

Summary for Input Data



Plot Reference	A 105		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	81 B	DER	5.54	TER	16.65
Environmental	95 A	% DER < TER			66.73
CO ₂ Emissions (t/year)	0.41	DFEE	44.15	TFEE	50.89
Compliance Check	See BREL	% DFEE < TFEE			13.26
% DPER < TPER	35.28	DPER	58.06	TPER	89.72

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

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

Orientation	Southeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, End-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	1	
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	243.03	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
		34.12 m	86.15 m ²	2.80 m

8.0 Living Area	38.77	m ²
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9.0 External Walls	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	54.88	35.32	0.00	None	19.56	Enter Gross Area
	Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	40.66	38.24	0.70	Stairwell Access Corridor 3	2.42	Enter Gross Area

9.1 Party Walls	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	27.86	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Plasterboard on timber frame	9.00	197.43

10.1 Party Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	86.15

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	110.00	86.15

Summary for Input Data

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 East	2.42	
NW windows	Window	External Wall 1	North West	13.60	
NE windows	Window	External Wall 1	North East	5.96	

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
E4 Jamb	Independently assessed	28.80	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	15.24	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	14.52	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	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	2.80	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E20 Exposed floor (normal)	Independently assessed	19.60	0.10	0.10	No
E21 Exposed floor (inverted)	Independently assessed	14.52	0.10	0.10	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	9.95	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	9.95	0.08	0.08	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
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data

21.0 Fixed Cooling System		No	
22.0 Pressure Testing		Yes	
Designed AP ₅₀	3.00	m ² /(h.m ²) @ 50 Pa	
Test Method	Blower Door		
22.0 Lighting		No	
No Fixed Lighting	No		
	Name	Efficacy	Power
	Lighting 1	75.00	15.00
			Capacity
			1125.00
			Count
			8
24.0 Main Heating 1		None	
25.0 Main Heating 2		None	
26.0 Heat Networks		Space and Water Combined	
Space Community Heating			
Distribution Loss	Calculated		
Distribution Loss Value	1.50		
SAP Code	2306		
	Heat Source	Fuel Type	Heating Use
	Heat source 1	Heat pump	Electricity
	Heat source 2	None	Space and Water
	Heat source 3	None	
	Heat source 4	None	
	Heat source 5	None	
			Efficiency
			232.00
			Percentage Of Heat
			100.00
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
27.0 Secondary Heating		None	
28.0 Water Heating			
Water Heating	Community Heating		
SAP Code	901		
Flue Gas Heat Recovery System	No		
Waste Water Heat Recovery Instantaneous System 1	No		
Waste Water Heat Recovery Instantaneous System 2	No		
Waste Water Heat Recovery Storage System	No		
Solar Panel	No		
Water use <= 125 litres/person/day	Yes		
Cold Water Source	From header tank		
Bath Count	1		
28.1 Showers			
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]
Shower	Combi boiler or unvented hot water system	8.00	
Shower 2	Combi boiler or unvented hot water system	8.00	
			Connected
			No
			Connected To
			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		
PV Cells kWp	Orientation	Elevation	Overshading FGHRs
			MCS Certificate
			Overshading Factor
			MCS Certificate
			Panel Manufacturer

Summary for Input Data



0.41		North East	Horizontal	Modest	No		0.80		Reference		
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				13.26	
% DPER < TPER	35.28	DPER	58.06	TPER	89.72		
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	86.1500 (1b)	2.8000 (2b)	241.2200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1500		241.2200 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 241.2200 (5)

2. Ventilation rate

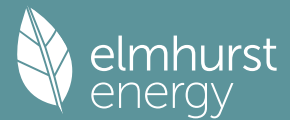
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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			19.5600	1.1450	22.3969		(27)
Heatloss Floor 1			86.1500	0.1000	8.6150	110.0000	9476.5000 (28b)
External Wall 1	54.8800	19.5600	35.3200	0.1500	5.2980	70.0000	2472.4001 (29a)
Corridor wall	40.6600	2.4200	38.2400	0.1900	7.2656	70.0000	2676.8000 (29a)
Total net area of external elements Aum(A, m ²)			181.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	45.9955		(33)
Main dwelling							
Party Wall 1			27.8600	0.0000	0.0000	70.0000	1950.2000 (32)
Party Ceiling 1			86.1500			30.0000	2584.5000 (32b)
Internal Wall 1			197.4300			9.0000	1776.8699 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		20937.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							243.0327 (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
E4 Jamb	28.8000	0.0400	1.1520
E7 Party floor between dwellings (in blocks of flats)	15.2400	0.0500	0.7620
E7 Party floor between dwellings (in blocks of flats)	14.5200	0.0390	0.5663
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	5.6000	0.0500	0.2800
E16 Corner (normal)	5.6000	0.0390	0.2184
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	19.6000	0.1000	1.9600
E21 Exposed floor (inverted)	14.5200	0.1000	1.4520
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.9500	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	9.9500	0.0800	0.7960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.1119 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	54.1074 (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	20.8609	20.6071	20.3534	19.0847	18.8310	17.5623	17.5623	17.3086	18.0698	18.8310	19.3385	19.8459	(38)
Heat transfer coeff	74.9683	74.7145	74.4608	73.1922	72.9384	71.6698	71.6698	71.4160	72.1772	72.9384	73.4459	73.9533	(39)
Average = Sum(39)m / 12 =												73.1287	
HLP	0.8702	0.8673	0.8643	0.8496	0.8466	0.8319	0.8319	0.8290	0.8378	0.8466	0.8525	0.8584	(40)
HLP (average)												0.8489	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5693 (42)
Hot water usage for mixer showers	65.5977	64.5934	63.1134	60.8365	58.7966	55.9426	53.6853	56.3242	57.6515	60.4782	63.4219	65.5386	(42a)
Hot water usage for baths	28.4157	27.9867	27.3765	26.4626	25.6390	24.5053	23.6451	24.6969	25.2489	26.3723	27.5403	28.3931	(42b)
Hot water usage for other uses	40.9419	39.4531	37.9643	36.4755	34.9867	33.4979	33.4979	34.9867	36.4755	37.9643	39.4531	40.9419	(42c)
Average daily hot water use (litres/day)												124.0440	(43)
Daily hot water use	134.9553	132.0333	128.4542	123.7747	119.4223	113.9458	110.8284	116.0079	119.3760	124.8148	130.4154	134.8736	(44)
Energy conte	198.6775	174.7067	183.5584	161.6807	153.8877	131.7745	122.4686	136.5434	138.4701	160.8365	176.2607	198.0718	(45)
Energy content (annual)										Total = Sum(45)m =		1936.9369	
Distribution loss (46)m = 0.15 x (45)m	29.8016	26.2060	27.5338	24.2521	23.0832	19.7662	18.3703	20.4815	20.7705	24.1255	26.4391	29.7108	(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	253.9543	224.6342	238.8352	215.1744	209.1645	185.2682	177.7455	191.8202	191.9638	216.1133	229.7544	253.3486	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	253.9543	224.6342	238.8352	215.1744	209.1645	185.2682	177.7455	191.8202	191.9638	216.1133	229.7544	253.3486	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2587.7767	(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	110.2817	98.0319	105.2546	96.5538	95.3891	86.6100	84.9423	89.6221	88.8363	97.6996	101.4016	110.0803	(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	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.8998	129.4248	116.8998	120.7964	116.8998	120.7964	116.8998	116.8998	120.7964	116.8998	120.7964	116.8998	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.8138	234.2193	228.1576	215.2527	198.9627	183.6524	173.4241	171.0186	177.0804	189.9852	206.2753	221.5856	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	(71)
Water heating gains (Table 5)	148.2281	145.8809	141.4713	134.1025	128.2112	120.2916	114.1697	120.4599	123.3837	131.3167	140.8356	147.9574	(72)
Total internal gains	558.4808	571.0641	548.0677	531.6907	505.6128	486.2795	466.0327	469.9174	482.7996	499.7408	529.4464	547.9819	(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					5.9600	11.2829	0.3500		0.7000		0.7700	11.4174 (75)
Northwest					13.6000	11.2829	0.3500		0.7000		0.7700	26.0532 (81)
Solar gains	37.4706	76.2725	137.4187	225.6810	303.3596	323.4134	302.5466	241.1937	167.4469	93.2110	47.1477	30.6004 (83)
Total gains	595.9514	647.3365	685.4864	757.3717	808.9723	809.6929	768.5793	711.1110	650.2465	592.9518	576.5941	578.5823 (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	77.5783	77.8417	78.1070	79.4608	79.7372	81.1487	81.1487	81.4370	80.5782	79.7372	79.1863	78.6429
alpha	6.1719	6.1894	6.2071	6.2974	6.3158	6.4099	6.4099	6.4291	6.3719	6.3158	6.2791	6.2429
util living area	0.9946	0.9899	0.9774	0.9206	0.7770	0.5600	0.4095	0.4602	0.7278	0.9448	0.9878	0.9955 (86)
MIT	20.1151	20.2451	20.4494	20.7461	20.9330	20.9929	20.9992	20.9983	20.9665	20.7326	20.3920	20.1033 (87)
Th 2	20.1929	20.1954	20.1979	20.2106	20.2131	20.2258	20.2258	20.2283	20.2207	20.2131	20.2080	20.2030 (88)
util rest of house	0.9930	0.9869	0.9705	0.8982	0.7283	0.4951	0.3379	0.3840	0.6597	0.9242	0.9836	0.9941 (89)
MIT 2	19.1600	19.3270	19.5863	19.9554	20.1582	20.2217	20.2255	20.2277	20.1985	19.9481	19.5243	19.1528 (90)
Living area fraction	fLA = Living area / (4) = 0.4500 (91)											
MIT	19.5898	19.7401	19.9747	20.3112	20.5069	20.5687	20.5737	20.5745	20.5441	20.3011	19.9148	19.5806 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.5898	19.7401	19.9747	20.3112	20.5069	20.5687	20.5737	20.5745	20.5441	20.3011	19.9148	19.5806 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9914	0.9848	0.9682	0.9014	0.7473	0.5241	0.3701	0.4183	0.6890	0.9269	0.9816	0.9927 (94)
Useful gains	590.8547	637.4962	663.6774	682.6660	604.5266	424.3703	284.4818	297.4767	448.0134	549.5927	565.9965	574.3720 (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	1146.2528	1108.7739	1003.3389	835.2102	642.3579	427.7785	284.7909	298.1251	465.1192	707.5847	941.1929	1137.4450 (97)
Space heating kWh	413.2162	316.6986	252.7081	109.8318	28.1464	0.0000	0.0000	0.0000	0.0000	117.5460	270.1414	418.9264 (98a)
Space heating requirement - total per year (kWh/year)												1927.2150
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	413.2162	316.6986	252.7081	109.8318	28.1464	0.0000	0.0000	0.0000	0.0000	117.5460	270.1414	418.9264 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1927.2150
Space heating per m2	(98c) / (4) =											22.3705 (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												
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												418.9264 (98)
307a	619.8242	475.0480	379.0622	164.7476	42.2197	0.0000	0.0000	0.0000	0.0000	176.3191	405.2121	628.3895
Space heating requirement												
	619.8242	475.0480	379.0622	164.7476	42.2197	0.0000	0.0000	0.0000	0.0000	176.3191	405.2121	628.3895 (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												
	253.9543	224.6342	238.8352	215.1744	209.1645	185.2682	177.7455	191.8202	191.9638	216.1133	229.7544	253.3486 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	380.9315	336.9512	358.2528	322.7616	313.7468	277.9023	266.6182	287.7303	287.9457	324.1700	344.6316	380.0229
Water heating fuel												
	380.9315	336.9512	358.2528	322.7616	313.7468	277.9023	266.6182	287.7303	287.9457	324.1700	344.6316	380.0229 (310)
Cooling System Energy Efficiency Ratio												
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 (314)
Pumps and Fa	19.0582	17.2139	19.0582	18.4434	19.0582	18.4434	19.0582	19.0582	18.4434	19.0582	18.4434	19.0582 (315)
Lighting	25.3834	20.3635	18.3351	13.4331	10.3761	8.4774	9.4654	12.3035	15.9810	20.9680	23.6833	26.0889 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-4.4854	-7.9557	-14.6624	-20.6115	-25.7418	-25.3774	-24.8461	-21.3936	-16.0997	-10.3663	-5.3839	-3.6624 (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												2890.8224 (307)
Space heating fuel - secondary												0.0000 (309)
Water heating fuel - community heating												3881.6650 (310)
Efficiency of water heater												0.0000 (311)
Electricity used for heat distribution												28.9082 (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)												224.3949 (330a)

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Total electricity for the above, kWh/year	224.3949 (331)
Electricity for lighting (calculated in Appendix L)	204.8588 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-180.5863 (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	7021.1549 (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	2919.1756	0.1563	194.7247 (367)
Electrical energy for heat distribution (space & water)	28.9082	0.0000	9.9852 (372)
Overall CO2 factor for heat network			0.0650 (386)
Total CO2 associated with community systems			440.3799 (373)
Space and water heating			440.3799 (376)
Pumps, fans and electric keep-hot	224.3949	0.1387	31.1263 (378)
Energy for lighting	204.8588	0.1443	29.5675 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-180.5863	0.1306	-23.5760
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-23.5760 (380)
Total CO2, kg/year			477.4978 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.5400 (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	2919.1756	1.5786	1966.9677 (467)
Electrical energy for heat distribution (space & water)	28.9082	0.0000	104.6672 (472)
Overall CO2 factor for heat network			0.6816 (486)
Total CO2 associated with community systems			4616.1833 (473)
Space and water heating			4616.1833 (476)
Pumps, fans and electric keep-hot	224.3949	1.5128	339.4646 (478)
Energy for lighting	204.8588	1.5338	314.2192 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-180.5863	1.4823	-267.6764
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-267.6764 (480)
Total Primary energy kWh/year			5002.1908 (483)
Dwelling Primary energy Rate (DPER)			58.0600 (484)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	86.1500 (1b)	x 2.8000 (2b)	= 241.2200 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1500		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	241.2200 (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) = 0.1244 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3744 (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) = 0.3182 (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	0.4057	0.3978	0.3898	0.3500	0.3421	0.3023	0.3023	0.2943	0.3182	0.3421	0.3580	0.3739 (22b)
	0.5823	0.5791	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5641	0.5699 (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			19.1100	1.1450	21.8817		(27)
Heatloss Floor 1			86.1500	0.1300	11.1995		(28b)
External Wall 1	54.8800	19.1100	35.7700	0.1800	6.4386		(29a)
Corridor wall	40.6600	2.4200	38.2400	0.1800	6.8832		(29a)
Total net area of external elements Aum(A, m2)			181.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	48.8230		(33)
Main dwelling							
Party Wall 1			27.8600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							243.0327 (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
E4 Jamb	28.8000	0.0500	1.4400
E7 Party floor between dwellings (in blocks of flats)	15.2400	0.0700	1.0668
E7 Party floor between dwellings (in blocks of flats)	14.5200	0.0700	1.0164
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
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)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	19.6000	0.3200	6.2720
E21 Exposed floor (inverted)	14.5200	0.3200	4.6464
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.9500	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	9.9500	0.1600	1.5920
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			17.6708 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 66.4938 (37)

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

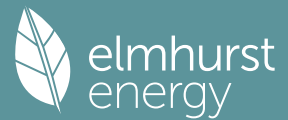
(38)m	Jan 46.3530	Feb 46.0986	Mar 45.8492	Apr 44.6779	May 44.4588	Jun 43.4386	Jul 43.4386	Aug 43.2497	Sep 43.8316	Oct 44.4588	Nov 44.9021	Dec 45.3656 (38)
Heat transfer coeff	112.8468	112.5923	112.3430	111.1717	110.9525	109.9324	109.9324	109.7435	110.3253	110.9525	111.3959	111.8593 (39)
Average = Sum(39)m / 12 =												111.1706
HLP	Jan 1.3099	Feb 1.3069	Mar 1.3040	Apr 1.2904	May 1.2879	Jun 1.2761	Jul 1.2761	Aug 1.2739	Sep 1.2806	Oct 1.2879	Nov 1.2930	Dec 1.2984 (40)
HLP (average)												1.2904
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5693 (42)
Hot water usage for mixer showers												
67.2980	66.2866	64.8129	61.9931	59.9122	57.5916	56.2726	57.7352	59.3385	61.8301	64.7104	67.0402 (42a)	
Hot water usage for baths												
29.0636	28.6319	28.0241	26.9034	26.0642	25.1336	24.6310	25.2346	25.8918	26.8875	28.0313	28.9653 (42b)	
Hot water usage for other uses												
40.9419	39.4531	37.9643	36.4755	34.9867	33.4979	33.4979	34.9867	36.4755	37.9643	39.4531	40.9419 (42c)	
Average daily hot water use (litres/day)												126.2129 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
137.3035	134.3717	130.8013	125.3720	120.9632	116.2232	114.4016	117.9565	121.7058	126.6819	132.1948	136.9474 (44)	
Energy content (annual)	217.4552	191.3435	201.0368	171.6281	162.8397	142.9100	138.3588	146.0548	150.0754	171.9062	188.3358	214.4265 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2096.3707
32.6183	28.7015	30.1555	25.7442	24.4259	21.4365	20.7538	21.9082	22.5113	25.7859	28.2504	32.1640 (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	25.9803	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	25.9803	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												
266.6978	235.8208	250.2794	219.2823	212.0823	190.5642	187.6014	195.2975	197.7296	221.1488	235.9900	263.6692 (62)	
WWHRS	-30.7658	-27.2096	-28.4923	-23.5927	-21.9876	-18.8149	-17.6360	-18.7541	-19.4667	-22.9490	-25.9985	-30.1961 (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												
235.9320	208.6112	221.7872	195.6895	190.0947	171.7493	169.9654	176.5434	178.2630	198.1998	209.9915	233.4731 (64)	
12Total per year (kWh/year)												2390.3001 (64)
Electric shower(s)								Total per year (kWh/year) = Sum(64)m =				2390 (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)	
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												
Heat gains from water heating, kWh/month												
111.6980	99.2035	106.2389	95.1897	93.5383	85.6409	85.3984	87.9574	88.0234	96.5529	100.7450	110.6910 (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	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.9366	129.4655	116.9366	120.8345	116.9366	120.8345	116.9366	116.9366	120.8345	116.9366	120.8345	116.9366	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.8138	234.2193	228.1576	215.2527	198.9627	183.6524	173.4241	171.0186	177.0804	189.9852	206.2753	221.5856	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	(71)
Water heating gains (Table 5)	150.1317	147.6243	142.7942	132.2079	125.7235	118.9457	114.7828	118.2223	122.2548	129.7755	139.9236	148.7782	(72)
Total internal gains	563.4212	575.8483	552.4274	532.8342	506.1619	484.9717	466.6827	467.7166	481.7088	501.2364	531.5725	551.8395	(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				5.8300	11.2829	0.6300	0.7000			0.7700			20.1031 (75)
Northwest				13.2800	11.2829	0.6300	0.7000			0.7700			45.7923 (81)
Solar gains	65.8954	134.1319	241.6630	396.8801	533.4848	568.7512	532.0551	424.1605	294.4702	163.9198	82.9134	53.8135	(83)
Total gains	629.3166	709.9802	794.0905	929.7144	1039.6467	1053.7229	998.7378	891.8771	776.1790	665.1562	614.4859	605.6529	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	51.5381	51.6546	51.7692	52.3147	52.4180	52.9044	52.9044	52.9955	52.7160	52.4180	52.2094	51.9930		
alpha	4.4359	4.4436	4.4513	4.4876	4.4945	4.5270	4.5270	4.5330	4.5144	4.4945	4.4806	4.4662		
util living area	0.9949	0.9905	0.9786	0.9322	0.8149	0.6278	0.4748	0.5466	0.8106	0.9626	0.9903	0.9957	(86)	
MIT	19.4451	19.6284	19.9464	20.4067	20.7710	20.9477	20.9881	20.9784	20.8360	20.3628	19.8352	19.4199	(87)	
Th 2	19.8331	19.8354	19.8377	19.8483	19.8503	19.8596	19.8596	19.8614	19.8560	19.8503	19.8463	19.8421	(88)	
util rest of house	0.9932	0.9874	0.9713	0.9087	0.7568	0.5317	0.3566	0.4208	0.7283	0.9448	0.9866	0.9943	(89)	
MIT 2	18.0450	18.2799	18.6836	19.2559	19.6633	19.8311	19.8561	19.8540	19.7449	19.2170	18.5523	18.0189	(90)	
Living area fraction									fLA = Living area / (4) =			0.4500	(91)	
MIT	18.6751	18.8868	19.2519	19.7738	20.1618	20.3336	20.3655	20.3600	20.2359	19.7326	19.1297	18.6494	(92)	
Temperature adjustment												0.0000		
adjusted MIT	18.6751	18.8868	19.2519	19.7738	20.1618	20.3336	20.3655	20.3600	20.2359	19.7326	19.1297	18.6494	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	623.5086	698.5183	767.4199	843.1343	804.6825	604.0397	409.4230	425.8622	588.8317	626.9128	604.2300	600.9062	(94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1622.1801	1574.8030	1432.5882	1208.8613	938.8555	630.3082	413.9551	434.5887	676.9478	1013.2893	1340.0563	1616.3029	(97)
Space heating kWh	743.0116	588.8633	494.8853	263.3235	99.8248	0.0000	0.0000	0.0000	0.0000	287.4641	529.7949	755.4552	(98a)
Space heating requirement - total per year (kWh/year)												3762.6227	
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	743.0116	588.8633	494.8853	263.3235	99.8248	0.0000	0.0000	0.0000	0.0000	287.4641	529.7949	755.4552	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3762.6227	
Space heating per m2										(98c) / (4) =		43.6752	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	743.0116	588.8633	494.8853	263.3235	99.8248	0.0000	0.0000	0.0000	0.0000	287.4641	529.7949	755.4552	(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)	804.9963	637.9884	536.1704	285.2909	108.1525	0.0000	0.0000	0.0000	0.0000	311.4454	573.9923	818.4780	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	235.9320	208.6112	221.7872	195.6895	190.0947	171.7493	169.9654	176.5434	178.2630	198.1998	209.9915	233.4731	(64)
Efficiency of water heater	86.4502	86.2552	85.8052	84.7262	82.6855	79.8000	79.8000	79.8000	79.8000	84.8927	86.0454	86.4969	(216)
Fuel for water heating, kWh/month	272.9109	241.8534	258.4775	230.9670	229.9010	215.2247	212.9893	221.2323	223.3872	233.4710	244.0474	269.9208	(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	24.2971	19.4920	17.5504	12.8582	9.9320	8.1146	9.0603	11.7770	15.2971	20.0707	22.6698	24.9724	24.9724	(232)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233a)m	-11.3359	-17.4184	-27.2578	-33.4510	-38.6071	-36.9740	-36.5198	-33.1915	-27.8230	-21.0839	-12.9599	-9.6401	-9.6401	(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	-2.6798	-5.8521	-12.0494	-18.7371	-25.4248	-25.7942	-25.4976	-21.2915	-15.2193	-8.5773	-3.6417	-2.1039	-2.1039	(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													4076.5143	(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													2854.3823	(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)													196.0916	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-473.1311	(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													6739.8572	(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	4076.5143	0.2100	856.0680	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2854.3823	0.2100	599.4203	(264)
Space and water heating			1455.4883	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	196.0916	0.1443	28.3021	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-306.2624	0.1328	-40.6829	
PV Unit electricity exported	-166.8687	0.1249	-20.8401	
Total			-61.5230	(269)
Total CO2, kg/year			1434.1966	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.6500	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4076.5143	1.1300	4606.4611	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2854.3823	1.1300	3225.4520	(278)
Space and water heating			7831.9132	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	196.0916	1.5338	300.7719	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-306.2624	1.4908	-456.5886	
PV Unit electricity exported	-166.8687	0.4584	-76.4893	
Total			-533.0779	(283)
Total Primary energy kWh/year			7729.7080	(286)
Target Primary Energy Rate (TPER)			89.7200	(287)

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Plot Reference	A 105				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	81 B	DER	5.54	TER	16.65		
Environmental	95 A	% DER < TER				66.73	
CO ₂ Emissions (t/year)	0.41	DFEE	44.15	TFEE	50.89		
Compliance Check	See BREL	% DFEE < TFEE				13.26	
% DPER < TPER	35.28	DPER	58.06	TPER	89.72		
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	86.1500 (1b)	2.8000 (2b)	241.2200 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1500		241.2200 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 241.2200 (5)

2. Ventilation rate

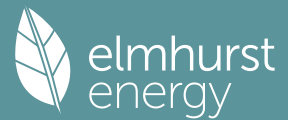
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1244 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2744 (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) = 0.2332 (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	0.2973	0.2915	0.2857	0.2565	0.2507	0.2216	0.2216	0.2157	0.2332	0.2507	0.2624	0.2740 (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	0.5442	0.5425	0.5408	0.5329	0.5314	0.5245	0.5245	0.5233	0.5272	0.5314	0.5344	0.5375 (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			19.5600	1.1450	22.3969		(27)
Heatloss Floor 1			86.1500	0.1000	8.6150	110.0000	9476.5000 (28b)
External Wall 1	54.8800	19.5600	35.3200	0.1500	5.2980	70.0000	2472.4001 (29a)
Corridor wall	40.6600	2.4200	38.2400	0.1900	7.2656	70.0000	2676.8000 (29a)
Total net area of external elements Aum(A, m ²)			181.6900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 45.9955		(33)
Main dwelling							
Party Wall 1			27.8600	0.0000	0.0000	70.0000	1950.2000 (32)
Party Ceiling 1			86.1500			30.0000	2584.5000 (32b)
Internal Wall 1			197.4300			9.0000	1776.8699 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 20937.2700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							243.0327 (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
E4 Jamb					28.8000	0.0400	1.1520

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E7 Party floor between dwellings (in blocks of flats)	15.2400	0.0500	0.7620										
E7 Party floor between dwellings (in blocks of flats)	14.5200	0.0390	0.5663										
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180										
E16 Corner (normal)	5.6000	0.0500	0.2800										
E16 Corner (normal)	5.6000	0.0390	0.2184										
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000										
E18 Party wall between dwellings	2.8000	0.0500	0.1400										
E20 Exposed floor (normal)	19.6000	0.1000	1.9600										
E21 Exposed floor (inverted)	14.5200	0.1000	1.4520										
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092										
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	9.9500	0.0000	0.0000										
P7 Party Wall - Exposed floor (normal)	9.9500	0.0800	0.7960										
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.1119 (36)									
Point Thermal bridges			(36a) =	0.0000									
Total fabric heat loss		(33) + (36) + (36a) =		54.1074 (37)									
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 43.3203	Feb 43.1837	Mar 43.0497	Apr 42.4206	May 42.3029	Jun 41.7550	Jul 41.7550	Aug 41.6535	Sep 41.9660	Oct 42.3029	Nov 42.5410	Dec 42.7900	(38)
Heat transfer coeff	97.4277	97.2911	97.1572	96.5280	96.4103	95.8624	95.8624	95.7609	96.0734	96.4103	96.6484	96.8974	(39)
Average = Sum(39)m / 12 =												96.5275	
HLP	Jan 1.1309	Feb 1.1293	Mar 1.1278	Apr 1.1205	May 1.1191	Jun 1.1127	Jul 1.1127	Aug 1.1116	Sep 1.1152	Oct 1.1191	Nov 1.1219	Dec 1.1248	(40)
HLP (average)												1.1205	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													2.5693 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	28.4157	27.9867	27.3765	26.4626	25.6390	24.5053	23.6451	24.6969	25.2489	26.3723	27.5403	28.3931	(42b)
Hot water usage for other uses	40.9419	39.4531	37.9643	36.4755	34.9867	33.4979	33.4979	34.9867	36.4755	37.9643	39.4531	40.9419	(42c)
Average daily hot water use (litres/day)												63.5680	(43)
Daily hot water use	Jan 69.3576	Feb 67.4398	Mar 65.3408	Apr 62.9382	May 60.6258	Jun 58.0032	Jul 57.1431	Aug 59.6837	Sep 61.7245	Oct 64.3367	Nov 66.9934	Dec 69.3351	(44)
Energy conte	102.1064	89.2366	93.3707	82.2130	78.1224	67.0788	63.1448	70.2488	71.5973	82.9043	90.5439	101.8236	(45)
Energy content (annual)										Total = Sum(45)m =		992.3904	
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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	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													
86.7904	75.8511	79.3651	69.8810	66.4041	57.0170	53.6731	59.7115	60.8577	70.4686	76.9623	86.5501		(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	86.7904	75.8511	79.3651	69.8810	66.4041	57.0170	53.6731	59.7115	60.8577	70.4686	76.9623	86.5501	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		843.5318	(64)
Electric shower(s)	53.8945	48.0204	52.4365	50.0395	50.9785	48.6285	50.2494	50.9785	50.0395	52.4365	51.4505	53.8945	(64a)
												613.0466	(64a)
Heat gains from water heating, kWh/month	35.1712	30.9679	32.9504	29.9801	29.3456	26.4114	25.9806	27.6725	27.7243	30.7263	32.1032	35.1111	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 128.4637	Feb 128.4637	Mar 128.4637	Apr 128.4637	May 128.4637	Jun 128.4637	Jul 128.4637	Aug 128.4637	Sep 128.4637	Oct 128.4637	Nov 128.4637	Dec 128.4637	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
116.8998	129.4248	116.8998	120.7964	116.8998	120.7964	116.8998	120.7964	116.8998	120.7964	116.8998	120.7964	116.8998	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
231.8138	234.2193	228.1576	215.2527	198.9627	183.6524	173.4241	171.0186	177.0804	189.9852	206.2753	221.5856		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	(71)
Water heating gains (Table 5)													
47.2731	46.0831	44.2882	41.6391	39.4431	36.6825	34.9202	37.1942	38.5060	41.2988	44.5878	47.1924		(72)
Total internal gains	457.5259	471.2663	450.8846	439.2273	416.8446	402.6704	386.7832	386.6517	397.9219	409.7229	433.1986	447.2169	(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			5.9600	11.2829	0.3500	0.7000	0.7700	11.4174	(75)				
Northwest			13.6000	11.2829	0.3500	0.7000	0.7700	26.0532	(81)				

Solar gains	37.4706	76.2725	137.4187	225.6810	303.3596	323.4134	302.5466	241.1937	167.4469	93.2110	47.1477	30.6004	(83)
Total gains	494.9965	547.5388	588.3033	664.9083	720.2042	726.0838	689.3298	627.8454	565.3688	502.9339	480.3463	477.8172	(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	59.6946	59.7784	59.8608	60.2510	60.3245	60.6693	60.6693	60.7336	60.5361	60.3245	60.1759
alpha	4.9796	4.9852	4.9907	5.0167	5.0216	5.0446	5.0446	5.0489	5.0357	5.0216	5.0117
util living area	0.9981	0.9965	0.9925	0.9736	0.9106	0.7573	0.5909	0.6620	0.8931	0.9842	0.9963
MIT	19.5533	19.6963	19.9461	20.3339	20.6919	20.9184	20.9814	20.9681	20.7977	20.3503	19.8938
Th 2	19.9757	19.9770	19.9782	19.9842	19.9853	19.9904	19.9904	19.9914	19.9884	19.9853	19.9830
util rest of house	0.9975	0.9954	0.9898	0.9631	0.8739	0.6694	0.4658	0.5356	0.8346	0.9760	0.9948
MIT 2	18.6560	18.7995	19.0491	19.4346	19.7685	19.9511	19.9854	19.9816	19.8682	19.4555	19.0016
Living area fraction	fLA = Living area / (4) =										
MIT	19.0599	19.2031	19.4528	19.8393	20.1841	20.3864	20.4337	20.4256	20.2865	19.8582	19.4031
Temperature adjustment	0.0000										
adjusted MIT	19.0599	19.2031	19.4528	19.8393	20.1841	20.3864	20.4337	20.4256	20.2865	19.8582	19.4031

8. Space heating requirement											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Utilisation	0.9968	0.9942	0.9879	0.9612	0.8822	0.7063	0.5225	0.5927	0.8545	0.9747	0.9936
Useful gains	493.3906	544.3513	581.1845	639.1272	635.3486	512.8056	360.1551	372.1134	483.0839	490.2164	477.2857
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	1438.0194	1391.5622	1258.4548	1055.9493	817.9514	554.7002	367.5045	385.4916	594.3584	892.5859	1189.0798
Space heating kWh	702.8039	569.3257	503.8891	300.1119	135.8565	0.0000	0.0000	0.0000	0.0000	299.3629	512.4917
Space heating requirement - total per year (kWh/year)	715.1298 (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
Solar heating contribution - total per year (kWh/year)	0.0000 (98b)										
Space heating kWh	702.8039	569.3257	503.8891	300.1119	135.8565	0.0000	0.0000	0.0000	0.0000	299.3629	512.4917
Space heating requirement after solar contribution - total per year (kWh/year)	715.1298 (98c)										
Space heating per m2	(98c) / (4) = 43.4007 (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
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	901.1064	709.3816	727.7829	0.0000	0.0000	0.0000
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7833	0.8633	0.8137	0.0000	0.0000	0.0000
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	705.8129	612.4245	592.1613	0.0000	0.0000	0.0000
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	803.4048	762.8105	693.0967	0.0000	0.0000	0.0000
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	70.2662	111.8872	75.0959	0.0000	0.0000	0.0000
Cooled fraction	fc = cooled area / (4) =										
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	17.5665	27.9718	18.7740	0.0000	0.0000	0.0000
Space cooling requirement	64.3123 (107)										
Energy for space heating	43.4007 (99)										
Energy for space cooling	0.7465 (108)										
Total	44.1472 (109)										
Fabric Energy Efficiency (DFEE)	44.1 (109)										

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

1. Overall dwelling characteristics											
Main dwelling	Area (m2)		Storey height (m)		Volume (m3)						
Ground floor	86.1500 (1b)	x	2.8000 (2b)	=	241.2200 (1b) - (3b)						
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	86.1500										
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	241.2200 (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)										

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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	
Pressure test												30.0000 / (5) =	0.1244 (8)
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000	(17)
Number of sides sheltered												0.3744	(18)
												2	(19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3182 (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)
	0.4057	0.3978	0.3898	0.3500	0.3421	0.3023	0.3023	0.2943	0.3182	0.3421	0.3580	0.3739	(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	0.5823	0.5791	0.5760	0.5613	0.5585	0.5457	0.5457	0.5433	0.5506	0.5585	0.5641	0.5699	(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			19.1100	1.1450	21.8817		(27)
Heatloss Floor 1			86.1500	0.1300	11.1995		(28b)
External Wall 1	54.8800	19.1100	35.7700	0.1800	6.4386		(29a)
Corridor wall	40.6600	2.4200	38.2400	0.1800	6.8832		(29a)
Total net area of external elements Aum(A, m2)			181.6900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)... (30) + (32) =	48.8230		(33)
Main dwelling							
Party Wall 1			27.8600	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							243.0327 (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	
E4 Jamb				28.8000	0.0500	1.4400	
E7 Party floor between dwellings (in blocks of flats)				15.2400	0.0700	1.0668	
E7 Party floor between dwellings (in blocks of flats)				14.5200	0.0700	1.0164	
E9 Balcony between dwellings, wall insulation continuous				4.3600	0.0200	0.0872	
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)				2.8000	-0.0900	-0.2520	
E18 Party wall between dwellings				2.8000	0.0600	0.1680	
E20 Exposed floor (normal)				19.6000	0.3200	6.2720	
E21 Exposed floor (inverted)				14.5200	0.3200	4.6464	
E25 Staggered party wall between dwellings				2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				9.9500	0.0000	0.0000	
P7 Party Wall - Exposed floor (normal)				9.9500	0.1600	1.5920	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							17.6708 (36)
Point Thermal bridges							(36a) = 0.0000
Total fabric heat loss							(33) + (36) + (36a) = 66.4938 (37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5693 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	29.0636	28.6319	28.0241	26.9034	26.0642	25.1336	24.6310	25.2346	25.8918	26.8875	28.0313	28.9653 (42b)
Hot water usage for other uses	40.9419	39.4531	37.9643	36.4755	34.9867	33.4979	33.4979	34.9867	36.4755	37.9643	39.4531	40.9419 (42c)
Average daily hot water use (litres/day)												64.1664 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	70.0055	68.0851	65.9884	63.3789	61.0509	58.6316	58.1290	60.2213	62.3673	64.8518	67.4844	69.9072 (44)
Energy content (annual)	110.8716	96.9522	101.4218	86.7625	82.1863	72.0944	70.3019	74.5666	76.9051	88.0033	96.1439	109.4578 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1065.6675
	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	94.2408	82.4094	86.2085	73.7482	69.8583	61.2802	59.7566	63.3816	65.3694	74.8028	81.7223	93.0392 (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	94.2408	82.4094	86.2085	73.7482	69.8583	61.2802	59.7566	63.3816	65.3694	74.8028	81.7223	93.0392 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 905.8174 (64)
												906 (64)

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Electric shower(s)	53.8945	48.0204	52.4365	50.0395	50.9785	48.6285	50.2494	50.9785	50.0395	52.4365	51.4505	53.8945 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												613.0466 (64a)
Heat gains from water heating, kWh/month	37.0338	32.6075	34.6612	30.9469	30.2092	27.4772	27.5015	28.5900	28.8522	31.8098	33.2932	36.7334 (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	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	128.4637	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	116.9366	129.4655	116.9366	120.8345	116.9366	120.8345	116.9366	116.9366	120.8345	116.9366	120.8345	116.9366	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	231.8138	234.2193	228.1576	215.2527	198.9627	183.6524	173.4241	171.0186	177.0804	189.9852	206.2753	221.5856	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	35.8464	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	-102.7709	(71)
Water heating gains (Table 5)	49.7767	48.5230	46.5877	42.9818	40.6038	38.1627	36.9644	38.4274	40.0725	42.7551	46.2406	49.3729	(72)
Total internal gains	460.0662	473.7470	453.2209	440.6081	418.0422	404.1887	388.8642	387.9218	399.5265	411.2161	434.8894	449.4342	(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					5.8300	11.2829	0.6300	0.7000			0.7700			20.1031 (75)
Northwest					13.2800	11.2829	0.6300	0.7000			0.7700			45.7923 (81)
Solar gains	65.8954	134.1319	241.6630	396.8801	533.4848	568.7512	532.0551	424.1605	294.4702	163.9198	82.9134			53.8135 (83)
Total gains	525.9616	607.8789	694.8840	837.4883	951.5269	972.9399	920.9194	812.0823	693.9967	575.1359	517.8028			503.2476 (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	51.5381	51.6546	51.7692	52.3147	52.4180	52.9044	52.9044	52.9955	52.7160	52.4180	52.2094	51.9930	
alpha	4.4359	4.4436	4.4513	4.4876	4.4945	4.5270	4.5270	4.5330	4.5144	4.4945	4.4806	4.4662	
util living area	0.9975	0.9948	0.9869	0.9514	0.8495	0.6678	0.5113	0.5923	0.8544	0.9776	0.9951	0.9980	(86)
MIT	19.3198	19.5066	19.8334	20.3200	20.7227	20.9330	20.9841	20.9703	20.7909	20.2660	19.7196	19.2951	(87)
Th 2	19.8331	19.8354	19.8377	19.8483	19.8503	19.8596	19.8596	19.8614	19.8560	19.8503	19.8463	19.8421	(88)
util rest of house	0.9966	0.9930	0.9822	0.9331	0.7966	0.5701	0.3858	0.4597	0.7805	0.9660	0.9931	0.9973	(89)
MIT 2	18.3150	18.5028	18.8285	19.3082	19.6688	19.8303	19.8558	19.8532	19.7401	19.2664	18.7239	18.2971	(90)
Living area fraction	18.7672	18.9546	19.2808	19.7635	20.1431	20.3266	20.3636	20.3559	20.2130	19.7163	19.1720	18.7462	(91)
MIT	18.7672	18.9546	19.2808	19.7635	20.1431	20.3266	20.3636	20.3559	20.2130	19.7163	19.1720	18.7462	(92)
Temperature adjustment	18.7672	18.9546	19.2808	19.7635	20.1431	20.3266	20.3636	20.3559	20.2130	19.7163	19.1720	18.7462	(93)
adjusted MIT	18.7672	18.9546	19.2808	19.7635	20.1431	20.3266	20.3636	20.3559	20.2130	19.7163	19.1720	18.7462	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9955	0.9912	0.9792	0.9315	0.8116	0.6121	0.4426	0.5196	0.8068	0.9643	0.9914	0.9963	(94)
Useful gains	523.6124	602.5171	680.4302	780.1350	772.2178	595.5039	407.5746	421.9382	559.8823	554.5944	513.3546	501.4042	(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	1632.5757	1582.4366	1435.8308	1207.7172	936.7832	629.5357	413.7378	434.1394	674.4188	1011.4718	1344.7673	1627.1317	(97)
Space heating kWh	825.0687	658.5059	562.0181	307.8592	122.4367	0.0000	0.0000	0.0000	0.0000	339.9168	598.6172	837.5413	(98a)
Space heating requirement - total per year (kWh/year)												4251.9638	
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	825.0687	658.5059	562.0181	307.8592	122.4367	0.0000	0.0000	0.0000	0.0000	339.9168	598.6172	837.5413	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4251.9638	
Space heating per m ²												49.3554	(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	1033.3644	813.4996	834.0503	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8408	0.9017	0.8523	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	868.8427	733.5439	710.8755	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1091.6468	1033.1149	908.1919	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	160.4189	222.8808	146.8034	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	40.1047	55.7202	36.7008	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												132.5258	(107)

Full SAP Calculation Printout



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

49.3554 (99)
1.5383 (108)
50.8937 (109)
50.9 (109)