

Summary for Input Data



Plot Reference	A 113	Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	82 B	DER	5.72	TER	15.88
Environmental	96 A	% DER < TER			63.98
CO ₂ Emissions (t/year)	0.26	DFEE	35.90	TFEE	41.38
Compliance Check	See BREL	% DFEE < TFEE			13.24
% DPER < TPER	27.89	DPER	60.74	TPER	84.23

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	1	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	3	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	253.36	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:	13.70 m	50.44 m ²	2.80 m

8.0 Living Area	27.38	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	19.18	10.84	0.00	None	8.34	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	19.18	16.76	0.70	Stairwell Access Corridor 3	2.42	Enter Gross Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	41.22	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	100.04

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	50.44

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	50.44

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 West	2.42	
Windows	Window	External Wall 1	North East	8.34	

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	5.08	0.05	0.05	No
E3 Sill	Independently assessed	1.59	0.04	0.04	No
E4 Jamb	Independently assessed	12.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	3.49	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	6.85	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	0.05	0.05	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	3.36	0.10	0.10	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E20 Exposed floor (normal)	Independently assessed	3.49	0.10	0.10	No
E21 Exposed floor (inverted)	Independently assessed	6.85	0.10	0.10	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E25 Staggered party wall between dwellings	Independently assessed	5.60	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	14.72	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	14.72	0.08	0.08	No
Y-value	0.05				W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	0
Number of passive vents	0
Number of flueless gas fires	0

Summary for Input Data



21.0 Fixed Cooling System		No	
22.0 Pressure Testing		Yes	
Designed AP ₅₀	3.00	m ² /(h.m ²) @ 50 Pa	
Test Method	Blower Door		
22.0 Lighting		No	
No Fixed Lighting	No		
	Name	Efficacy	Power
	Lighting 1	75.00	15.00
			Capacity
			1125.00
			Count
			5
24.0 Main Heating 1		None	
25.0 Main Heating 2		None	
26.0 Heat Networks		Space and Water Combined	
Space Community Heating			
Distribution Loss	Calculated		
Distribution Loss Value	1.50		
SAP Code	2306		
	Heat Source	Fuel Type	Heating Use
	Heat source 1	Heat pump	Electricity
	Heat source 2	None	Space and Water
	Heat source 3	None	
	Heat source 4	None	
	Heat source 5	None	
			Efficiency
			232.00
			Percentage Of Heat
			100.00
			Heat
			Heat Power Ratio
			Electrical
			Fuel Factor
			Efficiency type
27.0 Secondary Heating		None	
28.0 Water Heating		Community Heating	
Water Heating	Community Heating		
SAP Code	901		
Flue Gas Heat Recovery System	No		
Waste Water Heat Recovery Instantaneous System 1	No		
Waste Water Heat Recovery Instantaneous System 2	No		
Waste Water Heat Recovery Storage System	No		
Solar Panel	No		
Water use <= 125 litres/person/day	Yes		
Cold Water Source	From header tank		
Bath Count	1		
28.1 Showers			
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]
Shower	Combi boiler or unvented hot water system	8.00	
			Connected
			No
			Connected To
28.3 Waste Water Heat Recovery System			
29.0 Hot Water Cylinder		Internal Store	
Insulation Type	Measured Loss		
Cylinder Volume	180.00		
Loss	1.20		
			L
			kWh/day
32.0 Photovoltaic Unit		Multiple Dwellings – Not Connected	
Export Capable Meter?	No		
Connected To Dwelling	Yes		
Diverter	No		
Battery Capacity [kWh]	0.00		
PV Cells kWp	Orientation	Elevation	Overshading FGHRs
			MCS Certificate
			Overshading Factor
			MCS Certificate Reference
			Panel Manufacturer

Summary for Input Data



0.24

North East

Horizontal

Modest

No

0.80

34.0 Small-scale Hydro

None

Jan

Feb

Mar

Apr

May

Jun

Jul

Aug

Sep

Oct

Nov

Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE				13.24	
% DPER < TPER	27.89	DPER	60.74	TPER	84.23		
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.4400 (1b)	2.8000 (2b)	141.2320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.2320 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	3	(19)

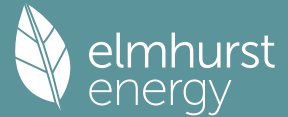
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1162 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
Heatloss Floor 1			50.4400	0.1000	5.0440	110.0000	5548.4000 (28b)
External Wall 1	19.1800		10.8400	0.1500	1.6260	70.0000	758.8000 (29a)
Corridor wall	19.1800	2.4200	16.7600	0.1900	3.1844	70.0000	1173.2000 (29a)
Total net area of external elements Aum(A, m ²)			88.8000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.8240		(33)
Main dwelling							
Party Wall 1			41.2200	0.0000	0.0000	70.0000	2885.4001 (32)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			100.0400			9.0000	900.3600 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		12779.3601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.3577 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E3 Sill	1.5900	0.0400	0.0636
E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	3.4900	0.0500	0.1745
E7 Party floor between dwellings (in blocks of flats)	6.8500	0.0390	0.2671
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.1000	0.3360
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	3.4900	0.1000	0.3490
E21 Exposed floor (inverted)	6.8500	0.1000	0.6850
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.7200	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	14.7200	0.0800	1.1776
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.4772 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	26.3013 (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	11.3356	11.2001	11.0647	10.3874	10.2520	9.5747	9.5747	9.4393	9.8456	10.2520	10.5229	10.7938	(38)
Heat transfer coeff	37.6369	37.5014	37.3660	36.6887	36.5533	35.8760	35.8760	35.7406	36.1469	36.5533	36.8242	37.0951	(39)
Average = Sum(39)m / 12 =												36.6548	
HLP	0.7462	0.7435	0.7408	0.7274	0.7247	0.7113	0.7113	0.7086	0.7166	0.7247	0.7301	0.7354	(40)
HLP (average)												0.7267	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7031 (42)
Hot water usage for mixer showers	51.4409	50.6533	49.4927	47.7072	46.1075	43.8695	42.0994	44.1687	45.2095	47.4262	49.7347	51.3945	(42a)
Hot water usage for baths	22.3092	21.9724	21.4933	20.7759	20.1293	19.2391	18.5638	19.3896	19.8230	20.7050	21.6220	22.2915	(42b)
Hot water usage for other uses	32.0711	30.9048	29.7386	28.5724	27.4062	26.2400	26.2400	27.4062	28.5724	29.7386	30.9048	32.0711	(42c)
Average daily hot water use (litres/day)												97.2659	(43)
Daily hot water use	105.8212	103.5306	100.7247	97.0555	93.6429	89.3486	86.9032	90.9645	93.6049	97.8698	102.2615	105.7571	(44)
Energy conte	155.7870	136.9919	143.9335	126.7787	120.6684	103.3287	96.0305	107.0669	108.5771	126.1151	138.2098	155.3120	(45)
Energy content (annual)										Total = Sum(45)m =		1518.7997	
Distribution loss (46)m = 0.15 x (45)m	23.3681	20.5488	21.5900	19.0168	18.1003	15.4993	14.4046	16.0600	16.2866	18.9173	20.7315	23.2968	(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	211.0638	186.9194	199.2103	180.2724	175.9452	156.8223	151.3073	162.3437	162.0707	181.3919	191.7034	210.5888	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	211.0638	186.9194	199.2103	180.2724	175.9452	156.8223	151.3073	162.3437	162.0707	181.3919	191.7034	210.5888	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2169.6394	(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	96.0206	85.4918	92.0793	84.9489	84.3437	77.1517	76.1516	79.8212	78.8968	86.1547	88.7497	95.8627	(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	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.5837	85.8963	77.5837	80.1699	77.5837	80.1699	77.5837	77.5837	80.1699	77.5837	80.1699	77.5837	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.3767	149.9164	146.0364	137.7764	127.3497	117.5500	111.0033	109.4636	113.3435	121.6035	132.0302	141.8299	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	(71)
Water heating gains (Table 5)	129.0600	127.2199	123.7625	117.9845	113.3652	107.1552	102.3543	107.2866	109.5789	115.7994	123.2635	128.8477	(72)
Total internal gains	403.5663	411.5784	395.9286	384.4768	366.8445	353.4210	339.4872	342.8798	351.6382	363.5325	384.0095	396.8073	(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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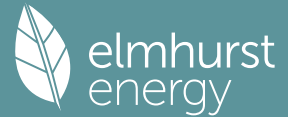


Table 6a												Table 6b	Table 6c	Table 6d			
Northeast												8.3400	11.2829	0.3500	0.7000	0.7700	15.9767 (75)
Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474 (83)					
Total gains	419.5430	444.0995	454.5212	480.7027	496.1911	491.3181	468.4872	445.7200	423.0343	403.2759	404.1123	409.8546 (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	94.3177	94.6584	95.0015	96.7552	97.1137	98.9470	98.9470	99.3220	98.2054	97.1137	96.3993	95.6953					
alpha	7.2878	7.3106	7.3334	7.4503	7.4742	7.5965	7.5965	7.6215	7.5470	7.4742	7.4266	7.3797					
util living area	0.9819	0.9696	0.9422	0.8437	0.6718	0.4666	0.3369	0.3687	0.5850	0.8544	0.9579	0.9840 (86)					
MIT	20.5088	20.6071	20.7422	20.9127	20.9850	20.9991	20.9999	20.9999	20.9956	20.9189	20.7161	20.5002 (87)					
Th 2	20.3002	20.3026	20.3049	20.3167	20.3191	20.3309	20.3309	20.3333	20.3262	20.3191	20.3144	20.3096 (88)					
util rest of house	0.9771	0.9619	0.9279	0.8129	0.6270	0.4181	0.2857	0.3154	0.5299	0.8192	0.9461	0.9797 (89)					
MIT 2	19.7407	19.8645	20.0308	20.2347	20.3076	20.3304	20.3309	20.3332	20.3235	20.2463	20.0099	19.7379 (90)					
Living area fraction									fLA = Living area / (4) =			0.5428 (91)					
MIT	20.1576	20.2676	20.4170	20.6027	20.6753	20.6934	20.6941	20.6951	20.6884	20.6114	20.3933	20.1517 (92)					
Temperature adjustment												0.0000					
adjusted MIT	20.1576	20.2676	20.4170	20.6027	20.6753	20.6934	20.6941	20.6951	20.6884	20.6114	20.3933	20.1517 (93)					
8. Space heating requirement																	
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec					
	0.9759	0.9614	0.9304	0.8263	0.6507	0.4444	0.3135	0.3443	0.5597	0.8350	0.9476	0.9786 (94)					
Useful gains	409.4489	426.9750	422.8885	397.2166	322.8724	218.3488	146.8634	153.4794	236.7764	336.7303	382.9241	401.0693 (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	596.8309	576.3063	520.0209	429.3581	328.0751	218.6075	146.8785	153.5092	238.1485	365.9491	489.5128	591.7291 (97)					
Space heating kWh	139.4122	100.3507	72.2665	23.1419	3.8708	0.0000	0.0000	0.0000	0.0000	21.7388	76.7438	141.8509 (98a)					
Space heating requirement - total per year (kWh/year)												579.3755					
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	139.4122	100.3507	72.2665	23.1419	3.8708	0.0000	0.0000	0.0000	0.0000	21.7388	76.7438	141.8509 (98c)					
Space heating requirement after solar contribution - total per year (kWh/year)												579.3755					
Space heating per m2										(98c) / (4) =		11.4864 (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	139.4122	100.3507	72.2665	23.1419	3.8708	0.0000	0.0000	0.0000	0.0000	21.7388	76.7438	141.8509 (98)					
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50																	
307a	209.1182	150.5260	108.3997	34.7129	5.8062	0.0000	0.0000	0.0000	0.0000	32.6082	115.1158	212.7763					
Space heating requirement	209.1182	150.5260	108.3997	34.7129	5.8062	0.0000	0.0000	0.0000	0.0000	32.6082	115.1158	212.7763 (307)					
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)												0.0000 (308)					
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)					
Water heating																	
Annual water heating requirement	211.0638	186.9194	199.2103	180.2724	175.9452	156.8223	151.3073	162.3437	162.0707	181.3919	191.7034	210.5888 (64)					
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50																	
310a	316.5957	280.3791	298.8154	270.4086	263.9178	235.2335	226.9610	243.5156	243.1061	272.0879	287.5552	315.8832					
Water heating fuel	316.5957	280.3791	298.8154	270.4086	263.9178	235.2335	226.9610	243.5156	243.1061	272.0879	287.5552	315.8832 (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	12.9071	11.6581	12.9071	12.4908	12.9071	12.4908	12.9071	12.9071	12.4908	12.9071	12.4908	12.9071 (331)					
Lighting	16.4938	13.2319	11.9139	8.7286	6.7422	5.5085	6.1505	7.9947	10.3843	13.6247	15.3891	16.9522 (332)					
Electricity generated by PVs (Appendix M) (negative quantity)																	
(333a)m	-2.6442	-4.7050	-8.7045	-12.2903	-15.4061	-15.2141	-14.8973	-12.7997	-9.5958	-6.1468	-3.1786	-2.1578 (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												869.0633 (307)					
Space heating fuel - secondary												0.0000 (309)					
Water heating fuel - community heating												3254.4592 (310)					
Efficiency of water heater												0.0000 (311)					
Electricity used for heat distribution												8.6906 (313)					
Space cooling fuel												0.0000 (321)					
Electricity for pumps and fans:																	
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.8820)																	
mechanical ventilation fans (SFP = 0.8820)												151.9713 (330a)					
Total electricity for the above, kWh/year												151.9713 (331)					

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Electricity for lighting (calculated in Appendix L)	133.1144 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-107.7401 (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	4300.8680 (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	1777.3804	0.1576	59.0456 (367)
Electrical energy for heat distribution (space & water)	8.6906	0.0000	5.9494 (372)
Overall CO2 factor for heat network			0.0636 (386)
Total CO2 associated with community systems			262.3903 (373)
Space and water heating			262.3903 (376)
Pumps, fans and electric keep-hot	151.9713	0.1387	21.0803 (378)
Energy for lighting	133.1144	0.1443	19.2125 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.7401	0.1305	-14.0579
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.0579 (380)
Total CO2, kg/year			288.6252 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.7200 (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	1777.3804	1.5835	593.1883 (467)
Electrical energy for heat distribution (space & water)	8.6906	0.0000	63.2398 (472)
Overall CO2 factor for heat network			0.6764 (486)
Total CO2 associated with community systems			2789.0947 (473)
Space and water heating			2789.0947 (476)
Pumps, fans and electric keep-hot	151.9713	1.5128	229.9021 (478)
Energy for lighting	133.1144	1.5338	204.1752 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.7401	1.4820	-159.6698
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-159.6698 (480)
Total Primary energy kWh/year			3063.5023 (483)
Dwelling Primary energy Rate (DPER)			60.7400 (484)

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

1. Overall dwelling characteristics

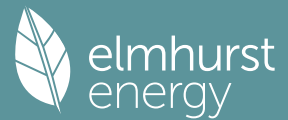
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	50.4400 (1b)	x 2.8000 (2b)	= 141.2320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 141.2320 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1416 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3916 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3035 (21)

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

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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												
Effective ac	0.3870	0.3794	0.3718	0.3338	0.3263	0.2883	0.2883	0.2807	0.3035	0.3263	0.3414	0.3566 (22b)
	0.5749	0.5720	0.5691	0.5557	0.5532	0.5416	0.5416	0.5394	0.5461	0.5532	0.5583	0.5636 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			8.3400	1.1450	9.5496		(27)
Heatloss Floor 1			50.4400	0.1300	6.5572		(28b)
External Wall 1	19.1800	8.3400	10.8400	0.1800	1.9512		(29a)
Corridor wall	19.1800	2.4200	16.7600	0.1800	3.0168		(29a)
Total net area of external elements Aum(A, m2)			88.8000				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.4948	(33)
Main dwelling							
Party Wall 1			41.2200	0.0000	0.0000		(32)

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

253.3577 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	5.0800	0.0500	0.2540
E3 Sill	1.5900	0.0500	0.0795
E4 Jamb	12.6000	0.0500	0.6300
E7 Party floor between dwellings (in blocks of flats)	3.4900	0.0700	0.2443
E7 Party floor between dwellings (in blocks of flats)	6.8500	0.0700	0.4795
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0200	0.0672
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	3.4900	0.3200	1.1168
E21 Exposed floor (inverted)	6.8500	0.3200	2.1920
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.7200	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	14.7200	0.1600	2.3552

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

8.1577 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 31.6525 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.7927	26.6572	26.5244	25.9005	25.7838	25.2405	25.2405	25.1399	25.4498	25.7838	26.0199	26.2668 (38)
Average = Sum(39)m / 12 =	58.4452	58.3097	58.1769	57.5531	57.4363	56.8930	56.8930	56.7924	57.1023	57.4363	57.6725	57.9193 (39)
												57.5525

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1587	1.1560	1.1534	1.1410	1.1387	1.1279	1.1279	1.1259	1.1321	1.1387	1.1434	1.1483 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

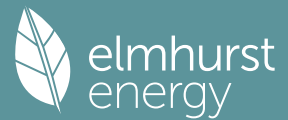
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7031 (42)
Hot water usage for mixer showers	52.7742	51.9811	50.8254	48.6142	46.9824	45.1626	44.1283	45.2752	46.5325	48.4864	50.7451	52.5720 (42a)
Hot water usage for baths	22.8179	22.4790	22.0018	21.1219	20.4630	19.7325	19.3379	19.8117	20.3277	21.1094	22.0074	22.7407 (42b)
Hot water usage for other uses	32.0711	30.9048	29.7386	28.5724	27.4062	26.2400	26.2400	27.4062	28.5724	29.7386	30.9048	32.0711 (42c)
Average daily hot water use (litres/day)												98.9673 (43)
Daily hot water use	107.6632	105.3650	102.5658	98.3085	94.8516	91.1351	89.7061	92.4931	95.4326	99.3344	103.6573	107.3838 (44)
Energy conte	170.5121	150.0383	157.6399	134.5795	127.6885	112.0612	108.4917	114.5258	117.6779	134.7959	147.6789	168.1371 (45)
Energy content (annual)										Total = Sum(45)m =		1643.8268
Distribution loss (46)m = 0.15 x (45)m	25.5768	22.5057	23.6460	20.1869	19.1533	16.8092	16.2738	17.1789	17.6517	20.2194	22.1518	25.2206 (46)
Water storage loss (or HIU loss):												180.0000 (47)
Store volume												1.5520 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.5400 (49)
Temperature factor from Table 2b												0.8381 (55)
Enter (49) or (54) in (55)												
Total storage loss	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)
If cylinder contains dedicated solar storage	25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	219.7548	194.5156	206.8825	182.2336	176.9312	159.7154	157.7344	163.7685	165.3321	184.0385	195.3331	217.3798 (62)
WWHRS	-24.1262	-21.3374	-22.3433	-18.5011	-17.2424	-14.7544	-13.8299	-14.7067	-15.2655	-17.9963	-20.3877	-23.6794 (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	195.6286	173.1782	184.5393	163.7325	159.6888	144.9610	143.9045	149.0617	150.0666	166.0422	174.9454	193.7004 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1999.4492 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Heat gains from water heating, kWh/month	96.0894	85.4695	91.8094	82.8710	81.8506	75.3837	75.4676	77.4740	77.2513	84.2138	87.2266	95.2997 (65)

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

Metabolic gains (Table 5), Watts

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.5837	85.8963	77.5837	80.1699	77.5837	80.1699	77.5837	77.5837	80.1699	77.5837	80.1699	77.5837	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.3767	149.9164	146.0364	137.7764	127.3497	117.5500	111.0033	109.4636	113.3435	121.6035	132.0302	141.8299	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	(71)
Water heating gains (Table 5)	129.1524	127.1868	123.3997	115.0986	110.0142	104.6996	101.4350	104.1317	107.2934	113.1905	121.1480	128.0910	(72)
Total internal gains	406.6588	414.5454	398.5658	384.5909	366.4936	350.9654	338.5679	339.7249	349.3527	363.9237	384.8941	399.0506	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF			Access factor Table 6d	Gains W	
Northeast					8.3400	11.2829	0.6300		0.7000		0.7700		28.7581 (75)	
Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853 (83)		
Total gains	435.4169	473.0833	504.0325	557.7976	599.3174	599.1802	570.7678	524.8374	477.8656	435.4617	421.0792	422.5359 (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	60.7376	60.8788	61.0177	61.6791	61.8045	62.3947	62.3947	62.5052	62.1660	61.8045	61.5514	61.2891	
alpha	5.0492	5.0586	5.0678	5.1119	5.1203	5.1596	5.1596	5.1670	5.1444	5.1203	5.1034	5.0859	
util living area	0.9905	0.9843	0.9690	0.9138	0.7850	0.5886	0.4351	0.4909	0.7473	0.9372	0.9819	0.9918	(86)
MIT	19.8562	20.0061	20.2536	20.6068	20.8657	20.9758	20.9958	20.9924	20.9222	20.6013	20.1827	19.8347	(87)
Th 2	19.9532	19.9553	19.9575	19.9675	19.9693	19.9781	19.9781	19.9797	19.9747	19.9693	19.9656	19.9616	(88)
util rest of house	0.9875	0.9793	0.9589	0.8865	0.7267	0.5027	0.3359	0.3856	0.6638	0.9111	0.9752	0.9892	(89)
MIT 2	18.6468	18.8378	19.1496	19.5824	19.8626	19.9652	19.9768	19.9772	19.9253	19.5871	19.0704	18.6257	(90)
Living area fraction									fLA = Living area / (4) =			0.5428	(91)
MIT	19.3033	19.4720	19.7489	20.1385	20.4071	20.5138	20.5299	20.5282	20.4664	20.1376	19.6742	19.2820	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3033	19.4720	19.7489	20.1385	20.4071	20.5138	20.5299	20.5282	20.4664	20.1376	19.6742	19.2820	(93)

8. Space heating requirement

Utilisation	0.9851	0.9764	0.9565	0.8916	0.7528	0.5486	0.3898	0.4428	0.7060	0.9161	0.9729	0.9870	(94)
Useful gains	428.9293	461.9214	482.1009	497.3148	451.1633	328.7210	222.5017	232.4218	337.3531	398.9185	409.6470	417.0427	(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	876.8728	849.6885	770.7784	646.8074	500.1066	336.4530	223.5852	234.4530	363.5358	547.8057	725.1828	873.5368	(97)
Space heating kWh	333.2700	260.5795	214.7760	107.6347	36.4138	0.0000	0.0000	0.0000	0.0000	110.7721	227.1857	339.6316	(98a)
Space heating requirement - total per year (kWh/year)												1630.2635	
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	333.2700	260.5795	214.7760	107.6347	36.4138	0.0000	0.0000	0.0000	0.0000	110.7721	227.1857	339.6316	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1630.2635	
Space heating per m ²										(98c) / (4) =		32.3208	(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	333.2700	260.5795	214.7760	107.6347	36.4138	0.0000	0.0000	0.0000	0.0000	110.7721	227.1857	339.6316	(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)	361.0726	282.3180	232.6934	116.6140	39.4516	0.0000	0.0000	0.0000	0.0000	120.0131	246.1384	367.9649	(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	195.6286	173.1782	184.5393	163.7325	159.6888	144.9610	143.9045	149.0617	150.0666	166.0422	174.9454	193.7004	(64)
Efficiency of water heater (217)m	85.2440	84.9738	84.4009	83.1423	81.3306	79.8000	79.8000	79.8000	79.8000	83.1733	84.6468	85.3058	(216)
Fuel for water heating, kWh/month	229.4926	203.8019	218.6460	196.9305	196.3453	181.6553	180.3314	186.7942	188.0534	199.6340	206.6770	227.0660	(219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)

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Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	16.1204	12.9324	11.6442	8.5310	6.5896	5.3838	6.0112	7.8136	10.1492	13.3162	15.0407	16.5684	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-17.3713	-25.3934	-37.8418	-44.1819	-49.0907	-46.3830	-45.8488	-42.5848	-37.0422	-29.7921	-19.4278	-14.9173	(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	-7.2467	-15.4805	-31.2003	-47.4849	-63.3795	-63.8676	-63.0829	-53.1130	-38.5603	-22.3069	-9.7325	-5.7106	(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												1766.2660	(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												2415.4275	(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)												130.1006	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-831.0411	(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												3566.7530	(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	1766.2660	0.2100	370.9159	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2415.4275	0.2100	507.2398	(264)
Space and water heating			878.1556	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	130.1006	0.1443	18.7775	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-409.8752	0.1338	-54.8429	
PV Unit electricity exported	-421.1659	0.1255	-52.8657	
Total			-107.7087	(269)
Total CO2, kg/year			801.1538	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8800	(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	1766.2660	1.1300	1995.8806	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2415.4275	1.1300	2729.4330	(278)
Space and water heating			4725.3136	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	130.1006	1.5338	199.5527	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-409.8752	1.4945	-612.5472	
PV Unit electricity exported	-421.1659	0.4607	-194.0467	
Total			-806.5938	(283)
Total Primary energy kWh/year			4248.3732	(286)
Target Primary Energy Rate (TPER)			84.2300	(287)

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Plot Reference	A 113				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.72	TER	15.88		
Environmental	96 A	% DER < TER				63.98	
CO ₂ Emissions (t/year)	0.26	DFEE	35.90	TFEE	41.38		
Compliance Check	See BREL	% DFEE < TFEE				13.24	
% DPER < TPER	27.89	DPER	60.74	TPER	84.23		
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	50.4400 (1b)	2.8000 (2b)	141.2320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.4400		141.2320 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.2320 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1416 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2916 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2260 (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	0.2881	0.2825	0.2768	0.2486	0.2429	0.2147	0.2147	0.2090	0.2260	0.2429	0.2542	0.2655 (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	0.5415	0.5399	0.5383	0.5309	0.5295	0.5230	0.5230	0.5219	0.5255	0.5295	0.5323	0.5353 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			8.3400	1.1450	9.5496		(27)
Heatloss Floor 1			50.4400	0.1000	5.0440	110.0000	5548.4000 (28b)
External Wall 1	19.1800	8.3400	10.8400	0.1500	1.6260	70.0000	758.8000 (29a)
Corridor wall	19.1800	2.4200	16.7600	0.1900	3.1844	70.0000	1173.2000 (29a)
Total net area of external elements Aum(A, m ²)			88.8000				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	21.8240		(33)
Main dwelling							
Party Wall 1			41.2200	0.0000	0.0000	70.0000	2885.4001 (32)
Party Ceiling 1			50.4400			30.0000	1513.2000 (32b)
Internal Wall 1			100.0400			9.0000	900.3600 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12779.3601 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							253.3577 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					5.0800	0.0500	0.2540
E3 Sill					1.5900	0.0400	0.0636

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E4 Jamb	12.6000	0.0400	0.5040
E7 Party floor between dwellings (in blocks of flats)	3.4900	0.0500	0.1745
E7 Party floor between dwellings (in blocks of flats)	6.8500	0.0390	0.2671
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.0500	0.1680
E9 Balcony between dwellings, wall insulation continuous	3.3600	0.1000	0.3360
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	3.4900	0.1000	0.3490
E21 Exposed floor (inverted)	6.8500	0.1000	0.6850
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
E25 Staggered party wall between dwellings	5.6000	0.0390	0.2184
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.7200	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	14.7200	0.0800	1.1776

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.4772 (36)
 Point Thermal bridges (36a) = 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 26.3013 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 25.2381	Feb 25.1630	Mar 25.0894	Apr 24.7434	May 24.6787	Jun 24.3775	Jul 24.3775	Aug 24.3217	Sep 24.4935	Oct 24.6787	Nov 24.8097	Dec 24.9465 (38)
Heat transfer coeff	51.5394	51.4643	51.3906	51.0447	50.9800	50.6787	50.6787	50.6229	50.7948	50.9800	51.1109	51.2478 (39)
Average = Sum(39)m / 12 =												51.0444

HLP	Jan 1.0218	Feb 1.0203	Mar 1.0188	Apr 1.0120	May 1.0107	Jun 1.0047	Jul 1.0047	Aug 1.0036	Sep 1.0070	Oct 1.0107	Nov 1.0133	Dec 1.0160 (40)
HLP (average)												1.0120
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7031 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	22.3092	21.9724	21.4933	20.7759	20.1293	19.2391	18.5638	19.3896	19.8230	20.7050	21.6220	22.2915 (42b)
Hot water usage for other uses	32.0711	30.9048	29.7386	28.5724	27.4062	26.2400	26.2400	27.4062	28.5724	29.7386	30.9048	32.0711 (42c)
Average daily hot water use (litres/day)												49.8414 (43)
Daily hot water use	Jan 54.3803	Feb 52.8773	Mar 51.2320	Apr 49.3483	May 47.5354	Jun 45.4791	Jul 44.8038	Aug 46.7958	Sep 48.3954	Oct 50.4436	Nov 52.5268	Dec 54.3626 (44)
Energy conte	80.0571	69.9673	73.2094	64.4612	61.2542	52.5951	49.5095	55.0795	56.1362	65.0017	70.9917	79.8354 (45)
Energy content (annual)												Total = Sum(45)m = 778.0984
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss (or HIU loss):												0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	68.0486	59.4722	62.2280	54.7920	52.0661	44.7058	42.0831	46.8176	47.7158	55.2514	60.3430	67.8601 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	68.0486	59.4722	62.2280	54.7920	52.0661	44.7058	42.0831	46.8176	47.7158	55.2514	60.3430	67.8601 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 661.3836 (64)
Electric shower(s)	42.2634	37.6570	41.1200	39.2403	39.9766	38.1338	39.4050	39.9766	39.2403	41.1200	40.3468	42.2634 (64a)
												Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 480.7433 (64a)
Heat gains from water heating, kWh/month	27.5780	24.2823	25.8370	23.5081	23.0107	20.7099	20.3720	21.6986	21.7390	24.0929	25.1724	27.5309 (65)

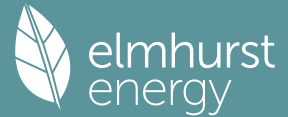
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan 85.1531	Feb 85.1531	Mar 85.1531	Apr 85.1531	May 85.1531	Jun 85.1531	Jul 85.1531	Aug 85.1531	Sep 85.1531	Oct 85.1531	Nov 85.1531	Dec 85.1531 (66)
(66)m												85.1531 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.5837	85.8963	77.5837	80.1699	77.5837	80.1699	77.5837	77.5837	80.1699	77.5837	80.1699	77.5837 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.3767	149.9164	146.0364	137.7764	127.3497	117.5500	111.0033	109.4636	113.3435	121.6035	132.0302	141.8299 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225 (71)
Water heating gains (Table 5)	37.0672	36.1344	34.7272	32.6501	30.9283	28.7638	27.3817	29.1647	30.1931	32.3829	34.9617	37.0039 (72)
Total internal gains	311.5735	320.4929	306.8932	299.1423	284.4077	275.0296	264.5147	264.7580	272.2524	280.1160	295.7077	304.9634 (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					8.3400	11.2829		0.3500	0.7000	0.7700		15.9767 (75)
Solar gains	15.9767	32.5211	58.5926	96.2260	129.3466	137.8971	128.9999	102.8402	71.3961	39.7433	20.1029	13.0474 (83)
Total gains	327.5502	353.0140	365.4859	395.3683	413.7543	412.9267	393.5146	367.5982	343.6485	319.8594	315.8106	318.0108 (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	68.8759	68.9764	69.0753	69.5434	69.6317	70.0456	70.0456	70.1228	69.8856	69.6317	69.4533	69.2678	
alpha	5.5917	5.5984	5.6050	5.6362	5.6421	5.6697	5.6697	5.6749	5.6590	5.6421	5.6302	5.6179	
util living area	0.9972	0.9951	0.9905	0.9693	0.9008	0.7319	0.5566	0.6152	0.8581	0.9763	0.9942	0.9977 (86)	
MIT	19.8503	19.9723	20.1748	20.4945	20.7813	20.9522	20.9915	20.9855	20.8800	20.5299	20.1452	19.8284 (87)	
Th 2	20.0652	20.0664	20.0677	20.0734	20.0744	20.0794	20.0794	20.0803	20.0775	20.0744	20.0723	20.0700 (88)	
util rest of house	0.9963	0.9935	0.9871	0.9574	0.8624	0.6475	0.4455	0.5015	0.7926	0.9647	0.9919	0.9969 (89)	
MIT 2	19.0186	19.1410	19.3429	19.6597	19.9232	20.0571	20.0772	20.0761	20.0100	19.6981	19.3181	19.0005 (90)	
Living area fraction									fLA = Living area / (4) =				0.5428 (91)
MIT	19.4701	19.5922	19.7945	20.1128	20.3890	20.5430	20.5735	20.5697	20.4822	20.1497	19.7671	19.4499 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4701	19.5922	19.7945	20.1128	20.3890	20.5430	20.5735	20.5697	20.4822	20.1497	19.7671	19.4499 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9955	0.9925	0.9858	0.9580	0.8768	0.6918	0.5061	0.5635	0.8240	0.9658	0.9909	0.9962 (94)
Useful gains	326.0777	350.3502	360.3026	378.7445	362.7938	285.6726	199.1421	207.1273	283.1579	308.9327	312.9444	316.8004 (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	781.8568	756.1256	683.2112	572.3548	442.9647	301.1839	201.3705	211.0837	324.1849	486.8412	647.4268	781.5237 (97)
Space heating kWh	339.0996	272.6811	240.2440	139.3994	59.6472	0.0000	0.0000	0.0000	0.0000	132.3639	240.8273	345.7541 (98a)
Space heating requirement - total per year (kWh/year)												1770.0167
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	339.0996	272.6811	240.2440	139.3994	59.6472	0.0000	0.0000	0.0000	0.0000	132.3639	240.8273	345.7541 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1770.0167
Space heating per m2										(98c) / (4) =		35.0915 (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	476.3800	375.0226	384.7343	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8280	0.9033	0.8694	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	394.4575	338.7422	334.4982	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	453.1610	432.1550	403.2630	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	42.2665	69.4991	51.1610	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	10.5666	17.3748	12.7902	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												40.7317 (107)
Energy for space heating												35.0915 (99)
Energy for space cooling												0.8075 (108)
Total												35.8991 (109)
Fabric Energy Efficiency (DFEE)												35.9 (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	50.4400 (1b)	x 2.8000 (2b)	= 141.2320 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.4400		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	141.2320 (5)

2. Ventilation rate

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

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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												20.0000 / (5) =	0.1416 (8)
Pressure Test Method												Yes	
Measured/design AP50												Blower Door	
Infiltration rate												5.0000	(17)
Number of sides sheltered												0.3916	(18)
												3	(19)
Shelter factor												(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor												(21) = (18) x (20) =	0.3035 (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)
	0.3870	0.3794	0.3718	0.3338	0.3263	0.2883	0.2883	0.2807	0.3035	0.3263	0.3414	0.3566	(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	0.5749	0.5720	0.5691	0.5557	0.5532	0.5416	0.5416	0.5394	0.5461	0.5532	0.5583	0.5636	(25)

3. Heat losses and heat loss parameter

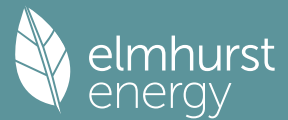
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.4200	1.0000	2.4200			(26)
TER Opening Type			8.3400	1.1450	9.5496			(27)
Heatloss Floor 1			50.4400	0.1300	6.5572			(28b)
External Wall 1	19.1800	8.3400	10.8400	0.1800	1.9512			(29a)
Corridor wall	19.1800	2.4200	16.7600	0.1800	3.0168			(29a)
Total net area of external elements Aum(A, m2)			88.8000					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	23.4948		(33)
Main dwelling								
Party Wall 1			41.2200	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								253.3577 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value	Total		
E1 Steel lintel with perforated steel base plate				5.0800	0.0500	0.2540		
E3 Sill				1.5900	0.0500	0.0795		
E4 Jamb				12.6000	0.0500	0.6300		
E7 Party floor between dwellings (in blocks of flats)				3.4900	0.0700	0.2443		
E7 Party floor between dwellings (in blocks of flats)				6.8500	0.0700	0.4795		
E9 Balcony between dwellings, wall insulation continuous				3.3600	0.0200	0.0672		
E9 Balcony between dwellings, wall insulation continuous				3.3600	0.0200	0.0672		
E18 Party wall between dwellings				2.8000	0.0600	0.1680		
E20 Exposed floor (normal)				3.4900	0.3200	1.1168		
E21 Exposed floor (inverted)				6.8500	0.3200	2.1920		
E25 Staggered party wall between dwellings				2.8000	0.0600	0.1680		
E25 Staggered party wall between dwellings				5.6000	0.0600	0.3360		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.7200	0.0000	0.0000		
P7 Party Wall - Exposed floor (normal)				14.7200	0.1600	2.3552		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							8.1577	(36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	31.6525 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	26.7927	26.6572	26.5244	25.9005	25.7838	25.2405	25.2405	25.1399	25.4498	25.7838	26.0199	26.2668 (38)
Average = Sum(39)m / 12 =	58.4452	58.3097	58.1769	57.5531	57.4363	56.8930	56.8930	56.7924	57.1023	57.4363	57.6725	57.9193 (39)
												57.5525
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1587	1.1560	1.1534	1.1410	1.1387	1.1279	1.1279	1.1259	1.1321	1.1387	1.1434	1.1483 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7031	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.8179	22.4790	22.0018	21.1219	20.4630	19.7325	19.3379	19.8117	20.3277	21.1094	22.0074	22.7407	(42b)
Hot water usage for other uses	32.0711	30.9048	29.7386	28.5724	27.4062	26.2400	26.2400	27.4062	28.5724	29.7386	30.9048	32.0711	(42c)
Average daily hot water use (litres/day)												50.3113	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.8889	53.3838	51.7404	49.6943	47.8692	45.9724	45.5778	47.2179	48.9001	50.8480	52.9123	54.8118	(44)
Energy content (annual)	86.9306	76.0179	79.5231	68.0290	64.4412	56.5285	55.1224	58.4656	60.2987	69.0003	75.3832	85.8220	(45)
Distribution loss (46)m = 0.15 x (45)m												835.5625	
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	73.8910	64.6152	67.5946	57.8246	54.7750	48.0492	46.8541	49.6958	51.2539	58.6503	64.0757	72.9487	(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	73.8910	64.6152	67.5946	57.8246	54.7750	48.0492	46.8541	49.6958	51.2539	58.6503	64.0757	72.9487	(64)
12Total per year (kWh/year)												710.2282	(64)
Electric shower(s)												710	(64)

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	42.2634	37.6570	41.1200	39.2403	39.9766	38.1338	39.4050	39.9766	39.2403	41.1200	40.3468	42.2634 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 480.7433 (64a)											
Heat gains from water heating, kWh/month	29.0386	25.5680	27.1787	24.2662	23.6879	21.5458	21.5648	22.4181	22.6236	24.9426	26.1056	28.8030 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531	85.1531 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	77.5837	85.8963	77.5837	80.1699	77.5837	80.1699	77.5837	77.5837	80.1699	77.5837	80.1699	77.5837 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	148.3767	149.9164	146.0364	137.7764	127.3497	117.5500	111.0033	109.4636	113.3435	121.6035	132.0302	141.8299 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153	31.5153 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225	-68.1225 (71)
Water heating gains (Table 5)	39.0304	38.0477	36.5304	33.7031	31.8386	29.9247	28.9849	30.1319	31.4216	33.5250	36.2578	38.7137 (72)
Total internal gains	313.5367	322.4062	308.6965	300.1953	285.3179	276.1905	266.1178	265.7251	273.4809	281.2581	297.0038	306.6733 (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					8.3400	11.2829		0.6300	0.7000			0.7700	28.7581 (75)	

Solar gains	28.7581	58.5379	105.4668	173.2067	232.8238	248.2148	232.1999	185.1124	128.5129	71.5380	36.1851	23.4853 (83)		
Total gains	342.2948	380.9442	414.1633	473.4020	518.1418	524.4053	498.3177	450.8375	401.9938	352.7961	333.1890	330.1586 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	60.7376	60.8788	61.0177	61.6791	61.8045	62.3947	62.3947	62.5052	62.1660	61.8045	61.5514	61.2891
util living area	5.0492	5.0586	5.0678	5.1119	5.1203	5.1596	5.1596	5.1670	5.1444	5.1203	5.1034	5.0859
	0.9967	0.9938	0.9860	0.9508	0.8491	0.6582	0.4951	0.5644	0.8287	0.9712	0.9933	0.9973 (86)
MIT	19.6670	19.8232	20.0854	20.4813	20.8015	20.9600	20.9924	20.9857	20.8716	20.4633	20.0090	19.6458 (87)
Th 2	19.9532	19.9553	19.9575	19.9675	19.9693	19.9781	19.9781	19.9797	19.9747	19.9693	19.9656	19.9616 (88)
util rest of house	0.9956	0.9917	0.9809	0.9327	0.7982	0.5678	0.3839	0.4469	0.7533	0.9571	0.9907	0.9964 (89)
MIT 2	18.7479	18.9048	19.1659	19.5558	19.8400	19.9608	19.9763	19.9758	19.9059	19.5469	19.0983	18.7332 (90)
Living area fraction									fLA = Living area / (4) =			0.5428 (91)
MIT	19.2468	19.4033	19.6650	20.0582	20.3619	20.5032	20.5278	20.5240	20.4301	20.0444	19.5927	19.2286 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2468	19.4033	19.6650	20.0582	20.3619	20.5032	20.5278	20.5240	20.4301	20.0444	19.5927	19.2286 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9946	0.9902	0.9791	0.9346	0.8191	0.6157	0.4445	0.5109	0.7897	0.9584	0.9894	0.9955 (94)
Useful gains	340.4522	377.2090	405.5206	442.4202	424.4349	322.8995	221.4844	230.3257	317.4708	338.1116	329.6593	328.6743 (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	873.5695	845.6846	765.8981	642.1884	497.5074	335.8490	223.4652	234.2113	361.4634	542.4495	720.4833	870.4450 (97)
Space heating kWh	396.6393	314.8156	268.1208	143.8331	54.3659	0.0000	0.0000	0.0000	0.0000	152.0274	281.3933	403.0774 (98a)
Space heating requirement - total per year (kWh/year)												2014.2728
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	396.6393	314.8156	268.1208	143.8331	54.3659	0.0000	0.0000	0.0000	0.0000	152.0274	281.3933	403.0774 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2014.2728
Space heating per m2										(98c) / (4) =		39.9340 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b												
Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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	534.7943	421.0083	431.6222	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8717	0.9288	0.8930	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	466.1813	391.0192	385.4261	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	583.2646	554.3815	500.3925	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	84.3000	121.5415	85.5350	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	21.0750	30.3854	21.3837	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												72.8441 (107)
Energy for space heating												39.9340 (99)
Energy for space cooling												1.4442 (108)

Total
Fabric Energy Efficiency (TFEE)

41.3782 (109)
41.4 (109)