

Summary for Input Data



Plot Reference	A 115		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	81 B	DER	5.68	TER	16.19
Environmental	95 A	% DER < TER			64.92
CO ₂ Emissions (t/year)	0.37	DFEE	41.50	TFEE	46.75
Compliance Check	See BREL	% DFEE < TFEE			11.23
% DPER < TPER	31.04	DPER	59.83	TPER	86.76

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	238.23	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:	27.53 m	72.81 m ²	2.80 m

8.0 Living Area	35.90	m ²
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Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	35.03	20.09	0.00	None	14.94	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	0.70	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	22.81	0.00	None

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

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

Description	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	72.81

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	
NE windows	Window	External Wall 1	North East	13.57	
SE windows	Window	External Wall 1	South East	1.36	

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	7.58	0.05	0.05	No
E3 Sill	Independently assessed	4.08	0.04	0.04	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	8.15	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	15.02	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.05	0.05	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.10	0.10	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E16 Corner (normal)	Independently assessed	8.40	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	5.60	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
E20 Exposed floor (normal)	Independently assessed	8.15	0.10	0.10	No
E21 Exposed floor (inverted)	Independently assessed	15.02	0.10	0.10	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	8.15	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	8.15	0.08	0.08	No

Y-value W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes
Approved Installation	Yes
Mechanical Ventilation data Type	Database
Type	Balanced mechanical ventilation with heat recovery
MV Reference Number	500625
Configuration	2
Manufacturer SFP	0.61
Duct Type	Rigid
MVHR Efficiency	89.00
Wet Rooms	2
SFP from Installer Commissioning Certificate	No
MVHR System Location	Inside heated envelope (installed exclusively)
Duct Installation Specification	Level 1

20.0 Fans, Open Fireplaces, Flues

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

Summary for Input Data

Number of passive vents

Number of flueless gas fires

21.0 Fixed Cooling System

22.0 Pressure Testing

Designed AP₅₀ m²/(h.m²) @ 50 Pa

Test Method

22.0 Lighting
No Fixed Lighting

Name	Efficacy	Power	Capacity	Count
Lighting 1	75.00	15.00	1125.00	7

24.0 Main Heating 1

25.0 Main Heating 2

26.0 Heat Networks

Space Community Heating

Distribution Loss

Distribution Loss Value

SAP Code

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

27.0 Secondary Heating

28.0 Water Heating

Water Heating

SAP Code

Flue Gas Heat Recovery System

Waste Water Heat Recovery Instantaneous System 1

Waste Water Heat Recovery Instantaneous System 2

Waste Water Heat Recovery Storage System

Solar Panel

Water use <= 125 litres/person/day

Cold Water Source

Bath Count

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower 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

Insulation Type

Cylinder Volume L

Loss kWh/day

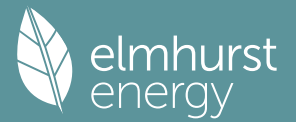
32.0 Photovoltaic Unit

Export Capable Meter?

Connected To Dwelling

Diverter

Summary for Input Data



Battery Capacity [kWh]

0.00

PV Cells kWp

Orientation

Elevation

Overshading

FGHRS

MCS Certificate

**Overshading
Factor**

**MCS
Certificate
Reference**

**Panel
Manufacturer**

0.35

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

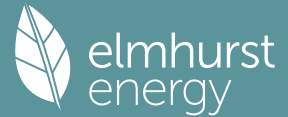
Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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Compliance Check	See BREL	% DFEE < TFEE				11.23	
% DPER < TPER	31.04	DPER	59.83	TPER	86.76		
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

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

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.1500 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1162 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2477	0.2448	0.2419	0.2274	0.2245	0.2099	0.2099	0.2070	0.2157	0.2245	0.2303	0.2361 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			14.9400	1.1450	17.1069		(27)
Heatloss Floor 1			72.8100	0.1000	7.2810	110.0000	8009.1000 (28b)
External Wall 1		14.9400	20.0900	0.1500	3.0135	70.0000	1406.2999 (29a)
Corridor wall	35.0300	2.4200	39.6200	0.1900	7.5278	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			149.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.3492		(33)
Main dwelling							
Party Wall 1			22.8100	0.0000	0.0000	70.0000	1596.7000 (32)
Party Ceiling 1			72.8100			30.0000	2184.3000 (32b)
Internal Wall 1			152.8800			9.0000	1375.9200 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		17345.7200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							238.2327 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790
E3 Sill	4.0800	0.0400	0.1632
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	8.1500	0.0500	0.4075
E7 Party floor between dwellings (in blocks of flats)	15.0200	0.0390	0.5858
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360
E16 Corner (normal)	2.8000	0.0500	0.1400
E16 Corner (normal)	8.4000	0.0390	0.3276
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E20 Exposed floor (normal)	8.1500	0.1000	0.8150
E21 Exposed floor (inverted)	15.0200	0.1000	1.5020
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1500	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	8.1500	0.0800	0.6520
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.6193 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.9685 (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	16.6656	16.4701	16.2746	15.2970	15.1015	14.1238	14.1238	13.9283	14.5149	15.1015	15.4925	15.8835 (38)
Average = Sum(39)m / 12 =	60.6341	60.4386	60.2430	59.2654	59.0699	58.0923	58.0923	57.8968	58.4833	59.0699	59.4610	59.8520 (39)
												59.2165
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8328	0.8301	0.8274	0.8140	0.8113	0.7979	0.7979	0.7952	0.8032	0.8113	0.8167	0.8220 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

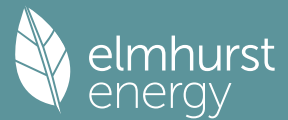
Assumed occupancy												2.3124 (42)
Hot water usage for mixer showers												62.7491 (42a)
Hot water usage for baths												27.1192 (42b)
Hot water usage for other uses												38.3110 (42c)
Average daily hot water use (litres/day)												118.1323 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	128.5126	125.7687	122.4271	117.3454	113.2188	108.7824	107.0772	110.4044	113.9135	118.5710	123.7310	128.1793 (44)
Energy content (annual)	203.5325	179.0930	188.1659	160.6400	152.4143	133.7607	129.5006	136.7038	140.4668	160.8998	176.2775	200.6977 (45)
Distribution loss (46)m = 0.15 x (45)m												1962.1526
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												
If cylinder contains dedicated solar storage												
Primary 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)
Combi 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 (57)
Total heat required for water heating calculated for each month	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)
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 (61)
PV diverter	258.8093	229.0204	243.4427	214.1337	207.6911	187.2544	184.7774	191.9806	193.9605	216.1766	229.7712	255.9745 (62)
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 (63a)
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 (63b)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Total per year (kWh/year)	258.8093	229.0204	243.4427	214.1337	207.6911	187.2544	184.7774	191.9806	193.9605	216.1766	229.7712	255.9745 (64)
Electric shower(s)												2612.9924 (64)
Heat gains from water heating, kWh/month												2613 (64)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												0.0000 (64a)
	111.8960	99.4904	106.7866	96.2077	94.8992	87.2704	87.2804	89.6754	89.5001	97.7206	101.4072	110.9534 (65)

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

Metabolic gains (Table 5), Watts												
(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	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459	103.2459 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739 (68)
Pumps, fans	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618 (69)
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)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947 (71)
Total internal gains	150.3979	148.0511	143.5304	133.6219	127.5527	121.2089	117.3124	120.5315	124.3058	131.3449	140.8434	149.1310 (72)
	515.0938	525.9236	505.0124	487.2021	463.3725	447.0124	430.6837	431.7884	444.3325	459.2735	486.5324	504.8363 (73)

6. Solar gains

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[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			13.5700	11.2829		0.3500		0.7000		0.7700		25.9957 (75)
Southeast			1.3700	36.7938		0.3500		0.7000		0.7700		8.5584 (77)
Solar gains	34.5541	67.4932	115.2825	181.2838	238.1421	251.8545	236.3915	191.6130	137.7663	80.7783	42.9604	28.5536 (83)
Total gains	549.6480	593.4168	620.2950	668.4859	701.5146	698.8669	667.0752	623.4014	582.0988	540.0518	529.4928	533.3899 (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	79.4645	79.7215	79.9803	81.2996	81.5687	82.9414	82.9414	83.2215	82.3868	81.5687	81.0323	80.5028
alpha	6.2976	6.3148	6.3320	6.4200	6.4379	6.5294	6.5294	6.5481	6.4925	6.4379	6.4022	6.3669
util living area	0.9901	0.9823	0.9639	0.8936	0.7411	0.5279	0.3827	0.4263	0.6722	0.9145	0.9784	0.9916 (86)
MIT	20.2381	20.3650	20.5511	20.8045	20.9518	20.9953	20.9995	20.9990	20.9799	20.8032	20.4966	20.2230 (87)
Th 2	20.2250	20.2273	20.2296	20.2412	20.2436	20.2552	20.2552	20.2575	20.2505	20.2436	20.2389	20.2343 (88)
util rest of house	0.9874	0.9775	0.9540	0.8676	0.6929	0.4683	0.3182	0.3580	0.6073	0.8875	0.9717	0.9893 (89)
MIT 2	19.3423	19.5041	19.7378	20.0481	20.2046	20.2525	20.2550	20.2572	20.2375	20.0541	19.6803	19.3305 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	19.7839	19.9286	20.1388	20.4210	20.5730	20.6188	20.6221	20.6230	20.6036	20.4234	20.0828	19.7706 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.7839	19.9286	20.1388	20.4210	20.5730	20.6188	20.6221	20.6230	20.6036	20.4234	20.0828	19.7706 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9855	0.9753	0.9526	0.8742	0.7145	0.4976	0.3500	0.3917	0.6385	0.8945	0.9701	0.9875 (94)
Useful gains	541.6644	578.7749	590.9213	584.4009	501.2178	347.7355	233.4919	244.1713	371.6729	483.0997	513.6383	526.7467 (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	938.8551	908.3061	821.6438	682.7984	524.1288	349.6447	233.6529	244.4954	380.3505	580.2703	771.9683	931.9298 (97)
Space heating kWh	295.5099	221.4450	171.6575	70.8462	17.0458	0.0000	0.0000	0.0000	0.0000	72.2949	185.9975	301.4562 (98a)
Space heating requirement - total per year (kWh/year)	1336.2530											
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	295.5099	221.4450	171.6575	70.8462	17.0458	0.0000	0.0000	0.0000	0.0000	72.2949	185.9975	301.4562 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1336.2530											
Space heating per m2	(98c) / (4) = 18.3526 (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	295.5099	221.4450	171.6575	70.8462	17.0458	0.0000	0.0000	0.0000	0.0000	72.2949	185.9975	301.4562 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50	443.2648	332.1675	257.4863	106.2692	25.5687	0.0000	0.0000	0.0000	0.0000	108.4424	278.9963	452.1844
307a	443.2648	332.1675	257.4863	106.2692	25.5687	0.0000	0.0000	0.0000	0.0000	108.4424	278.9963	452.1844 (307)
Space heating requirement	443.2648	332.1675	257.4863	106.2692	25.5687	0.0000	0.0000	0.0000	0.0000	108.4424	278.9963	452.1844 (307)
Efficiency of secondary/supplementary heating system in % (from Table 4a or Appendix E)	0.0000 (308)											
Space heating fuel for secondary/supplementary system	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (309)
Water heating												
Annual water heating requirement	258.8093	229.0204	243.4427	214.1337	207.6911	187.2544	184.7774	191.9806	193.9605	216.1766	229.7712	255.9745 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50	388.2140	343.5306	365.1640	321.2005	311.5367	280.8816	277.1662	287.9709	290.9407	324.2649	344.6568	383.9618
310a	388.2140	343.5306	365.1640	321.2005	311.5367	280.8816	277.1662	287.9709	290.9407	324.2649	344.6568	383.9618
Water heating fuel	388.2140	343.5306	365.1640	321.2005	311.5367	280.8816	277.1662	287.9709	290.9407	324.2649	344.6568	383.9618 (310)
Cooling System Energy Efficiency Ratio	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (314)
Space coolin	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (315)
Pumps and Fa	16.1071	14.5484	16.1071	15.5875	16.1071	15.5875	16.1071	16.1071	15.5875	16.1071	15.5875	16.1071 (331)
Lighting	22.1056	17.7340	15.9675	11.6985	9.0362	7.3827	8.2431	10.7148	13.9174	18.2604	20.6251	22.7200 (332)
Electricity generated by PVs (Appendix M) (negative quantity)	-3.8366	-6.8112	-12.5666	-17.6873	-22.1120	-21.8084	-21.3516	-18.3732	-13.8122	-8.8809	-4.6069	-3.1321 (333a)
(333a)m	-3.8366	-6.8112	-12.5666	-17.6873	-22.1120	-21.8084	-21.3516	-18.3732	-13.8122	-8.8809	-4.6069	-3.1321 (333a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)
(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)	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)
(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)	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)
(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)	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)
(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)	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)
(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	2004.3795 (307)											
Space heating fuel - secondary	0.0000 (309)											
Water heating fuel - community heating	3919.4886 (310)											
Efficiency of water heater	0.0000 (311)											
Electricity used for heat distribution	20.0438 (313)											
Space cooling fuel	0.0000 (321)											
Electricity for pumps and fans:												

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(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)	
mechanical ventilation fans (SFP = 0.7625)	189.6482 (330a)
Total electricity for the above, kWh/year	189.6482 (331)
Electricity for lighting (calculated in Appendix L)	178.4052 (332)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-154.9791 (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	6136.9424 (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	2553.3914	0.1566	135.3227 (367)
Electrical energy for heat distribution (space & water)	20.0438	0.0000	8.6606 (372)
Overall CO2 factor for heat network			0.0645 (386)
Total CO2 associated with community systems			381.9644 (373)
Space and water heating			381.9644 (376)
Pumps, fans and electric keep-hot	189.6482	0.1387	26.3065 (378)
Energy for lighting	178.4052	0.1443	25.7494 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-154.9791	0.1305	-20.2298
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-20.2298 (380)
Total CO2, kg/year			413.7905 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.6800 (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	2553.3914	1.5799	1364.9489 (467)
Electrical energy for heat distribution (space & water)	20.0438	0.0000	91.2769 (472)
Overall CO2 factor for heat network			0.6796 (486)
Total CO2 associated with community systems			4025.6253 (473)
Space and water heating			4025.6253 (476)
Pumps, fans and electric keep-hot	189.6482	1.5128	286.8998 (478)
Energy for lighting	178.4052	1.5338	273.6439 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-154.9791	1.4822	-229.7083
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-229.7083 (480)
Total Primary energy kWh/year			4356.4607 (483)
Dwelling Primary energy Rate (DPER)			59.8300 (484)

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

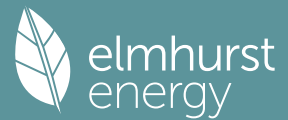
1. Overall dwelling characteristics

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

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1472 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3972 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3078 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate												
Effective ac	0.3924	0.3847	0.3770	0.3386	0.3309	0.2924	0.2924	0.2847	0.3078	0.3309	0.3463	0.3617 (22b)
	0.5770	0.5740	0.5711	0.5573	0.5547	0.5428	0.5428	0.5405	0.5474	0.5547	0.5600	0.5654 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.4200	1.0000	2.4200		(26)
TER Opening Type			14.9400	1.1450	17.1069		(27)
Heatloss Floor 1			72.8100	0.1300	9.4653		(28b)
External Wall 1	35.0300	14.9400	20.0900	0.1800	3.6162		(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316		(29a)
Total net area of external elements Aum(A, m2)			149.8800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	39.7400	(33)
Main dwelling							
Party Wall 1			22.8100	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							238.2327 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790
E3 Sill	4.0800	0.0500	0.2040
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	8.1500	0.0700	0.5705
E7 Party floor between dwellings (in blocks of flats)	15.0200	0.0700	1.0514
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E16 Corner (normal)	2.8000	0.0900	0.2520
E16 Corner (normal)	8.4000	0.0900	0.7560
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	8.1500	0.3200	2.6080
E21 Exposed floor (inverted)	15.0200	0.3200	4.8064
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1500	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	8.1500	0.1600	1.3040

Thermal bridges (Sum(L x Psi) calculated using Appendix K)			12.8677 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =		52.6077 (37)

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

(38)m	Jan 38.8188	Feb 38.6176	Mar 38.4204	Apr 37.4942	May 37.3210	Jun 36.5143	Jul 36.5143	Aug 36.3649	Sep 36.8250	Oct 37.3210	Nov 37.6715	Dec 38.0380 (38)
Heat transfer coeff	91.4264	91.2253	91.0281	90.1019	89.9286	89.1220	89.1220	88.9726	89.4327	89.9286	90.2792	90.6457 (39)
Average = Sum(39)m / 12 =												90.1011

HLP	Jan 1.2557	Feb 1.2529	Mar 1.2502	Apr 1.2375	May 1.2351	Jun 1.2240	Jul 1.2240	Aug 1.2220	Sep 1.2283	Oct 1.2351	Nov 1.2399	Dec 1.2450 (40)
HLP (average)												1.2375
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3124 (42)
Hot water usage	for mixer showers											
	62.9905	62.0438	60.6644	58.0252	56.0774	53.9054	52.6708	54.0397	55.5404	57.8725	60.5685	62.7491 (42a)
Hot water usage	for baths											
	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447	27.1192 (42b)
Hot water usage	for other uses											
	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178	38.3110 (42c)
Average daily hot water use (litres/day)												118.1323 (43)

Daily hot water use	Jan 128.5126	Feb 125.7687	Mar 122.4271	Apr 117.3454	May 113.2188	Jun 108.7824	Jul 107.0772	Aug 110.4044	Sep 113.9135	Oct 118.5710	Nov 123.7310	Dec 128.1793 (44)
Energy conte	203.5325	179.0930	188.1659	160.6400	152.4143	133.7607	129.5006	136.7038	140.4668	160.8998	176.2775	200.6977 (45)
Energy content (annual)										Total = Sum(45)m =		1962.1526

Distribution loss (46)m = 0.15 x (45)m												
30.5299	26.8639	28.2249	24.0960	22.8621	20.0641	19.4251	20.5056	21.0700	24.1350	26.4416	30.1047 (46)	
Water storage loss (or HUI loss):												

Water storage loss (or HIU loss):												
Store volume												180.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day):												1.5520 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8381 (55)

Total storage loss												
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (56)

If cylinder contains dedicated solar storage												
25.9803	23.4661	25.9803	25.1422	25.9803	25.1422	25.9803	25.9803	25.9803	25.1422	25.9803	25.1422	25.9803 (57)

Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

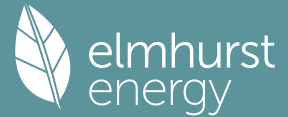
WWHRS	-28.7966	-25.4680	-26.6686	-22.0826	-20.5802	-17.6106	-16.5072	-17.5537	-18.2206	-21.4801	-24.3344	-28.2633 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)

WWHRS	-28.7966	-25.4680	-26.6686	-22.0826	-20.5802	-17.6106	-16.5072	-17.5537	-18.2206	-21.4801	-24.3344	-28.2633 (63a)
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	223.9786	198.1023	210.7400	186.2115	181.0768	163.8042	162.2361	168.3927	169.9003	188.6623	199.5973	221.6771 (64)
Total per year (kWh/year)												2274.3793 (64)
Electric shower(s)												2274 (64)

Total per year (kwh/year)											2274 (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)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.2459	114.3079	103.2459	106.6874	103.2459	106.6874	103.2459	103.2459	106.6874	103.2459	106.6874	103.2459 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947 (71)
Water heating gains (Table 5)	143.9095	141.5628	137.0421	127.1335	121.0644	114.7205	110.8241	114.0432	117.8174	124.8566	134.3551	142.6427 (72)
Total internal gains	511.6055	522.4353	501.5241	483.7138	459.8841	440.5240	424.1954	425.3001	437.8442	455.7852	483.0441	501.3480 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
Northeast	13.5700		11.2829		0.6300		0.7000		0.7700		46.7923 (75)	
Southeast	1.3700		36.7938		0.6300		0.7000		0.7700		15.4052 (77)	
Solar gains	62.1975	121.4878	207.5085	326.3109	428.6558	453.3382	425.5047	344.9034	247.9793	145.4010	77.3287	51.3966 (83)
Total gains	573.8030	643.9230	709.0327	810.0246	888.5400	893.8622	849.7001	770.2035	685.8235	601.1862	560.3728	552.7445 (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	52.7009	52.8171	52.9315	53.4756	53.5787	54.0636	54.0636	54.1544	53.8758	53.5787	53.3706	53.1548
alpha	4.5134	4.5211	4.5288	4.5650	4.5719	4.6042	4.6042	4.6103	4.5917	4.5719	4.5580	4.5437
util living area	0.9924	0.9864	0.9713	0.9181	0.7948	0.6064	0.4543	0.5175	0.7753	0.9482	0.9858	0.9936 (86)
MIT	19.5647	19.7496	20.0527	20.4787	20.8042	20.9572	20.9908	20.9839	20.8713	20.4504	19.9438	19.5374 (87)
Th 2	19.8757	19.8779	19.8800	19.8901	19.8920	19.9008	19.9008	19.9025	19.8974	19.8920	19.8882	19.8842 (88)
util rest of house	0.9901	0.9821	0.9620	0.8919	0.7363	0.5149	0.3445	0.4009	0.6914	0.9259	0.9806	0.9916 (89)
MIT 2	18.2291	18.4652	18.8482	19.3733	19.7327	19.8773	19.8980	19.8969	19.8118	19.3533	18.7209	18.2002 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.8876	19.0985	19.4421	19.9183	20.2610	20.4098	20.4368	20.4328	20.3342	19.8942	19.3238	18.8595 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8876	19.0985	19.4421	19.9183	20.2610	20.4098	20.4368	20.4328	20.3342	19.8942	19.3238	18.8595 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9872	0.9782	0.9575	0.8927	0.7572	0.5586	0.3988	0.4584	0.7273	0.9260	0.9770	0.9891 (94)
Useful gains	566.4679	629.8862	678.8954	723.0957	672.8311	499.2747	338.8350	353.0682	498.7887	556.6745	547.5116	546.6987 (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												
Space heating kWh	1333.6961	1295.2620	1178.0938	992.7718	769.8830	517.7768	341.9460	358.8109	557.5421	835.8166	1103.5575	1328.8243 (97)
Space heating requirement - total per year (kWh/year)	570.8177	447.1326	371.4036	194.1668	72.2066	0.0000	0.0000	0.0000	0.0000	207.6817	400.3530	581.9014 (98a)
Solar heating kWh												2845.6635
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	570.8177	447.1326	371.4036	194.1668	72.2066	0.0000	0.0000	0.0000	0.0000	207.6817	400.3530	581.9014 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2845.6635
Space heating per m2										(98c) / (4) =		39.0834 (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	570.8177	447.1326	371.4036	194.1668	72.2066	0.0000	0.0000	0.0000	0.0000	207.6817	400.3530	581.9014 (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)	618.4374	484.4340	402.3875	210.3649	78.2304	0.0000	0.0000	0.0000	0.0000	225.0073	433.7519	630.4458 (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	223.9786	198.1023	210.7400	186.2115	181.0768	163.8042	162.2361	168.3927	169.9003	188.6623	199.5973	221.6771 (64)

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Efficiency of water heater (217)m	86.0646	85.8281	85.3167	84.1537	82.1743	79.8000	79.8000	79.8000	79.8000	84.2757	85.5886	79.8000 (216)
Fuel for water heating, kWh/month	260.2446	230.8130	247.0090	221.2754	220.3569	205.2685	203.3034	211.0184	212.9077	223.8633	233.2055	86.1206 (217)
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 (233a)m	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting (234a)m	21.4525	17.2100	15.4957	11.3528	8.7692	7.1645	7.9996	10.3981	13.5062	17.7208	20.0156	22.0487 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-13.7735	-20.8385	-32.1172	-38.8051	-44.2540	-42.1971	-41.6836	-38.1413	-32.3458	-24.9737	-15.6379	-11.7483 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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)	-3.9945	-8.6623	-17.7139	-27.3553	-36.9212	-37.3761	-36.9377	-30.9285	-22.2203	-12.6288	-5.4085	-3.1399 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	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)	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)	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												3083.0591 (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												2726.6690 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												173.1336 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-599.8028 (233)
Wind generation												0.0000 (234)
Hydro-electric generation (Appendix N)												0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
Appendix Q - special features												
Energy saved or generated												-0.0000 (236)
Energy used												0.0000 (237)
Total delivered energy for all uses												5469.0589 (238)

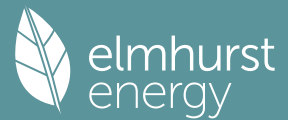
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3083.0591	0.2100	647.4424 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2726.6690	0.2100	572.6005 (264)
Space and water heating			1220.0429 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	173.1336	0.1443	24.9885 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-356.5159	0.1331	-47.4651
PV Unit electricity exported	-243.2869	0.1251	-30.4330
Total			-77.8980 (269)
Total CO2, kg/year			1179.0626 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.1900 (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	3083.0591	1.1300	3483.8568 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2726.6690	1.1300	3081.1359 (278)
Space and water heating			6564.9927 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	173.1336	1.5338	265.5581 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-356.5159	1.4920	-531.9092
PV Unit electricity exported	-243.2869	0.4591	-111.7003
Total			-643.6095 (283)
Total Primary energy kWh/year			6317.0420 (286)
Target Primary Energy Rate (TPER)			86.7600 (287)

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Plot Reference	A 115				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	81 B	DER	5.68	TER	16.19		
Environmental	95 A	% DER < TER				64.92	
CO ₂ Emissions (t/year)	0.37	DFEE	41.50	TFEE	46.75		
Compliance Check	See BREL	% DFEE < TFEE				11.23	
% DPER < TPER	31.04	DPER	59.83	TPER	86.76		
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

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

2. Ventilation rate

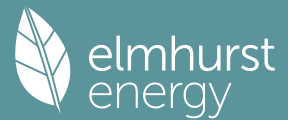
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1472 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2972 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.2303 (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	0.2936	0.2879	0.2821	0.2533	0.2476	0.2188	0.2188	0.2130	0.2303	0.2476	0.2591	0.2706 (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	0.5431	0.5414	0.5398	0.5321	0.5306	0.5239	0.5239	0.5227	0.5265	0.5306	0.5336	0.5366 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			14.9400	1.1450	17.1069		(27)
Heatloss Floor 1			72.8100	0.1000	7.2810	110.0000	8009.1000 (28b)
External Wall 1	35.0300	14.9400	20.0900	0.1500	3.0135	70.0000	1406.2999 (29a)
Corridor wall	42.0400	2.4200	39.6200	0.1900	7.5278	70.0000	2773.4001 (29a)
Total net area of external elements Aum(A, m ²)			149.8800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	37.3492		(33)
Main dwelling							
Party Wall 1			22.8100	0.0000	0.0000	70.0000	1596.7000 (32)
Party Ceiling 1			72.8100			30.0000	2184.3000 (32b)
Internal Wall 1			152.8800			9.0000	1375.9200 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	17345.7200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							238.2327 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					7.5800	0.0500	0.3790
E3 Sill					4.0800	0.0400	0.1632

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E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	8.1500	0.0500	0.4075
E7 Party floor between dwellings (in blocks of flats)	15.0200	0.0390	0.5858
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360
E16 Corner (normal)	2.8000	0.0500	0.1400
E16 Corner (normal)	8.4000	0.0390	0.3276
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E20 Exposed floor (normal)	8.1500	0.1000	0.8150
E21 Exposed floor (inverted)	15.0200	0.1000	1.5020
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1500	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	8.1500	0.0800	0.6520
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.6193 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	43.9685 (37)

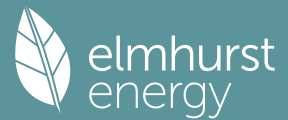
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	36.5384	36.4257	36.3154	35.7969	35.6999	35.2483	35.2483	35.1647	35.4222	35.6999	35.8961	36.1013
Average = Sum(39)m / 12 =	80.5068	80.3942	80.2838	79.7653	79.6683	79.2167	79.2167	79.1331	79.3907	79.6683	79.8646	80.0697
												79.7649
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1057	1.1042	1.1026	1.0955	1.0942	1.0880	1.0880	1.0868	1.0904	1.0942	1.0969	1.0997
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.3124 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Hot water usage for baths	27.2112	26.8071	26.2380	25.1887	24.4030	23.5317	23.0611	23.6263	24.2416	25.1738	26.2447	27.1192
Hot water usage for other uses	38.3110	36.9178	35.5247	34.1316	32.7384	31.3453	31.3453	32.7384	34.1316	35.5247	36.9178	38.3110
Average daily hot water use (litres/day)												60.0572 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	65.5221	63.7249	61.7627	59.3202	57.1414	54.8771	54.4065	56.3647	58.3731	60.6985	63.1625	65.4301
Energy content (annual)	103.7710	90.7434	94.9269	81.2064	76.9233	67.4777	65.7999	69.7913	71.9799	82.3673	89.9866	102.4478
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
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
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
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
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
Total heat required for water heating calculated for each month	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806
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
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
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
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
Output from w/h	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806
12Total per year (kWh/year)												847.8084
Electric shower(s)	50.4449	44.9468	49.0802	46.8366	47.7155	45.5159	47.0331	47.7155	46.8366	49.0802	48.1573	50.4449
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												573.8073
Heat gains from water heating, kWh/month	34.6626	30.5197	32.4420	28.9655	28.2751	25.7180	25.7408	26.7595	27.0049	29.7731	31.1615	34.3814

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.2459	114.3079	103.2459	106.6874	103.2459	106.6874	103.2459	103.2459	106.6874	103.2459	106.6874	103.2459
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618
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
Losses e.g. evaporation (negative values) (Table 5)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947
Water heating gains (Table 5)	46.5895	45.4162	43.6049	40.2299	38.0041	35.7195	34.5978	35.9671	37.5068	40.0176	43.2798	46.2115
Total internal gains	411.2854	423.2886	405.0869	393.8101	373.8239	361.5229	347.9691	347.2240	357.5335	367.9462	388.9689	401.9168

6. Solar gains												
[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b			Specific data or Table 6c		Access factor Table 6d	Gains W
Northeast				13.5700	11.2829	0.3500			0.7000		0.7700	25.9957 (75)
Southeast				1.3700	36.7938	0.3500			0.7000		0.7700	8.5584 (77)
Solar gains	34.5541	67.4932	115.2825	181.2838	238.1421	251.8545	236.3915	191.6130	137.7663	80.7783	42.9604	28.5536 (83)

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Total gains 445.8396 490.7818 520.3694 575.0939 611.9660 613.3775 584.3606 538.8370 495.2998 448.7245 431.9292 430.4705 (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	59.8490	59.9329	60.0153	60.4054	60.4789	60.8237	60.8237	60.8880	60.6904	60.4789	60.3303	60.1757
alpha	4.9899	4.9955	5.0010	5.0270	5.0319	5.0549	5.0549	5.0592	5.0460	5.0319	5.0220	5.0117
util living area	0.9973	0.9951	0.9901	0.9687	0.9028	0.7466	0.5780	0.6423	0.8736	0.9785	0.9946	0.9977 (86)
MIT	19.6124	19.7567	19.9987	20.3695	20.7088	20.9241	20.9833	20.9723	20.8220	20.3981	19.9488	19.5863 (87)
Th 2	19.9962	19.9974	19.9987	20.0045	20.0056	20.0107	20.0107	20.0116	20.0087	20.0056	20.0034	20.0011 (88)
util rest of house	0.9964	0.9935	0.9866	0.9568	0.8650	0.6600	0.4573	0.5201	0.8111	0.9682	0.9926	0.9970 (89)
MIT 2	18.7326	18.8773	19.1186	19.4861	19.8011	19.9738	20.0061	20.0030	19.9045	19.5189	19.0738	18.7104 (90)
Living area fraction	fLA = Living area / (4) = 0.4931 (91)											
MIT	19.1664	19.3109	19.5526	19.9217	20.2486	20.4424	20.4879	20.4809	20.3569	19.9524	19.5052	19.1423 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.1664	19.3109	19.5526	19.9217	20.2486	20.4424	20.4879	20.4809	20.3569	19.9524	19.5052	19.1423 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9954	0.9921	0.9846	0.9556	0.8754	0.7000	0.5171	0.5805	0.8358	0.9675	0.9912	0.9962 (94)
Useful gains	443.8073	486.8855	512.3447	549.5641	535.7423	429.3815	302.1467	312.7737	413.9772	434.1261	428.1362	428.8250 (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	1196.8431	1158.5545	1047.9099	879.1466	681.0561	462.8132	307.9867	322.9369	496.7400	745.0903	990.7386	1196.4245 (97)
Space heating kWh	560.2586	451.3616	398.4605	237.2994	108.1135	0.0000	0.0000	0.0000	0.0000	231.3573	405.0737	571.0940 (98a)
Space heating requirement - total per year (kWh/year)	2963.0186											
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	560.2586	451.3616	398.4605	237.2994	108.1135	0.0000	0.0000	0.0000	0.0000	231.3573	405.0737	571.0940 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2963.0186											
Space heating per m2	(98c) / (4) = 40.6952 (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	744.6374	586.2039	601.4117	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7931	0.8724	0.8300	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	590.5377	511.3909	499.1961	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	677.5036	645.6169	594.4186	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	62.6155	99.8642	70.8456	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	15.6539	24.9660	17.7114	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	58.3313 (107)											
Energy for space heating	40.6952 (99)											
Energy for space cooling	0.8011 (108)											
Total	41.4964 (109)											
Fabric Energy Efficiency (DFEE)	41.5 (109)											

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

1. Overall dwelling characteristics

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

2. Ventilation rate

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

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Number of passive vents
Number of flueless gas fires

0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =
Pressure Test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
30.0000 / (5) = 0.1472 (8)
Yes
Blower Door
5.0000 (17)
0.3972 (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) = 0.3078 (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	0.3924	0.3847	0.3770	0.3386	0.3309	0.2924	0.2924	0.2847	0.3078	0.3309	0.3463	0.3617	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =													(23c)
Effective ac	0.5770	0.5740	0.5711	0.5573	0.5547	0.5428	0.5428	0.5405	0.5474	0.5547	0.5600	0.5654	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.4200	1.0000	2.4200			(26)
TER Opening Type			14.9400	1.1450	17.1069			(27)
Heatloss Floor 1			72.8100	0.1300	9.4653			(28b)
External Wall 1	35.0300	14.9400	20.0900	0.1800	3.6162			(29a)
Corridor wall	42.0400	2.4200	39.6200	0.1800	7.1316			(29a)
Total net area of external elements Aum(A, m2)			149.8800					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	39.7400		(33)
Main dwelling								
Party Wall 1			22.8100	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								238.2327 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	7.5800	0.0500	0.3790	
E3 Sill	4.0800	0.0500	0.2040	
E4 Jamb	18.6000	0.0500	0.9300	
E7 Party floor between dwellings (in blocks of flats)	8.1500	0.0700	0.5705	
E7 Party floor between dwellings (in blocks of flats)	15.0200	0.0700	1.0514	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E16 Corner (normal)	8.4000	0.0900	0.7560	
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E20 Exposed floor (normal)	8.1500	0.3200	2.6080	
E21 Exposed floor (inverted)	15.0200	0.3200	4.8064	
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.1500	0.0000	0.0000	
P7 Party Wall - Exposed floor (normal)	8.1500	0.1600	1.3040	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.8677 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 52.6077 (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	38.8188	38.6176	38.4204	37.4942	37.3210	36.5143	36.5143	36.3649	36.8250	37.3210	37.6715	38.0380	(38)
Heat transfer coeff	91.4264	91.2253	91.0281	90.1019	89.9286	89.1220	89.1220	88.9726	89.4327	89.9286	90.2792	90.6457	(39)
Average = Sum(39)m / 12 =												90.1011	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2557	1.2529	1.2502	1.2375	1.2351	1.2240	1.2240	1.2220	1.2283	1.2351	1.2399	1.2450	(40)
HLP (average)												1.2375	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3124 (42)
Hot water usage for mixer showers													(42a)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Hot water usage for baths													(42b)
27.2112 26.8071 26.2380 25.1887 24.4030 23.5317 23.0611 23.6263 24.2416 25.1738 26.2447 27.1192													
Hot water usage for other uses													(42c)
38.3110 36.9178 35.5247 34.1316 32.7384 31.3453 31.3453 32.7384 34.1316 35.5247 36.9178 38.3110													
Average daily hot water use (litres/day)													(43)
Daily hot water use													(44)
65.5221 63.7249 61.7627 59.3202 57.1414 54.8771 54.4065 56.3647 58.3731 60.6985 63.1625 65.4301													
Energy conte 103.7710 90.7434 94.9269 81.2064 76.9233 67.4777 65.7999 69.7913 71.9799 82.3673 89.9866 102.4478													(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													(46)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Water storage loss (or HIU loss):													(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													(57)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Primary loss													(59)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Combi loss													(61)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Total heat required for water heating calculated for each month													
88.2054 77.1319 80.6879 69.0255 65.3848 57.3561 55.9299 59.3226 61.1829 70.0122 76.4886 87.0806													(62)
WWHRS													(63a)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
PV diverter													(63b)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
Solar input													(63c)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													
FGHRS													(63d)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000													

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Output from w/h	88.2054	77.1319	80.6879	69.0255	65.3848	57.3561	55.9299	59.3226	61.1829	70.0122	76.4886	87.0806 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											847.8084 (64)
Electric shower(s)	50.4449	44.9468	49.0802	46.8366	47.7155	45.5159	47.0331	47.7155	46.8366	49.0802	48.1573	50.4449 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											573.8073 (64a)
Heat gains from water heating, kWh/month	34.6626	30.5197	32.4420	28.9655	28.2751	25.7180	25.7408	26.7595	27.0049	29.7731	31.1615	34.3814 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184	115.6184 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.2459	114.3079	103.2459	106.6874	103.2459	106.6874	103.2459	103.2459	106.6874	103.2459	106.6874	103.2459 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.7646	205.8790	200.5507	189.2073	174.8884	161.4306	152.4400	150.3255	155.6538	166.9972	181.3161	194.7739 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618	34.5618 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947	-92.4947 (71)
Water heating gains (Table 5)	46.5895	45.4162	43.6049	40.2299	38.0041	35.7195	34.5978	35.9671	37.5068	40.0176	43.2798	46.2115 (72)
Total internal gains	411.2854	423.2886	405.0869	393.8101	373.8239	361.5229	347.9691	347.2240	357.5335	367.9462	388.9689	401.9168 (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				13.5700	11.2829	0.6300	0.7000			0.7700	46.7923 (75)	
Southeast				1.3700	36.7938	0.6300	0.7000			0.7700	15.4052 (77)	
Solar gains	62.1975	121.4878	207.5085	326.3109	428.6558	453.3382	425.5047	344.9034	247.9793	145.4010	77.3287	51.3966 (83)
Total gains	473.4829	544.7764	612.5955	720.1210	802.4797	814.8611	773.4738	692.1274	605.5128	513.3472	466.2975	453.3134 (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	52.7009	52.8171	52.9315	53.4756	53.5787	54.0636	54.0636	54.1544	53.8758	53.5787	53.3706	53.1548
alpha	4.5134	4.5211	4.5288	4.5650	4.5719	4.6042	4.6042	4.6103	4.5917	4.5719	4.5580	4.5437
util living area	0.9965	0.9929	0.9832	0.9432	0.8371	0.6530	0.4958	0.5687	0.8288	0.9699	0.9931	0.9971 (86)
MIT	19.4183	19.6083	19.9231	20.3818	20.7523	20.9422	20.9869	20.9764	20.8264	20.3418	19.8094	19.3914 (87)
Th 2	19.8757	19.8779	19.8800	19.8901	19.8920	19.9008	19.9008	19.9025	19.8974	19.8920	19.8882	19.8842 (88)
util rest of house	0.9954	0.9905	0.9774	0.9232	0.7838	0.5590	0.3776	0.4439	0.7522	0.9555	0.9904	0.9962 (89)
MIT 2	18.4473	18.6378	18.9507	19.4006	19.7299	19.8753	19.8976	19.8959	19.8025	19.3726	18.8466	18.4269 (90)
Living area fraction	18.9261	19.1163	19.4302	19.8844	20.2340	20.4014	20.4347	20.4286	20.3073	19.8505	19.3214	18.9025 (92)
Temperature adjustment	18.9261	19.1163	19.4302	19.8844	20.2340	20.4014	20.4347	20.4286	20.3073	19.8505	19.3214	18.9025 (93)
adjusted MIT	18.9261	19.1163	19.4302	19.8844	20.2340	20.4014	20.4347	20.4286	20.3073	19.8505	19.3214	18.9025 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9940	0.9884	0.9744	0.9231	0.8017	0.6035	0.4360	0.5055	0.7838	0.9548	0.9885	0.9951 (94)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1337.2123	1296.8856	1177.0076	989.7146	767.4480	517.0286	341.7569	358.4365	555.1392	831.8823	1103.3342	1332.7144 (97)
Space heating kWh	644.7204	509.6593	431.5930	233.9741	92.3042	0.0000	0.0000	0.0000	0.0000	254.2529	462.5228	655.9361 (98a)
Space heating requirement - total per year (kWh/year)												3284.9628
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	644.7204	509.6593	431.5930	233.9741	92.3042	0.0000	0.0000	0.0000	0.0000	254.2529	462.5228	655.9361 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3284.9628
Space heating per m2												(98c) / (4) = 45.1169 (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	837.7465	659.5026	676.1917	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8550	0.9133	0.8722	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	716.2609	602.3104	589.8077	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	913.0039	866.6583	773.5891	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	141.6550	196.6749	136.7334	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												1.0000 (105)
Intermittency factor (Table 10b)												

Full SAP Calculation Printout



Space cooling kWh	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 requirement	0.0000	0.0000	0.0000	0.0000	0.0000	35.4137	49.1687	34.1833	0.0000	0.0000	0.0000	0.0000	(107)
Energy for space heating													118.7658 (107)
Energy for space cooling													45.1169 (99)
Total													1.6312 (108)
Fabric Energy Efficiency (TFEE)													46.7481 (109)
													46.7 (109)