	6.3864			(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316			(29a)
Total net area of external elements Aum(A, m2)			91.9800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.4953			(33)
Main dwelling								
Party Wall 1			7.9000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 168.6941 (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)	26.9500	0.0700	1.8865	
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0700	2.1021	
E9 Balcony between dwellings, wall insulation continuous	8.7200	0.0200	0.1744	
E16 Corner (normal)	5.6000	0.0900	0.5040	
E16 Corner (normal)	5.6000	0.0900	0.5040	
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040	
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)	5.6400	0.0000	0.0000	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 6.8245 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 39.3198 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	39.8700	39.6280	39.3908	38.2767	38.0682	37.0979	37.0979	36.9182	37.4717	38.0682	38.4899	38.9308	(38)
Heat transfer coeff	79.1897	78.9477	78.7105	77.5964	77.3880	76.4177	76.4177	76.2380	76.7914	77.3880	77.8097	78.2505	(39)
Average = Sum(39)m / 12 =												77.5954	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0876	1.0843	1.0810	1.0657	1.0629	1.0495	1.0495	1.0471	1.0547	1.0629	1.0687	1.0747	(40)
HLP (average)												1.0657	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3124 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447	27.1192	(42b)
Hot water usage for other uses	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178	38.3110	(42c)
Average daily hot water use (litres/day)												60.0572	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	65.5221	63.7249	61.7627	59.3202	57.1414	54.8771	54.4065	56.3647	58.3731	60.6985	63.1625	65.4301	(44)
Energy content (annual)	103.7710	90.7434	94.9269	81.2064	76.9233	67.4777	65.7999	69.7913	71.9799	82.3673	89.9866	102.4478	(45)
Distribution loss (46)m = 0.15 x (45)m												997.4216	
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	(46)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806	(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	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806	(64)
12Total per year (kWh/year)												847.8084	(64)
Electric shower(s)	50.4449	44.9468	49.0802	46.8366	47.7155	45.5159	47.0331	47.7155	46.8366	49.0802	48.1573	50.4449	(64a)
Heat gains from water heating, kWh/month	34.6626	30.5197	32.4420	28.9655	28.2751	25.7180	25.7408	26.7595	27.0049	29.7731	31.1615	34.3814	(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	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.5773	114.6749	103.5773	107.0299	103.5773	107.0299	103.5773	103.5773	107.0299	103.5773	107.0299	103.5773	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	(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)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	(71)
Water heating gains (Table 5)	46.5895	45.4162	43.6049	40.2299	38.0041	35.7195	34.5978	35.9671	37.5068	40.0176	43.2798	46.2115	(72)
Total internal gains	411.6169	423.6556	405.4184	394.1526	374.1554	361.8655	348.3006	347.5555	357.8760	368.2776	389.3114	402.2483	(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				10.7200	11.2829	0.6300	0.7000			0.7700			36.9648 (75)
Southeast				3.7400	36.7938	0.6300	0.7000			0.7700			42.0551 (77)
Solar gains	79.0199	146.8784	233.5786	344.0799	435.2935	454.0930	428.6606	357.2558	271.3159	171.1253	96.8836	66.1777 (83)	
Total gains	490.6368	570.5340	638.9970	738.2325	809.4489	815.9585	776.9613	704.8113	629.1920	539.4029	486.1950	468.4260 (84)	

7. Mean internal temperature (heating season)

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

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	43.0844	43.2164	43.3467	43.9690	44.0874	44.6473	44.6473	44.7525	44.4300	44.0874	43.8485	43.6015	21.0000 (85)
alpha	3.8723	3.8811	3.8898	3.9313	3.9392	3.9765	3.9765	3.9835	3.9620	3.9392	3.9232	3.9068	
util living area	0.9864	0.9749	0.9510	0.8804	0.7482	0.5654	0.4238	0.4816	0.7248	0.9209	0.9756	0.9885	(86)
MIT	19.3124	19.5601	19.9243	20.4153	20.7690	20.9436	20.9859	20.9771	20.8502	20.3760	19.7721	19.2806	(87)
Th 2	20.0110	20.0137	20.0163	20.0289	20.0313	20.0422	20.0443	20.0443	20.0380	20.0313	20.0265	20.0215	(88)
util rest of house	0.9833	0.9694	0.9401	0.8545	0.6985	0.4919	0.3355	0.3883	0.6549	0.8977	0.9693	0.9859	(89)
MIT 2	18.4780	18.7243	19.0826	19.5579	19.8706	20.0128	20.0375	20.0358	19.9488	19.5339	18.9456	18.4543	(90)
Living area fraction	18.8894	19.1364	19.4976	19.9806	20.3136	20.4717	20.5051	20.4999	20.3933	19.9491	19.3531	18.8617	(91)
MIT	18.8894	19.1364	19.4976	19.9806	20.3136	20.4717	20.5051	20.4999	20.3933	19.9491	19.3531	18.8617	(92)
Temperature adjustment	18.8894	19.1364	19.4976	19.9806	20.3136	20.4717	20.5051	20.4999	20.3933	19.9491	19.3531	18.8617	(93)
adjusted MIT	18.8894	19.1364	19.4976	19.9806	20.3136	20.4717	20.5051	20.4999	20.3933	19.9491	19.3531	18.8617	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9788	0.9632	0.9331	0.8531	0.7138	0.5257	0.3788	0.4336	0.6823	0.8955	0.9638	0.9819	(94)
Useful gains	480.2344	549.5483	596.2656	629.7593	577.8174	428.9680	294.2932	305.6293	429.2943	483.0109	468.5881	459.9482	(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	1155.3306	1123.9318	1023.0505	859.8185	666.5875	448.7045	298.4195	312.5693	483.2693	723.5086	953.4129	1147.2881	(97)
Space heating kWh	502.2716	385.9857	317.5280	165.6426	66.0450	0.0000	0.0000	0.0000	0.0000	178.9303	349.0739	511.3809	(98a)
Space heating requirement - total per year (kWh/year)												2476.8580	
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	502.2716	385.9857	317.5280	165.6426	66.0450	0.0000	0.0000	0.0000	0.0000	178.9303	349.0739	511.3809	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2476.8580	
Space heating per m2												34.0181	(99)

8c. Space cooling requirement

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	718.3259	565.4906	579.4085	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8824	0.9286	0.9008	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	633.8322	525.1127	521.9449	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	913.9152	870.3784	788.0678	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	201.6597	256.8777	197.9955	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	50.4149	64.2194	49.4989	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												164.1332	(107)
Energy for space heating												34.0181	(99)
Energy for space cooling												2.2543	(108)
Total												36.2724	(109)
Fabric Energy Efficiency (TFEE)												36.3	(109)

