

Summary for Input Data



Plot Reference	A 414	Issued on Date	15/05/2026
Assessment Reference	Be Green 260515	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	83 B	DER	4.67	TER	13.08
Environmental	96 A	% DER < TER			64.30
CO ₂ Emissions (t/year)	0.31	DFEE	31.04	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			4.75
% DPER < TPER	29.38	DPER	49.45	TPER	70.02

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

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

Orientation	Northeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Mid-floor flat	
Which Floor	4	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	170.41	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements		Heat Loss Perimeter	Internal Floor Area	Average Storey Height
	Ground floor:	32.85 m	74.33 m ²	2.80 m

8.0 Living Area	34.26	m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	49.94	36.84	0.00	None	13.10	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	42.04	39.62	0.90	Stairwell Access Corridor 4	2.42	Enter Gross Area

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	7.90	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	173.12

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	74.33

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

Party Floor 1 Lowest occupied Precast concrete planks floor, screed, carpeted 40.00 74.33

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
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.35		0.70	1.20

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	North East	2.42	
SW Windows	Windows	External Wall 1	South West	10.72	
SE windows	Windows	External Wall 1	South East	2.38	

14.0 Conservatory

None

15.0 Draught Proofing

100 %

16.0 Draught Lobby

No

17.0 Thermal Bridging

Calculate Bridges

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	8.25	0.05	0.05	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	20.20	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	30.03	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	6.72	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	2.80	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	5.64	0.00	0.00	No
E3 Sill	Independently assessed	4.76	0.04	0.04	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E20 Exposed floor (normal)	Independently assessed	8.75	0.05	0.05	No

Y-value 0.05 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

Summary for Input Data

Number of flueless gas fires

0

21.0 Fixed Cooling System

No

22.0 Pressure Testing

Yes

Designed AP₅₀

3.00

m³/(h.m²) @ 50 Pa

Test Method

Blower Door

22.0 Lighting

No Fixed Lighting

No

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	15.00	1125.00	7

24.0 Main Heating 1

None

25.0 Main Heating 2

None

26.0 Heat Networks

Space Community Heating

Space and Water Combined

Distribution Loss

Calculated

Distribution Loss Value

1.50

SAP Code

2306

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	Heat pump	Electricity	Space and Water	232.00	100.00					
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating

None

28.0 Water Heating

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]

Connected

Connected To

Shower 1

Combi boiler or unvented hot water system

8.00

No

Shower 2

Combi boiler or unvented hot water system

8.00

No

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder

Internal Store

Insulation Type

Measured Loss

Cylinder Volume

180.00

L

Loss

1.20

kWh/day

32.0 Photovoltaic Unit

Multiple Dwellings – Not Connected

Export Capable Meter?

No

Connected To Dwelling

Yes

Diverter

No

Battery Capacity [kWh]

0.00

Summary for Input Data



PV Cells kWp	Orientation	Elevation	Overshading	FGHRS	MCS Certificate	Overshading Factor	MCS Certificate Reference	Panel Manufacturer
0.36	South East	Horizontal	Modest		No	0.80		

34.0 Small-scale Hydro

None

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

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE			4.75
% DPER < TPER	29.38	DPER	49.45	TPER	70.02
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	74.3300 (1b)	2.8000 (2b)	208.1240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.3300		208.1240 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	208.1240 (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)

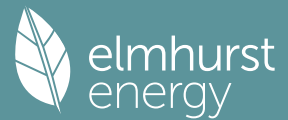
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	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)
Windows			13.1000	1.1450	15.0000		(27)
External Wall 1	49.9400	13.1000	36.8400	0.1500	5.5260	70.0000	2578.8000 (29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.0776		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000	70.0000	553.0000 (32)
Party Floor 1			74.3300			40.0000	2973.2000 (32d)
Party Ceiling 1			74.3300			30.0000	2229.9000 (32b)
Internal Wall 1			173.1200			9.0000	1558.0800 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	12666.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		170.4074 (35)
List of Thermal Bridges		

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	20.2000	0.0500	1.0100
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0360	1.0811
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0500	0.3360
E16 Corner (normal)	5.6000	0.0500	0.2800
E16 Corner (normal)	2.8000	0.0360	0.1008
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0360	0.1008
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.6400	0.0000	0.0000
E3 Sill	4.7600	0.0400	0.1904
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	8.7500	0.0500	0.4375
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.8331 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.9107 (37)

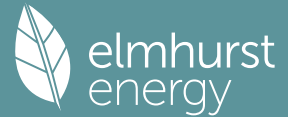
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	17.9987	17.7798	17.5609	16.4663	16.2473	15.1527	15.1527	14.9338	15.5906	16.2473	16.6852	17.1230 (38)
Average = Sum(39)m / 12 =	52.9094	52.6905	52.4715	51.3769	51.1580	50.0634	50.0634	49.8445	50.5012	51.1580	51.5959	52.0337 (39)
												51.3222
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7118	0.7089	0.7059	0.6912	0.6883	0.6735	0.6735	0.6706	0.6794	0.6883	0.6941	0.7000 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.3465 (42)
Hot water usage for mixer showers												
	61.9569	61.0083	59.6104	57.4599	55.5332	52.8377	50.7057	53.1981	54.4517	57.1215	59.9018	61.9010 (42a)
Hot water usage for baths	26.8452	26.4400	25.8635	25.0001	24.2220	23.1509	22.3383	23.3320	23.8535	24.9148	26.0182	26.8239 (42b)
Hot water usage for other uses	38.6605	37.2547	35.8488	34.4430	33.0372	31.6313	31.6313	33.0372	34.4430	35.8488	37.2547	38.6605 (42c)
Average daily hot water use (litres/day)												117.1572 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	127.4626	124.7030	121.3227	116.9031	112.7924	107.6199	104.6753	109.5673	112.7482	117.8851	123.1747	127.3855 (44)
Energy content (annual)	187.6470	165.0073	173.3677	152.7046	145.3444	124.4589	115.6693	128.9627	130.7823	151.9069	166.4748	187.0749 (45)
Distribution loss (46)m = 0.15 x (45)m	28.1470	24.7511	26.0052	22.9057	21.8017	18.6688	17.3504	19.3444	19.6173	22.7860	24.9712	28.0612 (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	242.9238	214.9347	228.6445	206.1983	200.6212	177.9525	170.9461	184.2395	184.2759	207.1837	219.9685	242.3517 (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	242.9238	214.9347	228.6445	206.1983	200.6212	177.9525	170.9461	184.2395	184.2759	207.1837	219.9685	242.3517 (64)
12Total per year (kWh/year)												2480.2404 (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	106.6141	94.8069	101.8662	93.5692	92.5485	84.1775	82.6815	87.1015	86.2800	94.7305	98.1478	106.4238 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1027	118.5780	107.1027	110.6728	107.1027	110.6728	107.1027	107.1027	110.6728	107.1027	110.6728	107.1027 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	207.1851	209.3351	203.9173	192.3835	177.8242	164.1405	154.9990	152.8490	158.2668	169.8006	184.3599	198.0436 (68)
Pumps, fans	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601 (71)
Total internal gains	143.2985	141.0816	136.9169	129.9573	124.3931	116.9132	111.1310	117.0720	119.8334	127.3259	136.3164	143.0428 (72)
	515.7839	527.1923	506.1345	491.2111	467.5176	449.9241	431.4302	435.2212	446.9705	462.4267	489.5466	506.3866 (73)

6. Solar gains												
[Jan]	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	W/m2	Specific data	factor	W						
				or Table 6b	Table 6d							

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Southeast		2.3800		36.7938		0.3500		0.7000		0.7700		14.8680 (77)	
Southwest		10.7200		36.7938		0.3500		0.7000		0.7700		66.9683 (79)	

Solar gains	81.8362	139.3974	190.7296	236.3232	264.7017	262.7875	253.3552	232.1836	206.5198	154.0638	98.0209	70.0348	(83)
Total gains	597.6201	666.5896	696.8641	727.5343	732.2192	712.7115	684.7854	667.4048	653.4903	616.4905	587.5676	576.4214	(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	66.4993	66.7756	67.0542	68.4829	68.7759	70.2797	70.2797	70.5883	69.6703	68.7759	68.1923	67.6185	
alpha	5.4333	5.4517	5.4703	5.5655	5.5851	5.6853	5.6853	5.7059	5.6447	5.5851	5.5462	5.5079	
util living area	0.9579	0.9270	0.8800	0.7740	0.6280	0.4469	0.3213	0.3430	0.5260	0.7794	0.9179	0.9632	(86)
MIT	20.3288	20.5026	20.6811	20.8730	20.9654	20.9959	20.9995	20.9993	20.9897	20.8881	20.6145	20.3097	(87)
Th 2	20.3304	20.3330	20.3356	20.3486	20.3512	20.3643	20.3643	20.3669	20.3590	20.3512	20.3460	20.3408	(88)
util rest of house	0.9507	0.9156	0.8622	0.7454	0.5895	0.4035	0.2751	0.2961	0.4795	0.7462	0.9034	0.9568	(89)
MIT 2	19.5554	19.7710	19.9886	20.2209	20.3208	20.3615	20.3640	20.3665	20.3514	20.2431	19.9215	19.5400	(90)
Living area fraction	fLA = Living area / (4) = 0.4609 (91)												
MIT	19.9119	20.1082	20.3078	20.5215	20.6179	20.6539	20.6569	20.6582	20.6456	20.5404	20.2409	19.8948	(92)
Temperature adjustment	0.0000												
adjusted MIT	19.9119	20.1082	20.3078	20.5215	20.6179	20.6539	20.6569	20.6582	20.6456	20.5404	20.2409	19.8948	(93)

8. Space heating requirement													

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9456	0.9113	0.8614	0.7533	0.6056	0.4233	0.2964	0.3177	0.5004	0.7563	0.9009	0.9518	(94)
Useful gains	565.0942	607.4847	600.2858	548.0310	443.4109	301.7253	202.9606	212.0358	327.0369	466.2401	529.3271	548.6568	(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	826.0143	801.3292	724.5175	597.0757	456.2229	303.0779	203.1032	212.2457	330.5612	508.5307	678.0161	816.6575	(97)
Space heating kWh	194.1246	130.2635	92.4284	35.3122	9.5321	0.0000	0.0000	0.0000	0.0000	31.4642	107.0561	199.3925	(98a)
Space heating requirement - total per year (kWh/year)													799.5736
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	194.1246	130.2635	92.4284	35.3122	9.5321	0.0000	0.0000	0.0000	0.0000	31.4642	107.0561	199.3925	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)													799.5736
Space heating per m2	(98c) / (4) =												10.7571 (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													
	194.1246	130.2635	92.4284	35.3122	9.5321	0.0000	0.0000	0.0000	0.0000	31.4642	107.0561	199.3925	(98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50													
307a	291.1869	195.3952	138.6426	52.9683	14.2982	0.0000	0.0000	0.0000	0.0000	47.1963	160.5841	299.0888	
Space heating requirement	291.1869	195.3952	138.6426	52.9683	14.2982	0.0000	0.0000	0.0000	0.0000	47.1963	160.5841	299.0888	(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													
	242.9238	214.9347	228.6445	206.1983	200.6212	177.9525	170.9461	184.2395	184.2759	207.1837	219.9685	242.3517	(64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50													
310a	364.3857	322.4020	342.9667	309.2975	300.9318	266.9288	256.4192	276.3592	276.4139	310.7756	329.9527	363.5275	
Water heating fuel	364.3857	322.4020	342.9667	309.2975	300.9318	266.9288	256.4192	276.3592	276.4139	310.7756	329.9527	363.5275	(310)
Cooling System Energy Efficiency Ratio	0.0000 (314)												
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(315)
Pumps and Fa	16.4434	14.8521	16.4434	15.9129	16.4434	15.9129	16.4434	16.4434	15.9129	16.4434	15.9129	16.4434	(331)
Lighting	23.1261	18.5526	16.7046	12.2385	9.4534	7.7235	8.6237	11.2094	14.5599	19.1033	21.5772	23.7688	(332)
Electricity generated by PVs (Appendix M) (negative quantity)													
(333a)m	-3.9439	-6.9995	-12.9092	-18.1614	-22.6964	-22.3814	-21.9133	-18.8615	-14.1848	-9.1248	-4.7352	-3.2198	(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													1199.3604 (307)
Space heating fuel - secondary													0.0000 (309)
Water heating fuel - community heating													3720.3606 (310)
Efficiency of water heater													0.0000 (311)
Electricity used for heat distribution													11.9936 (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)													193.6074 (330a)
Total electricity for the above, kWh/year													193.6074 (331)

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Electricity for lighting (calculated in Appendix L)	186.6407 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-159.1310 (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	5140.8381 (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	2120.5694	0.1574	81.3876 (367)
Electrical energy for heat distribution (space & water)	11.9936	0.0000	7.1274 (372)
Overall CO2 factor for heat network			0.0639 (386)
Total CO2 associated with community systems			314.3415 (373)
Space and water heating			314.3415 (376)
Pumps, fans and electric keep-hot	193.6074	0.1387	26.8557 (378)
Energy for lighting	186.6407	0.1443	26.9380 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-159.1310	0.1305	-20.7729
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.7729 (380)
Total CO2, kg/year			347.3624 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.6700 (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	2120.5694	1.5828	818.2553 (467)
Electrical energy for heat distribution (space & water)	11.9936	0.0000	75.5595 (472)
Overall CO2 factor for heat network			0.6774 (486)
Total CO2 associated with community systems			3332.4357 (473)
Space and water heating			3332.4357 (476)
Pumps, fans and electric keep-hot	193.6074	1.5128	292.8892 (478)
Energy for lighting	186.6407	1.5338	286.2757 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-159.1310	1.4822	-235.8662
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-235.8662 (480)
Total Primary energy kWh/year			3675.7344 (483)
Dwelling Primary energy Rate (DPER)			49.4500 (484)

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

1. Overall dwelling characteristics

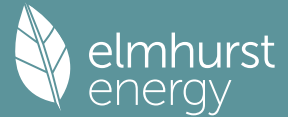
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	74.3300 (1b)	2.8000 (2b)	208.1240 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.3300		208.1240 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	208.1240 (5)

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) = 0.1441 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3941 (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) = 0.3350 (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	0.4272	0.4188	0.4104	0.3685	0.3601	0.3183	0.3183	0.3099	0.3350	0.3601	0.3769	0.3937 (22b)
	0.5912	0.5877	0.5842	0.5679	0.5649	0.5506	0.5506	0.5480	0.5561	0.5649	0.5710	0.5775 (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			13.1000	1.1450	15.0000		(27)
External Wall 1	49.9400	13.1000	36.8400	0.1800	6.6312		(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316		(29a)
Total net area of external elements Aum(A, m2)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)					31.1828		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							170.4074 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	20.2000	0.0700	1.4140
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0700	2.1021
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0200	0.1344
E16 Corner (normal)	5.6000	0.0900	0.5040
E16 Corner (normal)	2.8000	0.0900	0.2520
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520
E18 Party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.6400	0.0000	0.0000
E3 Sill	4.7600	0.0500	0.2380
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	8.7500	0.3200	2.8000
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.8710 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 40.0538 (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	40.6063	40.3629	40.1245	39.0043	38.7947	37.8190	37.8190	37.6384	38.1949	38.7947	39.2187	39.6619 (38)
Heat transfer coeff	80.6601	80.4167	80.1783	79.0581	78.8485	77.8728	77.8728	77.6922	78.2487	78.8485	79.2725	79.7157 (39)
Average = Sum(39)m / 12 =												79.0571
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0852	1.0819	1.0787	1.0636	1.0608	1.0477	1.0477	1.0452	1.0527	1.0608	1.0665	1.0725 (40)
HLP (average)												1.0636
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

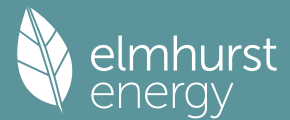
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3465 (42)
Hot water usage for mixer showers													
63.5628	62.6076	61.2156	58.5524	56.5870	54.3952	53.1493	54.5307	56.0450	58.3984	61.1188	63.3193	(42a)	
Hot water usage for baths													
27.4573	27.0495	26.4753	25.4165	24.6237	23.7446	23.2697	23.8400	24.4608	25.4015	26.4821	27.3645	(42b)	
Hot water usage for other uses													
38.6605	37.2547	35.8488	34.4430	33.0372	31.6313	31.6313	33.0372	34.4430	35.8488	37.2547	38.6605	(42c)	
Average daily hot water use (litres/day)												119.2059 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
129.6806	126.9118	123.5397	118.4119	114.2478	109.7711	108.0504	111.4079	114.9489	119.6487	124.8556	129.3442	(44)	
Energy content (annual)	205.3824	180.7207	189.8760	162.0999	153.7995	134.9763	130.6776	137.9462	141.7434	162.3622	177.8797	202.5218 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1979.9857	
30.8074	27.1081	28.4814	24.3150	23.0699	20.2464	19.6016	20.6919	21.2615	24.3543	26.6820	30.3783	(46)	
Water storage loss (or HIU loss):													
Store volume												180.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8381 (55)	
Total storage loss													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(56)	
If cylinder contains dedicated solar storage													
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	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	(61)	
Total heat required for water heating calculated for each month													
254.6251	225.1979	239.1186	209.7541	203.0422	182.6305	179.9203	187.1889	189.3976	211.6048	225.5339	251.7645	(62)	
WWHRS	-29.0583	-25.6994	-26.9109	-22.2833	-20.7672	-17.7707	-16.6572	-17.7132	-18.3862	-21.6753	-24.5555	-28.5201 (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	(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	(63c)	
FGHRS	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													
225.5668	199.4986	212.2078	187.4708	182.2750	164.8599	163.2631	169.4757	171.0114	189.9295	200.9784	223.2444	(64)	
12Total per year (kWh/year)												2289.7813 (64)	
Electric shower(s)												2290 (64)	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)	
Heat gains from water heating, kWh/month													
107.6838	95.6714	102.5279	92.0216	90.5325	83.0030	82.8444	85.2613	85.2531	93.3796	97.2683	106.7326	(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	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251 (66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.1027	118.5780	107.1027	110.6728	107.1027	110.6728	107.1027	107.1027	110.6728	107.1027	110.6728	107.1027 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.1851	209.3351	203.9173	192.3835	177.8242	164.1405	154.9990	152.8490	158.2668	169.8006	184.3599	198.0436 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325 (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)	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601 (71)
Water heating gains (Table 5)	144.7363	142.3682	137.8063	127.8078	121.6834	115.2819	111.3500	114.5985	118.4070	125.5102	135.0949	143.4579 (72)
Total internal gains	520.2216	531.4788	510.0239	492.0616	467.8079	448.2928	431.6492	432.7477	445.5441	463.6110	491.3251	509.8017 (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			
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			
-----	-----	-----	-----	2.3800	36.7938	0.6300	0.7000	0.7700	26.7623 (77)			
-----	-----	-----	-----	10.7200	36.7938	0.6300	0.7000	0.7700	120.5429 (79)			
-----	-----	-----	-----	-----	-----	-----	-----	-----	-----			
Solar gains	147.3052	250.9153	343.3132	425.3818	476.4630	473.0175	456.0393	417.9304	371.7356	277.3149	176.4377	126.0626 (83)
Total gains	667.5269	782.3941	853.3371	917.4434	944.2709	921.3103	887.6886	850.6781	817.2798	740.9258	667.7628	635.8643 (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	43.6206	43.7526	43.8827	44.5045	44.6228	45.1818	45.1818	45.2869	44.9649	44.6228	44.3841	44.1373
alpha	3.9080	3.9168	3.9255	3.9670	3.9749	4.0121	4.0121	4.0191	3.9977	3.9749	3.9589	3.9425
util living area	0.9665	0.9399	0.8990	0.8150	0.6878	0.5188	0.3807	0.4126	0.6117	0.8373	0.9408	0.9714 (86)
MIT	19.6256	19.9039	20.2244	20.5888	20.8350	20.9597	20.9908	20.9873	20.9211	20.6068	20.0682	19.5827 (87)
Th 2	20.0130	20.0157	20.0183	20.0307	20.0330	20.0438	20.0438	20.0458	20.0396	20.0330	20.0283	20.0234 (88)
util rest of house	0.9596	0.9283	0.8798	0.7817	0.6359	0.4489	0.3004	0.3303	0.5414	0.8005	0.9274	0.9655 (89)
MIT 2	18.4380	18.7854	19.1800	19.6194	19.8899	20.0175	20.0399	20.0400	19.9831	19.6522	19.0045	18.3915 (90)
Living area fraction									fLA = Living area / (4) =			0.4609 (91)
MIT	18.9854	19.3009	19.6614	20.0662	20.3255	20.4518	20.4782	20.4766	20.4154	20.0922	19.4948	18.9405 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9854	19.3009	19.6614	20.0662	20.3255	20.4518	20.4782	20.4766	20.4154	20.0922	19.4948	18.9405 (93)

8. Space heating requirement

Utilisation	0.9506	0.9183	0.8719	0.7830	0.6523	0.4793	0.3372	0.3679	0.5698	0.8030	0.9186	0.9572 (94)
Useful gains	634.5773	718.4693	743.9861	718.3611	615.9429	441.6147	299.3584	312.9469	465.7265	594.9640	613.3841	608.6367 (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	1184.5241	1158.0769	1055.2541	882.7774	680.1079	455.6946	302.0052	316.7219	494.1744	748.4418	982.5668	1175.0526 (97)
Space heating kWh	409.1604	295.4163	231.5834	118.3798	47.7387	0.0000	0.0000	0.0000	0.0000	114.1875	265.8116	421.4134 (98a)
Space heating requirement - total per year (kWh/year)												1903.6911
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	409.1604	295.4163	231.5834	118.3798	47.7387	0.0000	0.0000	0.0000	0.0000	114.1875	265.8116	421.4134 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1903.6911
Space heating per m2										(98c) / (4) =		25.6113 (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	409.1604	295.4163	231.5834	118.3798	47.7387	0.0000	0.0000	0.0000	0.0000	114.1875	265.8116	421.4134 (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)	443.2941	320.0610	250.9029	128.2554	51.7213	0.0000	0.0000	0.0000	0.0000	123.7134	287.9866	456.5692 (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	225.5668	199.4986	212.2078	187.4708	182.2750	164.8599	163.2631	169.4757	171.0114	189.9295	200.9784	223.2444 (64)
Efficiency of water heater (217)m	85.3780	84.9385	84.2562	83.0582	81.5147	79.8000	79.8000	79.8000	79.8000	82.9569	84.6877	79.8000 (216)
Fuel for water heating, kWh/month	264.1977	234.8741	251.8603	225.7102	223.6100	206.5913	204.5904	212.3755	214.3000	228.9497	237.3172	261.2201 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041 (231)

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Lighting	22.2538	17.8528	16.0745	11.7769	9.0968	7.4322	8.2984	10.7866	14.0107	18.3828	20.7633	22.8723	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-14.0544	-21.2592	-32.7578	-39.5680	-45.1125	-43.0104	-42.4873	-38.8834	-32.9838	-25.4744	-15.9555	-11.9884	(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	-4.0845	-8.8574	-18.1136	-27.9736	-37.7574	-38.2240	-37.7754	-31.6283	-22.7214	-12.9130	-5.5303	-3.2106	(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												2062.5039	(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												2765.5963	(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)												179.6012	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-612.3244	(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												4481.3770	(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	2062.5039	0.2100	433.1258 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2765.5963	0.2100	580.7752 (264)
Space and water heating			1013.9011 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	179.6012	0.1443	25.9220 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-363.5350	0.1331	-48.4016
PV Unit electricity exported	-248.7894	0.1251	-31.1210
Total			-79.5225 (269)
Total CO2, kg/year			972.2298 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.0800 (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	2062.5039	1.1300	2330.6294 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2765.5963	1.1300	3125.1239 (278)
Space and water heating			5455.7533 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	179.6012	1.5338	275.4783 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-363.5350	1.4920	-542.3889
PV Unit electricity exported	-248.7894	0.4591	-114.2256
Total			-656.6145 (283)
Total Primary energy kWh/year			5204.7179 (286)
Target Primary Energy Rate (TPER)			70.0200 (287)

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Plot Reference	A 414				Issued on Date	15/05/2026	
Assessment Reference	Be Green 260515			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	83 B	DER	4.67	TER	13.08		
Environmental	96 A	% DER < TER				64.30	
CO ₂ Emissions (t/year)	0.31	DFEE	31.04	TFEE	32.58		
Compliance Check	See BREL	% DFEE < TFEE				4.75	
% DPER < TPER	29.38	DPER	49.45	TPER	70.02		
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	74.3300 (1b)	2.8000 (2b)	208.1240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.3300		208.1240 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	208.1240 (5)

2. Ventilation rate

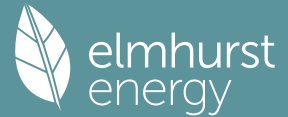
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1441 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2941 (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) = 0.2500 (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)
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	0.3188	0.3125	0.3063	0.2750	0.2688	0.2375	0.2375	0.2313	0.2500	0.2688	0.2813	0.2938 (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	0.5508	0.5488	0.5469	0.5378	0.5361	0.5282	0.5282	0.5267	0.5313	0.5361	0.5396	0.5432 (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)
Windows			13.1000	1.1450	15.0000		(27)
External Wall 1	49.9400	13.1000	36.8400	0.1500	5.5260	70.0000	2578.8000 (29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			91.9800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.0776		(33)
Main dwelling							
Party Wall 1			7.9000	0.0000	0.0000	70.0000	553.0000 (32)
Party Floor 1			74.3300			40.0000	2973.2000 (32a)
Party Ceiling 1			74.3300			30.0000	2229.9000 (32b)
Internal Wall 1			173.1200			9.0000	1558.0800 (32c)
Heat capacity Cm = Sum (A x k)						(28)...(30) + (32) + (32a)...(32e) =	12666.3800 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							170.4074 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					8.2500	0.0500	0.4125
E4 Jamb					18.6000	0.0400	0.7440

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E7 Party floor between dwellings (in blocks of flats)	20.2000	0.0500	1.0100
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0360	1.0811
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0500	0.3360
E16 Corner (normal)	5.6000	0.0500	0.2800
E16 Corner (normal)	2.8000	0.0360	0.1008
E17 Corner (inverted - internal area greater than external area)	2.8000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0360	0.1008
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.6400	0.0000	0.0000
E3 Sill	4.7600	0.0400	0.1904
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E20 Exposed floor (normal)	8.7500	0.0500	0.4375
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.8331 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	34.9107 (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	37.8301	37.6946	37.5618	36.9379	36.8212	36.2778	36.2778	36.1772	36.4871	36.8212	37.0573	37.3042 (38)
Average = Sum(39)m / 12 =	72.7408	72.6053	72.4725	71.8486	71.7319	71.1885	71.1885	71.0879	71.3978	71.7319	71.9680	72.2149 (39)
												71.8481
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9786	0.9768	0.9750	0.9666	0.9650	0.9577	0.9577	0.9564	0.9606	0.9650	0.9682	0.9715 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3465 (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	26.8452	26.4400	25.8635	25.0001	24.2220	23.1509	22.3383	23.3320	23.8535	24.9148	26.0182	26.8239 (42b)
Hot water usage for other uses	38.6605	37.2547	35.8488	34.4430	33.0372	31.6313	31.6313	33.0372	34.4430	35.8488	37.2547	38.6605 (42c)
Average daily hot water use (litres/day)												60.0378 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	65.5057	63.6947	61.7123	59.4431	57.2592	54.7823	53.9697	56.3692	58.2965	60.7636	63.2729	65.4844 (44)
Energy content (annual)	96.4358	84.2809	88.1856	77.6476	73.7843	63.3539	59.6381	66.3476	67.6210	78.3001	85.5155	96.1687 (45)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
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 (57)
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 (59)
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 (61)
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 (62)
Total heat required for water heating calculated for each month	81.9704	71.6388	74.9578	66.0004	62.7166	53.8508	50.6924	56.3954	57.4779	66.5551	72.6881	81.7434 (63a)
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 (63b)
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 (63c)
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 (63d)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64)
Output from w/h	81.9704	71.6388	74.9578	66.0004	62.7166	53.8508	50.6924	56.3954	57.4779	66.5551	72.6881	81.7434 (64)
12Total per year (kWh/year)												796.6871 (64)
Electric shower(s)	50.9032	45.3552	49.5261	47.2622	48.1490	45.9295	47.4605	48.1490	47.2622	49.5261	48.5948	50.9032 (64a)
Heat gains from water heating, kWh/month	33.2184	29.2485	31.1210	28.3156	27.7164	24.9451	24.5382	26.1361	26.1850	29.0203	30.3207	33.1616 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												579.0209 (64a)

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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1027	118.5780	107.1027	110.6728	107.1027	110.6728	107.1027	107.1027	110.6728	107.1027	110.6728	107.1027 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	207.1851	209.3351	203.9173	192.3835	177.8242	164.1405	154.9990	152.8490	158.2668	169.8006	184.3599	198.0436 (68)
Pumps, fans	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601 (71)
Total internal gains	44.6484	43.5245	41.8293	39.3273	37.2532	34.6459	32.9815	35.1292	36.3681	39.0058	42.1121	44.5721 (72)
	417.1338	429.6351	411.0468	400.5812	380.3777	367.6568	353.2807	353.2784	363.5052	374.1066	395.3424	407.9159 (73)

6. Solar gains

[Jan]												
					Area	Solar flux		g	FF	Access		Gains
					m2	Table 6a		Specific data	Specific data	factor		W
						W/m2		or Table 6b	or Table 6c	Table 6d		
Southeast					2.3800	36.7938		0.3500	0.7000	0.7700		14.8680 (77)
Southwest					10.7200	36.7938		0.3500	0.7000	0.7700		66.9683 (79)

Solar gains	81.8362	139.3974	190.7296	236.3232	264.7017	262.7875	253.3552	232.1836	206.5198	154.0638	98.0209	70.0348 (83)
Total gains	498.9700	569.0325	601.7764	636.9044	645.0794	630.4443	606.6358	585.4620	570.0250	528.1704	493.3633	477.9507 (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	48.3695	48.4598	48.5486	48.9702	49.0499	49.4242	49.4242	49.4942	49.2794	49.0499	48.8889	48.7218
alpha	4.2246	4.2307	4.2366	4.2647	4.2700	4.2949	4.2949	4.2996	4.2853	4.2700	4.2593	4.2481
util living area	0.9861	0.9750	0.9574	0.9120	0.8236	0.6622	0.5013	0.5374	0.7474	0.9202	0.9744	0.9883 (86)
MIT	19.5465	19.7643	20.0445	20.4179	20.7259	20.9229	20.9815	20.9750	20.8655	20.4754	19.9522	19.5074 (87)
Th 2	20.1012	20.1027	20.1042	20.1112	20.1126	20.1187	20.1187	20.1198	20.1163	20.1126	20.1099	20.1071 (88)
util rest of house	0.9831	0.9697	0.9480	0.8917	0.7823	0.5896	0.4074	0.4434	0.6824	0.8978	0.9680	0.9858 (89)
MIT 2	18.7762	18.9920	19.2679	19.6319	19.9131	20.0759	20.1120	20.1101	20.0343	19.6925	19.1849	18.7420 (90)
Living area fraction	fLA = Living area / (4) =											0.4609 (91)
MIT	19.1312	19.3480	19.6258	19.9942	20.2878	20.4663	20.5128	20.5087	20.4174	20.0533	19.5386	19.0948 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1312	19.3480	19.6258	19.9942	20.2878	20.4663	20.5128	20.5087	20.4174	20.0533	19.5386	19.0948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9789	0.9641	0.9419	0.8886	0.7911	0.6194	0.4502	0.4860	0.7060	0.8961	0.9629	0.9820 (94)
Useful gains	488.4626	548.6230	566.8258	565.9668	510.3324	390.5139	273.1339	284.5300	402.4151	473.2848	475.0581	469.3632 (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	1078.8366	1049.0014	951.2606	797.1031	616.0162	417.6138	278.5443	292.0810	451.0500	678.1050	895.1804	1075.6243 (97)
Space heating kWh	439.2383	336.2543	286.0195	166.4182	78.6288	0.0000	0.0000	0.0000	0.0000	152.3862	302.4881	451.0582 (98a)
Space heating requirement - total per year (kWh/year)	2212.4915											
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	439.2383	336.2543	286.0195	166.4182	78.6288	0.0000	0.0000	0.0000	0.0000	152.3862	302.4881	451.0582 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2212.4915											
Space heating per m2	(98c) / (4) = 29.7658 (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	669.1720	526.7950	540.2680	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8259	0.8939	0.8761	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	552.6696	470.8892	473.3300	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	694.5126	668.9339	646.1628	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	102.1269	147.3453	128.5877	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	25.5317	36.8363	32.1469	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												94.5150 (107)
Energy for space heating												29.7658 (99)
Energy for space cooling												1.2716 (108)
Total												31.0374 (109)
Fabric Energy Efficiency (DFEE)												31.0 (109)

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

CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	74.3300 (1b)	x 2.8000 (2b)	= 208.1240 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.3300		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	208.1240 (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) = 30.0000 / (5) = 0.1441 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3941 (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) = 0.3350 (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	0.4272	0.4188	0.4104	0.3685	0.3601	0.3183	0.3183	0.3099	0.3350	0.3601	0.3769	0.3937	(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	0.5912	0.5877	0.5842	0.5679	0.5649	0.5506	0.5506	0.5480	0.5561	0.5649	0.5710	0.5775	(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			13.1000	1.1450	15.0000			(27)
External Wall 1	49.9400	13.1000	36.8400	0.1800	6.6312			(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316			(29a)
Total net area of external elements Aum(A, m2)			91.9800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 31.1828			(33)
Main dwelling								
Party Wall 1			7.9000	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							170.4074	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125	
E4 Jamb	18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)	20.2000	0.0700	1.4140	
E7 Party floor between dwellings (in blocks of flats)	30.0300	0.0700	2.1021	
E9 Balcony between dwellings, wall insulation continuous	6.7200	0.0200	0.1344	
E16 Corner (normal)	5.6000	0.0900	0.5040	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E17 Corner (inverted - internal area greater than external area)	2.8000	-0.0900	-0.2520	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.6400	0.0000	0.0000	
E3 Sill	4.7600	0.0500	0.2380	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E20 Exposed floor (normal)	8.7500	0.3200	2.8000	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				8.8710 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	40.0538 (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	40.6063	40.3629	40.1245	39.0043	38.7947	37.8190	37.8190	37.6384	38.1949	38.7947	39.2187	39.6619	(38)
Heat transfer coeff	80.6601	80.4167	80.1783	79.0581	78.8485	77.8728	77.8728	77.6922	78.2487	78.8485	79.2725	79.7157	(39)
Average = Sum(39)m / 12 =												79.0571	
HLP	1.0852	1.0819	1.0787	1.0636	1.0608	1.0477	1.0477	1.0452	1.0527	1.0608	1.0665	1.0725	(40)
HLP (average)												1.0636	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3465 (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	27.4573	27.0495	26.4753	25.4165	24.6237	23.7446	23.2697	23.8400	24.4608	25.4015	26.4821	27.3645	(42b)
Hot water usage for other uses	38.6605	37.2547	35.8488	34.4430	33.0372	31.6313	31.6313	33.0372	34.4430	35.8488	37.2547	38.6605	(42c)
Average daily hot water use (litres/day)												60.6032	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	66.1178	64.3042	62.3241	59.8595	57.6609	55.3759	54.9011	56.8771	58.9038	61.2503	63.7368	66.0250	(44)
Energy content (annual)	104.7145	91.5683	95.7899	81.9447	77.6226	68.0911	66.3981	70.4258	72.6343	83.1161	90.8047	103.3792	(45)
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	89.0073	77.8331	81.4214	69.6530	65.9792	57.8775	56.4384	59.8619	61.7392	70.6487	77.1840	87.8723	(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	89.0073	77.8331	81.4214	69.6530	65.9792	57.8775	56.4384	59.8619	61.7392	70.6487	77.1840	87.8723	(64)
12Total per year (kWh/year)												855.5158	(64)
Electric shower(s)	50.9032	45.3552	49.5261	47.2622	48.1490	45.9295	47.4605	48.1490	47.2622	49.5261	48.5948	50.9032	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												579.0209	(64a)

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Heat gains from water heating, kWh/month
34.9776 30.7971 32.7369 29.2288 28.5321 25.9517 25.9747 27.0027 27.2503 30.0437 31.4447 34.6939 (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	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	117.3251	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	107.1027	118.5780	107.1027	110.6728	107.1027	110.6728	107.1027	107.1027	110.6728	107.1027	110.6728	107.1027	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	207.1851	209.3351	203.9173	192.3835	177.8242	164.1405	154.9990	152.8490	158.2668	169.8006	184.3599	198.0436	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	34.7325	(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)	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	-93.8601	(71)
Water heating gains (Table 5)	47.0129	45.8290	44.0012	40.5955	38.3495	36.0441	34.9122	36.2940	37.8477	40.3813	43.6732	46.6316	(72)
Total internal gains	419.4983	431.9396	413.2187	401.8494	381.4740	369.0549	355.2114	354.4432	364.9848	375.4821	396.9034	409.9754	(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
Southeast				2.3800	36.7938	0.6300	0.7000			0.7700			26.7623 (77)
Southwest				10.7200	36.7938	0.6300	0.7000			0.7700			120.5429 (79)
Solar gains	147.3052	250.9153	343.3132	425.3818	476.4630	473.0175	456.0393	417.9304	371.7356	277.3149	176.4377	126.0626	(83)
Total gains	566.8035	682.8549	756.5320	827.2312	857.9370	842.0724	811.2508	772.3737	736.7204	652.7970	573.3411	536.0380	(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	43.6206	43.7526	43.8827	44.5045	44.6228	45.1818	45.1818	45.2869	44.9649	44.6228	44.3841	44.1373		
alpha	3.9080	3.9168	3.9255	3.9670	3.9749	4.0121	4.0121	4.0191	3.9977	3.9749	3.9589	3.9425		
util living area	0.9801	0.9597	0.9265	0.8522	0.7320	0.5601	0.4146	0.4512	0.6612	0.8786	0.9624	0.9836	(86)	
MIT	19.4501	19.7470	20.0945	20.5046	20.7925	20.9472	20.9875	20.9825	20.8958	20.5144	19.9178	19.4050	(87)	
Th 2	20.0130	20.0157	20.0183	20.0307	20.0330	20.0438	20.0438	20.0458	20.0396	20.0330	20.0283	20.0234	(88)	
util rest of house	0.9757	0.9514	0.9113	0.8226	0.6813	0.4870	0.3280	0.3626	0.5898	0.8475	0.9532	0.9800	(89)	
MIT 2	18.6141	18.9066	19.2446	19.6379	19.8901	20.0164	20.0396	20.0395	19.9800	19.6576	19.0873	18.5776	(90)	
Living area fraction	18.9994	19.2940	19.6364	20.0374	20.3061	20.4454	20.4765	20.4741	20.4021	20.0525	19.4701	18.9590	(92)	
Temperature adjustment												0.0000		
adjusted MIT	18.9994	19.2940	19.6364	20.0374	20.3061	20.4454	20.4765	20.4741	20.4021	20.0525	19.4701	18.9590	(93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9700	0.9439	0.9044	0.8228	0.6964	0.5185	0.3677	0.4030	0.6180	0.8482	0.9467	0.9749	(94)
Useful gains	549.8136	644.5593	684.2129	680.6382	597.4761	436.6231	298.2588	311.2879	455.2766	553.6971	542.7578	522.6061	(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	1185.6580	1157.5161	1053.2504	880.4986	678.5756	455.1994	301.8752	316.5274	493.1284	745.3180	980.6071	1176.5207	(97)
Space heating kWh	473.0683	344.7069	274.5639	143.8995	60.3380	0.0000	0.0000	0.0000	0.0000	142.5659	315.2515	486.5124	(98a)
Space heating requirement - total per year (kWh/year)												2240.9066	
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	473.0683	344.7069	274.5639	143.8995	60.3380	0.0000	0.0000	0.0000	0.0000	142.5659	315.2515	486.5124	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2240.9066	
Space heating per m2										(98c) / (4) =		30.1481	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b													
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	732.0048	576.2591	590.4605	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8870	0.9343	0.9196	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	649.2517	538.3892	543.0144	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	941.6341	907.7683	864.4344	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	210.5153	274.8180	239.1364	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	52.6288	68.7045	59.7841	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												181.1174	(107)
Energy for space heating												30.1481	(99)
Energy for space cooling												2.4367	(108)
Total												32.5847	(109)

