

Summary for Input Data



Plot Reference	A 111		Issued on Date	19/03/2026
Assessment Reference	Be Green	Plot Type Ref		
Plot Address			SAP Version	10.2

SAP Rating	82 B	DER	5.79	TER	15.05
Environmental	96 A	% DER < TER			61.53
CO ₂ Emissions (t/year)	0.26	DFEE	35.54	TFEE	37.92
Compliance Check	See BREL	% DFEE < TFEE			6.26
% DPER < TPER	22.92	DPER	61.40	TPER	79.66

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

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

Orientation	Northwest
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	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
Thermal Mass	249.01 kJ/m ² K
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	Yes
Smart gas meter fitted	Yes

7.0 Measurements	Ground floor:	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
		14.38 m	50.12 m ²	2.80 m

8.0 Living Area	28.34 m ²
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9.0 External Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Res	Shelter	Openings	Area Calculation Type
	External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	40.26	26.43	0.00	None	13.83	Enter Gross Area

9.1 Party Walls	Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Area (m ²)	Shelter Res	Shelter
	Party Wall 1	Filled Cavity with Edge Sealing	Single plasterboard on dabs on both sides, dense blocks, cavity or cavity fill	0.00	70.00	39.03	0.00	None

9.2 Internal Walls	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Internal Wall 1	Plasterboard on timber frame	9.00	97.83

10.1 Party Ceilings	Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
	Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	50.12

11.0 Heat Loss Floors	Description	Type	Storey Index	Construction	U-Value (W/m ² K)	Shelter Code	Shelter Factor	Kappa (kJ/m ² K)	Area (m ²)
	Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	110.00	50.12

12.0 Opening Types

Summary for Input Data

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
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
NW windows	Window	External Wall 1	North West	5.48	
SE windows	Window	External Wall 1	South East	8.34	

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	7.40	0.05	0.05	No
E3 Sill	Independently assessed	3.41	0.04	0.04	No
E4 Jamb	Independently assessed	16.69	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	2.83	0.05	0.05	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	11.55	0.05	0.05	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.10	0.10	No
E18 Party wall between dwellings	Independently assessed	8.40	0.05	0.05	No
E20 Exposed floor (normal)	Independently assessed	10.02	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	13.94	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	13.94	0.08	0.08	No

Y-value

0.06

 W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present

 Yes

Approved Installation

 Yes

Mechanical Ventilation data Type

 Database

Type

 Balanced mechanical ventilation with heat recovery

MV Reference Number

 500625

Configuration

 1

Manufacturer SFP

 0.63

Duct Type

 Rigid

MVHR Efficiency

 90.00

Wet Rooms

 1

SFP from Installer Commissioning Certificate

 No

MVHR System Location

 Inside heated envelope (installed exclusively)

Duct Installation Specification

 Level 1

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys

 0

Number of open flues

 0

Number of chimneys/flues attached to closed fire

 0

Number of flues attached to solid fuel boiler

 0

Number of flues attached to other heater

 0

Number of blocked chimneys

 0

Number of intermittent extract fans

 0

Number of passive vents

 0

Number of flueless gas fires

 0

21.0 Fixed Cooling System

No

22.0 Pressure Testing

Yes

Designed AP₅₀

 3.00 m³/(h.m²) @ 50 Pa

Summary for Input Data

Test Method	Blower Door									
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22.0 Lighting

No Fixed Lighting	No									
	Name	Efficacy	Power	Capacity	Count					
	Lighting 1	75.00	15.00	1125.00	4					

24.0 Main Heating 1

	None									
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25.0 Main Heating 2

	None									
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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									
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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	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									
Loss	1.20									

32.0 Photovoltaic Unit

	Multiple Dwellings – Not Connected									
Export Capable Meter?	No									
Connected To Dwelling	Yes									
Diverter	No									
Battery Capacity [kWh]	0.00									

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

34.0 Small-scale Hydro

	None										
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Summary for Input Data



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				6.26	
% DPER < TPER	22.92		DPER	61.40		TPER	79.66	
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001		
Client								

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.1200 (1b)	2.8000 (2b)	140.3360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1200		140.3360 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	140.3360 (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)

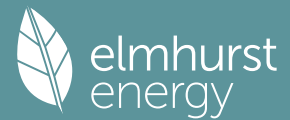
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1275 (21)

	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) =												81.0000 (23c)
Effective ac	0.2576	0.2544	0.2512	0.2352	0.2321	0.2161	0.2161	0.2129	0.2225	0.2321	0.2384	0.2448 (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							
Window			13.8200	1.1450	15.8244		(27)
Heatloss Floor 1			50.1200	0.1000	5.0120	110.0000	5513.2000 (28b)
External Wall 1	40.2600	13.8200	26.4400	0.1500	3.9660	70.0000	1850.7999 (29a)
Total net area of external elements A _{um} (A, m ²)			90.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.8024		(33)
Main dwelling							
Party Wall 1			39.0300	0.0000	0.0000	70.0000	2732.0999 (32)
Party Ceiling 1			50.1200			30.0000	1503.6000 (32b)
Internal Wall 1			97.8300			9.0000	880.4700 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	12480.1698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							249.0058 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate				7.4000	0.0500	0.3700	

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E3 Sill	3.4100	0.0400	0.1364
E4 Jamb	16.6900	0.0400	0.6676
E7 Party floor between dwellings (in blocks of flats)	2.8300	0.0500	0.1415
E9 Balcony between dwellings, wall insulation continuous	11.5500	0.0500	0.5775
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360
E18 Party wall between dwellings	8.4000	0.0500	0.4200
E20 Exposed floor (normal)	10.0200	0.1000	1.0020
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	13.9400	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	13.9400	0.0800	1.1152

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 5.0062 (36)
 Point Thermal bridges 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 29.8086 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
 (38)m Jan 11.9279 Feb 11.7803 Mar 11.6327 Apr 10.8946 May 10.7470 Jun 10.0089 Jul 10.0089 Aug 9.8613 Sep 10.3042 Oct 10.7470 Nov 11.0423 Dec 11.3375 (38)
 Heat transfer coeff 41.7366 41.5890 41.4413 40.7033 40.5556 39.8176 39.8176 39.6699 40.1128 40.5556 40.8509 41.1461 (39)
 Average = Sum(39)m / 12 = 40.6664

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8327	0.8298	0.8268	0.8121	0.8092	0.7944	0.7944	0.7915	0.8003	0.8092	0.8151	0.8210	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6936 (42)
Hot water usage for mixer showers	51.2868	50.5016	49.3445	47.5643	45.9694	43.7381	41.9733	44.0364	45.0741	47.2842	49.5857	51.2406 (42a)
Hot water usage for baths	22.2428	21.9070	21.4293	20.7140	20.0693	19.1818	18.5085	19.3319	19.7640	20.6433	21.5576	22.2251 (42b)
Hot water usage for other uses	31.9745	30.8118	29.6491	28.4864	27.3237	26.1610	26.1610	27.3237	28.4864	29.6491	30.8118	31.9745 (42c)
Average daily hot water use (litres/day)												96.9745 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	105.5041	103.2204	100.4229	96.7647	93.3624	89.0809	86.6428	90.6920	93.3245	97.5766	101.9550	105.4402 (44)
Distribution loss (46)m = 0.15 x (45)m	155.3202	136.5815	143.5022	126.3989	120.3069	103.0191	95.7428	106.7461	108.2517	125.7373	137.7956	154.8467 (45)
Water storage loss (or HIU loss):												Total = Sum(45)m = 1514.2490
Store volume	23.2980	20.4872	21.5253	18.9598	18.0460	15.4529	14.3614	16.0119	16.2378	18.8606	20.6693	23.2270 (46)
b) If manufacturer declared loss factor is not known :												110.0000 (47)
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	210.5970	186.5089	198.7790	179.8926	175.5837	156.5128	151.0196	162.0229	161.7454	181.0141	191.2893	210.1235 (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	210.5970	186.5089	198.7790	179.8926	175.5837	156.5128	151.0196	162.0229	161.7454	181.0141	191.2893	210.1235 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 2165.0888 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	95.8654	85.3553	91.9359	84.8226	84.2235	77.0488	76.0559	79.7145	78.7886	86.0291	88.6120	95.7080 (65)

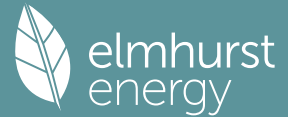
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.4198	82.3934	74.4198	76.9005	74.4198	76.9005	74.4198	74.4198	76.9005	74.4198	76.9005	74.4198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.5456	149.0767	145.2184	137.0047	126.6364	116.8916	110.3815	108.8505	112.7087	120.9224	131.2907	141.0355	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	(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)	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	(71)
Water heating gains (Table 5)	128.8514	127.0168	123.5698	117.8091	113.2036	107.0122	102.2257	107.1432	109.4287	115.6305	123.0722	128.6397	(72)
Total internal gains	399.2213	406.8913	391.6126	380.1189	362.6643	349.2088	335.4316	338.8180	347.4424	359.3772	379.6679	392.4996	(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	8.3400	36.7938	0.3500	0.7000	0.7700	52.1003 (77)
Northwest	5.4800	11.2829	0.3500	0.7000	0.7700	10.4979 (81)

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Solar gains	62.5982	110.1149	159.9260	213.6807	253.5103	257.9100	246.0589	215.3913	178.3915	124.1977	75.6132	53.1601 (83)
Total gains	461.8195	517.0062	551.5386	593.7995	616.1746	607.1188	581.4905	554.2093	525.8339	483.5749	455.2812	445.6597 (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	83.0618	83.3566	83.6535	85.1704	85.4804	87.0649	87.0649	87.3889	86.4241	85.4804	84.8627	84.2537
alpha	6.5375	6.5571	6.5769	6.6780	6.6987	6.8043	6.8043	6.8259	6.7616	6.6987	6.6575	6.6169
util living area	0.9760	0.9513	0.9021	0.7762	0.6030	0.4191	0.3012	0.3292	0.5231	0.8037	0.9442	0.9798 (86)
MIT	20.4392	20.5949	20.7644	20.9277	20.9872	20.9991	20.9999	20.9999	20.9961	20.9242	20.6847	20.4188 (87)
Th 2	20.2251	20.2276	20.2301	20.2428	20.2454	20.2582	20.2582	20.2607	20.2530	20.2454	20.2403	20.2352 (88)
util rest of house	0.9698	0.9398	0.8811	0.7398	0.5572	0.3708	0.2505	0.2763	0.4679	0.7625	0.9292	0.9745 (89)
MIT 2	19.5915	19.7843	19.9873	20.1772	20.2359	20.2577	20.2581	20.2607	20.2507	20.1795	19.9068	19.5747 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	20.0708	20.2427	20.4267	20.6016	20.6607	20.6769	20.6776	20.6786	20.6722	20.6006	20.3466	20.0520 (92)
Temperature adjustment												
adjusted MIT	20.0708	20.2427	20.4267	20.6016	20.6607	20.6769	20.6776	20.6786	20.6722	20.6006	20.3466	20.0520 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9684	0.9400	0.8869	0.7575	0.5826	0.3981	0.2792	0.3062	0.4990	0.7826	0.9315	0.9730 (94)
Useful gains	447.2221	485.9957	489.1385	449.8038	358.9929	241.6884	162.3389	169.6966	262.3882	378.4353	424.1091	433.6441 (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	658.2195	638.0849	577.1399	476.2918	363.4071	241.9669	162.3588	169.7331	263.6279	405.5799	541.1368	652.2488 (97)
Space heating kWh	156.9820	102.2040	65.4731	19.0714	3.2841	0.0000	0.0000	0.0000	0.0000	20.1956	84.2599	162.6419 (98a)
Space heating requirement - total per year (kWh/year)	614.1120											
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	156.9820	102.2040	65.4731	19.0714	3.2841	0.0000	0.0000	0.0000	0.0000	20.1956	84.2599	162.6419 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	614.1120											
Space heating per m2	(98c) / (4) = 12.2528 (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	156.9820	102.2040	65.4731	19.0714	3.2841	0.0000	0.0000	0.0000	0.0000	20.1956	84.2599	162.6419 (98)
Space heat from Heat pump = (98) x 1.00 x 1.00 x 1.50												
307a	235.4730	153.3060	98.2096	28.6071	4.9262	0.0000	0.0000	0.0000	0.0000	30.2934	126.3899	243.9629
Space heating requirement	235.4730	153.3060	98.2096	28.6071	4.9262	0.0000	0.0000	0.0000	0.0000	30.2934	126.3899	243.9629 (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	210.5970	186.5089	198.7790	179.8926	175.5837	156.5128	151.0196	162.0229	161.7454	181.0141	191.2893	210.1235 (64)
Water heat from Heat pump = (64) x 1.00 x 1.00 x 1.50												
310a	315.8956	279.7634	298.1685	269.8389	263.3755	234.7691	226.5294	243.0344	242.6181	271.5211	286.9340	315.1852
Water heating fuel	315.8956	279.7634	298.1685	269.8389	263.3755	234.7691	226.5294	243.0344	242.6181	271.5211	286.9340	315.1852 (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	11.4511	10.3430	11.4511	11.0817	11.4511	11.0817	11.4511	11.4511	11.0817	11.4511	11.0817	11.4511 (331)
Lighting	17.0574	13.6841	12.3210	9.0269	6.9726	5.6967	6.3607	8.2678	10.7391	14.0903	15.9149	17.5315 (332)
Electricity generated by PVs (Appendix M) (negative quantity)												
(333a)m	-2.6428	-4.7012	-8.6944	-12.2701	-15.3738	-15.1782	-14.8620	-12.7731	-9.5805	-6.1403	-3.1765	-2.1567 (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	921.1690 (307)											
Space heating fuel - secondary	0.0000 (309)											
Water heating fuel - community heating	3247.6332 (310)											
Efficiency of water heater	0.0000 (311)											
Electricity used for heat distribution	9.2117 (313)											
Space cooling fuel	0.0000 (321)											
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)												
mechanical ventilation fans (SFP = 0.7875)	134.8278 (330a)											
Total electricity for the above, kWh/year	134.8278 (331)											
Electricity for lighting (calculated in Appendix L)	137.6628 (332)											
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation	-107.5498 (333)											

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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	4333.7420 (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	1796.8971	0.1581	62.7797 (367)
Electrical energy for heat distribution (space & water)	9.2117	0.0000	6.0264 (372)
Overall CO2 factor for heat network			0.0638 (386)
Total CO2 associated with community systems			265.7849 (373)
Space and water heating			265.7849 (376)
Pumps, fans and electric keep-hot	134.8278	0.1387	18.7023 (378)
Energy for lighting	137.6628	0.1443	19.8690 (379)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.5498	0.1305	-14.0340
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-14.0340 (380)
Total CO2, kg/year			290.3222 (383)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.7900 (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	1796.8971	1.5853	629.4500 (467)
Electrical energy for heat distribution (space & water)	9.2117	0.0000	63.9771 (472)
Overall CO2 factor for heat network			0.6768 (486)
Total CO2 associated with community systems			2821.6111 (473)
Space and water heating			2821.6111 (476)
Pumps, fans and electric keep-hot	134.8278	1.5128	203.9675 (478)
Energy for lighting	137.6628	1.5338	211.1518 (479)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-107.5498	1.4820	-159.3910
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-159.3910 (480)
Total Primary energy kWh/year			3077.3394 (483)
Dwelling Primary energy Rate (DPER)			61.4000 (484)

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

1. Overall dwelling characteristics

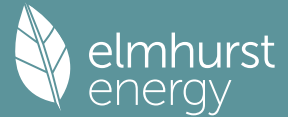
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	50.1200 (1b)	x 2.8000 (2b)	= 140.3360 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	140.3360 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1425 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3925 (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) = 0.3336 (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	0.4254	0.4170	0.4087	0.3670	0.3587	0.3170	0.3170	0.3086	0.3336	0.3587	0.3753	0.3920 (22b)

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Effective ac 0.5905 0.5870 0.5835 0.5673 0.5643 0.5502 0.5502 0.5476 0.5557 0.5643 0.5704 0.5768 (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 Opening Type			12.5300	1.1450	14.3473		(27)
Heatloss Floor 1			50.1200	0.1300	6.5156		(28b)
External Wall 1	40.2600	12.5300	27.7300	0.1800	4.9914		(29a)
Total net area of external elements Aum(A, m2)			90.3800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		25.8543		(33)
Main dwelling							
Party Wall 1			39.0300	0.0000	0.0000		(32)

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

249.0058 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.4000	0.0500	0.3700
E3 Sill	3.4100	0.0500	0.1705
E4 Jamb	16.6900	0.0500	0.8345
E7 Party floor between dwellings (in blocks of flats)	2.8300	0.0700	0.1981
E9 Balcony between dwellings, wall insulation continuous	11.5500	0.0200	0.2310
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E18 Party wall between dwellings	8.4000	0.0600	0.5040
E20 Exposed floor (normal)	10.0200	0.3200	3.2064
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	13.9400	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	13.9400	0.1600	2.2304

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

8.0001 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 33.8544 (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	27.3455	27.1828	27.0233	26.2742	26.1341	25.4817	25.4817	25.3608	25.7330	26.1341	26.4176	26.7140
Heat transfer coeff	61.2000	61.0373	60.8778	60.1287	59.9885	59.3361	59.3361	59.2153	59.5874	59.9885	60.2721	60.5685
Average = Sum(39)m / 12 =												60.1280

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2211	1.2178	1.2146	1.1997	1.1969	1.1839	1.1839	1.1815	1.1889	1.1969	1.2026	1.2085
HLP (average)												1.1997
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

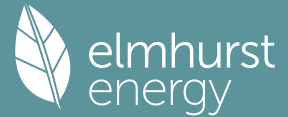
4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6936 (42)
Hot water usage for mixer showers	52.6162	51.8254	50.6732	48.4686	46.8417	45.0274	43.9961	45.1396	46.3931	48.3411	50.5931	52.4146 (42a)
Hot water usage for baths	22.7499	22.4120	21.9362	21.0590	20.4021	19.6737	19.2803	19.7527	20.2671	21.0465	21.9419	22.6730 (42b)
Hot water usage for other uses	31.9745	30.8118	29.6491	28.4864	27.3237	26.1610	26.1610	27.3237	28.4864	29.6491	30.8118	31.9745 (42c)
Average daily hot water use (litres/day)												98.6708 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	107.3406	105.0493	102.2586	98.0140	94.5675	90.8620	89.4373	92.2160	95.1466	99.0368	103.3468	107.0621 (44)
Energy conte	170.0012	149.5888	157.1676	134.1762	127.3060	111.7255	108.1667	114.1827	117.3253	134.3920	147.2364	167.6333 (45)
Energy content (annual)										Total = Sum(45)m =		1638.9017
Distribution loss (46)m = 0.15 x (45)m	25.5002	22.4383	23.5751	20.1264	19.0959	16.7588	16.2250	17.1274	17.5988	20.1588	22.0855	25.1450 (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	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	219.2439	194.0660	206.4103	181.8304	176.5486	159.3797	157.4094	163.4253	164.9795	183.6347	194.8906	216.8760 (62)
WWHRS	-24.0539	-21.2735	-22.2764	-18.4457	-17.1907	-14.7102	-13.7885	-14.6627	-15.2198	-17.9424	-20.3266	-23.6085 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	195.1900	172.7926	184.1339	163.3847	159.3579	144.6694	143.6209	148.7627	149.7597	165.6922	174.5640	193.2675 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1995.1955 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	95.9195	85.3201	91.6524	82.7370	81.7234	75.2721	75.3596	77.3599	77.1340	84.0795	87.0795	95.1322 (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	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.4198	82.3934	74.4198	76.9005	74.4198	76.9005	74.4198	74.4198	76.9005	74.4198	76.9005	74.4198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.5456	149.0767	145.2184	137.0047	126.6364	116.8916	110.3815	108.8505	112.7087	120.9224	131.2907	141.0355 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682 (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)

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Losses e.g. evaporation (negative values) (Table 5)	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454 (71)
Water heating gains (Table 5)	128.9241	126.9644	123.1887	114.9124	109.8432	104.5445	101.2897	103.9783	107.1306	113.0100	120.9437	127.8659 (72)
Total internal gains	402.2941	409.8389	394.2314	380.2222	362.3040	346.7412	334.4956	335.6531	345.1443	359.7568	380.5394	394.7257 (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				7.5600	36.7938	0.6300	0.7000	0.7700				85.0097 (77)
Northwest				4.9700	11.2829	0.6300	0.7000	0.7700				17.1376 (81)
Solar gains	102.1474	179.6872	260.9759	348.7054	413.7116	420.8950	401.5533	351.5001	291.1122	202.6694	123.3856	86.7461 (83)
Total gains	504.4414	589.5261	655.2073	728.9276	776.0155	767.6362	736.0489	687.1533	636.2565	562.4261	503.9251	481.4718 (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	56.6457	56.7967	56.9455	57.6549	57.7896	58.4250	58.4250	58.5443	58.1786	57.7896	57.5178	57.2363
alpha	4.7764	4.7864	4.7964	4.8437	4.8526	4.8950	4.8950	4.9030	4.8786	4.8526	4.8345	4.8158
util living area	0.9823	0.9634	0.9250	0.8281	0.6713	0.4866	0.3533	0.3938	0.6168	0.8691	0.9640	0.9855 (86)
MIT	19.8848	20.1211	20.4133	20.7365	20.9213	20.9867	20.9977	20.9962	20.9601	20.7127	20.2520	19.8471 (87)
Th 2	19.9032	19.9058	19.9083	19.9202	19.9225	19.9329	19.9329	19.9349	19.9289	19.9225	19.9180	19.9132 (88)
util rest of house	0.9770	0.9531	0.9045	0.7871	0.6080	0.4090	0.2684	0.3040	0.5326	0.8268	0.9520	0.9811 (89)
MIT 2	18.6474	18.9430	19.2999	19.6777	19.8639	19.9262	19.9323	19.9337	19.9057	19.6652	19.1194	18.6074 (90)
Living area fraction	19.3471	19.6091	19.9294	20.2764	20.4618	20.5259	20.5347	20.5345	20.5019	20.2575	19.7598	19.3084 (92)
MIT	19.3471	19.6091	19.9294	20.2764	20.4618	20.5259	20.5347	20.5345	20.5019	20.2575	19.7598	19.3084 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3471	19.6091	19.9294	20.2764	20.4618	20.5259	20.5347	20.5345	20.5019	20.2575	19.7598	19.3084 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9737	0.9497	0.9050	0.8015	0.6406	0.4526	0.3164	0.3548	0.5787	0.8412	0.9498	0.9780 (94)
Useful gains	491.1588	559.8955	592.9545	584.2443	497.0875	347.4060	232.8940	243.8225	368.2260	473.1024	478.6522	470.8639 (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	920.8812	897.8038	817.5546	684.0471	525.6098	351.6190	233.4721	244.8249	381.4743	579.3383	763.0318	915.0927 (97)
Space heating kWh	319.7134	227.0744	167.1024	71.8581	21.2206	0.0000	0.0000	0.0000	0.0000	79.0395	204.7533	330.5062 (98a)
Space heating requirement - total per year (kWh/year)												1421.2679
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	319.7134	227.0744	167.1024	71.8581	21.2206	0.0000	0.0000	0.0000	0.0000	79.0395	204.7533	330.5062 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1421.2679
Space heating per m ²										(98c) / (4) =		28.3573 (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	319.7134	227.0744	167.1024	71.8581	21.2206	0.0000	0.0000	0.0000	0.0000	79.0395	204.7533	330.5062 (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)	346.3851	246.0177	181.0427	77.8527	22.9909	0.0000	0.0000	0.0000	0.0000	85.6333	221.8346	358.0782 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	195.1900	172.7926	184.1339	163.3847	159.3579	144.6694	143.6209	148.7627	149.7597	165.6922	174.5640	193.2675 (64)
Efficiency of water heater (217)m	85.1592	84.6734	83.8428	82.3495	80.7619	79.8000	79.8000	79.8000	79.8000	82.5005	84.4184	79.8000 (216)
Fuel for water heating, kWh/month	229.2061	204.0695	219.6181	198.4041	197.3182	181.2900	179.9760	186.4194	187.6688	200.8379	206.7842	226.7010 (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	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.4630	12.4050	11.1693	8.1831	6.3209	5.1642	5.7661	7.4950	9.7353	12.7732	14.4273	15.8927 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-17.2564	-25.2249	-37.5924	-43.8957	-48.7795	-46.0925	-45.5591	-42.3083	-36.7951	-29.5915	-19.2980	-14.8186 (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)

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Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	-7.2054	-15.3898	-31.0117	-47.1895	-62.9772	-63.4587	-62.6816	-52.7824	-38.3279	-22.1771	-9.6773	-5.6785	(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												1539.8352	(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												2418.2934	(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)												124.7950	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-825.7688	(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												3343.1548	(238)

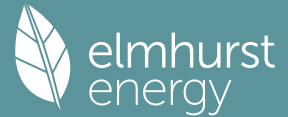
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1539.8352	0.2100	323.3654 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2418.2934	0.2100	507.8416 (264)
Space and water heating			831.2070 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	124.7950	0.1443	18.0118 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.2120	0.1338	-54.4860
PV Unit electricity exported	-418.5569	0.1255	-52.5401
Total			-107.0261 (269)
Total CO2, kg/year			754.1220 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0500 (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	1539.8352	1.1300	1740.0138 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2418.2934	1.1300	2732.6715 (278)
Space and water heating			4472.6853 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	124.7950	1.5338	191.4147 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-407.2120	1.4945	-608.5647
PV Unit electricity exported	-418.5569	0.4608	-192.8516
Total			-801.4163 (283)
Total Primary energy kWh/year			3992.7846 (286)
Target Primary Energy Rate (TPER)			79.6600 (287)

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Plot Reference	A 111				Issued on Date	19/03/2026	
Assessment Reference	Be Green			Plot Type Ref			
Plot Address					SAP Version	10.2	
SAP Rating	82 B	DER	5.79	TER	15.05		
Environmental	96 A	% DER < TER				61.53	
CO ₂ Emissions (t/year)	0.26	DFEE	35.54	TFEE	37.92		
Compliance Check	See BREL	% DFEE < TFEE				6.26	
% DPER < TPER	22.92	DPER	61.40	TPER	79.66		
Assessor Details	Mr. Robert Tanner				Assessor ID	W344-0001	
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	50.1200 (1b)	2.8000 (2b)	140.3360 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1200		140.3360 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	140.3360 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1425 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2925 (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) = 0.2486 (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	0.3170	0.3108	0.3046	0.2735	0.2673	0.2362	0.2362	0.2300	0.2486	0.2673	0.2797	0.2921 (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	0.5502	0.5483	0.5464	0.5374	0.5357	0.5279	0.5279	0.5264	0.5309	0.5357	0.5391	0.5427 (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							
Window			13.8200	1.1450	15.8244		(27)
Heatloss Floor 1			50.1200	0.1000	5.0120	110.0000	5513.2000 (28b)
External Wall 1	40.2600	13.8200	26.4400	0.1500	3.9660	70.0000	1850.7999 (29a)
Total net area of external elements Aum(A, m ²)			90.3800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 24.8024		(33)
Main dwelling							
Party Wall 1			39.0300	0.0000	0.0000	70.0000	2732.0999 (32)
Party Ceiling 1			50.1200			30.0000	1503.6000 (32b)
Internal Wall 1			97.8300			9.0000	880.4700 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 12480.1698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							249.0058 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					7.4000	0.0500	0.3700
E3 Sill					3.4100	0.0400	0.1364
E4 Jamb					16.6900	0.0400	0.6676
E7 Party floor between dwellings (in blocks of flats)					2.8300	0.0500	0.1415

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E9 Balcony between dwellings, wall insulation continuous	11.5500	0.0500	0.5775	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.1000	0.4360	
E18 Party wall between dwellings	8.4000	0.0500	0.4200	
E20 Exposed floor (normal)	10.0200	0.1000	1.0020	
E25 Staggered party wall between dwellings	2.8000	0.0500	0.1400	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	13.9400	0.0000	0.0000	
P7 Party Wall - Exposed floor (normal)	13.9400	0.0800	1.1152	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				5.0062 (36)
Point Thermal bridges				0.0000
Total fabric heat loss		(33) + (36) + (36a) =		29.8086 (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	25.4825	25.3921	25.3036	24.8875	24.8097	24.4474	24.4474	24.3803	24.5869	24.8097	24.9672	25.1318 (38)
Average = Sum(39)m / 12 =	55.2911	55.2008	55.1122	54.6962	54.6183	54.2560	54.2560	54.1889	54.3956	54.6183	54.7758	54.9404 (39)
												54.6958
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1032	1.1014	1.0996	1.0913	1.0898	1.0825	1.0825	1.0812	1.0853	1.0898	1.0929	1.0962 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6936 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.2428	21.9070	21.4293	20.7140	20.0693	19.1818	18.5085	19.3319	19.7640	20.6433	21.5576	22.2251	(42b)
Hot water usage for other uses	31.9745	30.8118	29.6491	28.4864	27.3237	26.1610	26.1610	27.3237	28.4864	29.6491	30.8118	31.9745	(42c)
Average daily hot water use (litres/day)													49.6920 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	54.2173	52.7188	51.0784	49.2004	47.3930	45.3428	44.6695	46.6555	48.2503	50.2924	52.3694	54.1996	(44)
Energy content (annual)	79.8172	69.7576	72.9900	64.2680	61.0706	52.4374	49.3611	54.9144	55.9680	64.8068	70.7789	79.5961	(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	67.8446	59.2940	62.0415	54.6278	51.9100	44.5718	41.9570	46.6773	47.5728	55.0858	60.1621	67.6567	(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	67.8446	59.2940	62.0415	54.6278	51.9100	44.5718	41.9570	46.6773	47.5728	55.0858	60.1621	67.6567	(64a)
12Total per year (kWh/year)													659.4013 (64)
Electric shower(s)	42.1368	37.5442	40.9968	39.1228	39.8569	38.0196	39.2869	39.8569	39.1228	40.9968	40.2259	42.1368	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													479.3034 (64a)
Heat gains from water heating, kWh/month	27.4953	24.2095	25.7596	23.4376	22.9417	20.6479	20.3110	21.6335	21.6739	24.0207	25.0970	27.4484	(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	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	74.4198	82.3934	74.4198	76.9005	74.4198	76.9005	74.4198	74.4198	76.9005	74.4198	76.9005	74.4198	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	147.5456	149.0767	145.2184	137.0047	126.6364	116.8916	110.3815	108.8505	112.7087	120.9224	131.2907	141.0355	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	(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)	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	(71)
Water heating gains (Table 5)	36.9561	36.0261	34.6231	32.5523	30.8357	28.6776	27.2997	29.0773	30.1026	32.2858	34.8570	36.8930	(72)
Total internal gains	307.3260	315.9007	302.6659	294.8620	280.2964	270.8742	260.5056	260.7521	268.1163	276.0326	291.4527	300.7528	(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				8.3400	36.7938		0.3500		0.7000		0.7700		52.1003 (77)
Northwest				5.4800	11.2829		0.3500		0.7000		0.7700		10.4979 (81)
Solar gains	62.5982	110.1149	159.9260	213.6807	253.5103	257.9100	246.0589	215.3913	178.3915	124.1977	75.6132		53.1601 (83)
Total gains	369.9243	426.0155	462.5919	508.5427	533.8067	528.7842	506.5645	476.1435	446.5078	400.2303	367.0659	353.9129	(84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	62.6993	62.8019	62.9028	63.3813	63.4716	63.8955	63.8955	63.9746	63.7316	63.4716	63.2892	63.0995
alpha	5.1800	5.1868	5.1935	5.2254	5.2314	5.2597	5.2597	5.2650	5.2488	5.2314	5.2193	5.2066
util living area	0.9947	0.9884	0.9745	0.9275	0.8180	0.6301	0.4665	0.5151	0.7592	0.9467	0.9884	0.9958 (86)
MIT	19.7981	19.9876	20.2457	20.5876	20.8453	20.9695	20.9947	20.9913	20.9211	20.5897	20.1358	19.7636 (87)
Th 2	19.9982	19.9997	20.0012	20.0079	20.0092	20.0151	20.0151	20.0162	20.0129	20.0092	20.0066	20.0040 (88)
util rest of house	0.9930	0.9847	0.9662	0.9039	0.7645	0.5441	0.3646	0.4093	0.6790	0.9242	0.9840	0.9944 (89)
MIT 2	18.9149	19.1035	19.3577	19.6872	19.9100	20.0019	20.0138	20.0139	19.9728	19.6968	19.2569	18.8851 (90)
Living area fraction									fLA = Living area / (4) =			0.5654 (91)
MIT	19.4143	19.6034	19.8598	20.1963	20.4389	20.5490	20.5685	20.5666	20.5090	20.2017	19.7539	19.3819 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4143	19.6034	19.8598	20.1963	20.4389	20.5490	20.5685	20.5666	20.5090	20.2017	19.7539	19.3819 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9918	0.9829	0.9648	0.9089	0.7891	0.5918	0.4223	0.4692	0.7214	0.9293	0.9826	0.9933 (94)
Useful gains	366.8783	418.7315	446.2902	462.2381	421.2530	312.9485	213.9313	223.4234	322.1268	371.9256	360.6867	351.5542 (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	835.6859	811.6389	736.2890	617.8654	477.3027	322.7688	215.3131	225.7810	348.6226	524.4269	693.1268	834.0990 (97)
Space heating kWh	348.7929	264.0338	215.7591	112.0517	41.7010	0.0000	0.0000	0.0000	0.0000	113.4610	239.3569	359.0133 (98a)
Space heating requirement - total per year (kWh/year)												1694.1695
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	348.7929	264.0338	215.7591	112.0517	41.7010	0.0000	0.0000	0.0000	0.0000	113.4610	239.3569	359.0133 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1694.1695
Space heating per m2												(98c) / (4) = 33.8023 (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	510.0062	401.4943	411.8355	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8957	0.9464	0.9271	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	456.8103	379.9920	381.8140	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	591.8355	567.4135	533.1704	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	97.2182	139.4417	112.6092	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												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	24.3045	34.8604	28.1523	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												87.3172 (107)
Energy for space heating												33.8023 (99)
Energy for space cooling												1.7422 (108)
Total												35.5444 (109)
Fabric Energy Efficiency (DFEE)												35.5 (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	50.1200 (1b)	x 2.8000 (2b)	= 140.3360 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	50.1200		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	140.3360 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1425 (8)
Pressure test	Yes
Pressure Test Method	Blower Door

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Measured/design AP50 5.0000 (17)
Infiltration rate 0.3925 (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) = 0.3336 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
	0.4254	0.4170	0.4087	0.3670	0.3587	0.3170	0.3170	0.3086	0.3336	0.3587	0.3753	0.3920
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5905	0.5870	0.5835	0.5673	0.5643	0.5502	0.5502	0.5476	0.5557	0.5643	0.5704	0.5768
												(22)
												(22a)
												(22b)
												(23b)
												(23c)
												(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 Opening Type			12.5300	1.1450	14.3473		(27)
Heatloss Floor 1			50.1200	0.1300	6.5156		(28b)
External Wall 1	40.2600	12.5300	27.7300	0.1800	4.9914		(29a)
Total net area of external elements Aum(A, m2)			90.3800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	25.8543		(33)
Main dwelling							
Party Wall 1			39.0300	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 249.0058 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	7.4000	0.0500	0.3700
E3 Sill	3.4100	0.0500	0.1705
E4 Jamb	16.6900	0.0500	0.8345
E7 Party floor between dwellings (in blocks of flats)	2.8300	0.0700	0.1981
E9 Balcony between dwellings, wall insulation continuous	11.5500	0.0200	0.2310
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872
E18 Party wall between dwellings	8.4000	0.0600	0.5040
E20 Exposed floor (normal)	10.0200	0.3200	3.2064
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	13.9400	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	13.9400	0.1600	2.2304

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

Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 33.8544 (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	27.3455	27.1828	27.0233	26.2742	26.1341	25.4817	25.4817	25.3608	25.7330	26.1341	26.4176	26.7140
Average = Sum(39)m / 12 =	61.2000	61.0373	60.8778	60.1287	59.9885	59.3361	59.3361	59.2153	59.5874	59.9885	60.2721	60.5685
												(39)
												60.1280

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2211	1.2178	1.2146	1.1997	1.1969	1.1839	1.1839	1.1815	1.1889	1.1969	1.2026	1.2085
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												(40)
												1.1997
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.6936 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	22.7499	22.4120	21.9362	21.0590	20.4021	19.6737	19.2803	19.7527	20.2671	21.0465	21.9419	22.6730	(42b)
Hot water usage for other uses	31.9745	30.8118	29.6491	28.4864	27.3237	26.1610	26.1610	27.3237	28.4864	29.6491	30.8118	31.9745	(42c)
Average daily hot water use (litres/day)													50.1605 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	54.7244	53.2238	51.5853	49.5454	47.7258	45.8347	45.4412	47.0764	48.7535	50.6956	52.7537	54.6475	(44)
Energy conte	86.6701	75.7900	79.2847	67.8251	64.2480	56.3591	54.9572	58.2904	60.1180	68.7935	75.1573	85.5648	(45)
Energy content (annual)	Total = Sum(45)m =												833.0583
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	73.6696	64.4215	67.3920	57.6514	54.6108	47.9052	46.7136	49.5469	51.1003	58.4745	63.8837	72.7301	(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	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	73.6696	64.4215	67.3920	57.6514	54.6108	47.9052	46.7136	49.5469	51.1003	58.4745	63.8837	72.7301	(64)

12Total per year (kWh/year)													(64)
Electric shower(s)	42.1368	37.5442	40.9968	39.1228	39.8569	38.0196	39.2869	39.8569	39.1228	40.9968	40.2259	42.1368	(64a)
													(64a)
													(64a)
Heat gains from water heating, kWh/month	28.9516	25.4914	27.0972	24.1935	23.6169	21.4812	21.5001	22.3509	22.5558	24.8678	26.0274	28.7167	(65)

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

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Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817	84.6817 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	74.4198	82.3934	74.4198	76.9005	74.4198	76.9005	74.4198	74.4198	76.9005	74.4198	76.9005	74.4198 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	147.5456	149.0767	145.2184	137.0047	126.6364	116.8916	110.3815	108.8505	112.7087	120.9224	131.2907	141.0355 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682	31.4682 (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)												
	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454	-67.7454 (71)
Water heating gains (Table 5)												
	38.9134	37.9337	36.4210	33.6021	31.7432	29.8350	28.8980	30.0416	31.3275	33.4245	36.1492	38.5977 (72)
Total internal gains												
	309.2834	317.8082	304.4638	295.9119	281.2039	272.0316	262.1039	261.7164	269.3411	277.1712	292.7449	302.4576 (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					7.5600	36.7938	0.6300	0.7000			0.7700			85.0097 (77)
Northwest					4.9700	11.2829	0.6300	0.7000			0.7700			17.1376 (81)
Solar gains	102.1474	179.6872	260.9759	348.7054	413.7116	420.8950	401.5533	351.5001	291.1122	202.6694	123.3856	86.7461 (83)		
Total gains	411.4307	497.4954	565.4397	644.6173	694.9155	692.9267	663.6572	613.2165	560.4533	479.8406	416.1305	389.2036 (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	56.6457	56.7967	56.9455	57.6549	57.7896	58.4250	58.4250	58.5443	58.1786	57.7896	57.5178	57.2363
alpha	4.7764	4.7864	4.7964	4.8437	4.8526	4.8950	4.8950	4.9030	4.8786	4.8526	4.8345	4.8158
util living area												
	0.9922	0.9806	0.9541	0.8749	0.7274	0.5346	0.3909	0.4395	0.6822	0.9177	0.9826	0.9939 (86)
MIT												
	19.6999	19.9513	20.2721	20.6522	20.8886	20.9802	20.9965	20.9939	20.9386	20.6096	20.0886	19.6611 (87)
Th 2												
	19.9032	19.9058	19.9083	19.9202	19.9225	19.9329	19.9329	19.9349	19.9289	19.9225	19.9180	19.9132 (88)
util rest of house												
	0.9897	0.9747	0.9400	0.8401	0.6647	0.4513	0.2974	0.3402	0.5954	0.8859	0.9762	0.9920 (89)
MIT 2												
	18.7431	18.9923	19.3045	19.6628	19.8558	19.9249	19.9321	19.9333	19.8999	19.6371	19.1394	18.7124 (90)
Living area fraction												
									fLA = Living area / (4) =			0.5654 (91)
MIT												
	19.2841	19.5346	19.8517	20.2222	20.4398	20.5216	20.5340	20.5330	20.4872	20.1870	19.6761	19.2489 (92)
Temperature adjustment												
												0.0000
adjusted MIT												
	19.2841	19.5346	19.8517	20.2222	20.4398	20.5216	20.5340	20.5330	20.4872	20.1870	19.6761	19.2489 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9879	0.9722	0.9392	0.8507	0.6960	0.4979	0.3504	0.3964	0.6423	0.8947	0.9744	0.9904 (94)
Useful gains	406.4489	483.6425	531.0577	548.3663	483.6773	345.0133	232.5146	243.1032	359.9910	429.3328	405.4724	385.4741 (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												
	917.0279	893.2531	812.8190	680.7905	524.2864	351.3646	233.4255	244.7384	380.5972	575.1087	757.9877	911.4859 (97)
Space heating kWh												
	379.8708	275.2584	209.6304	95.3454	30.2132	0.0000	0.0000	0.0000	0.0000	108.4573	253.8110	391.3527 (98a)
Space heating requirement - total per year (kWh/year)												1743.9391
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												
	379.8708	275.2584	209.6304	95.3454	30.2132	0.0000	0.0000	0.0000	0.0000	108.4573	253.8110	391.3527 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1743.9391
Space heating per m ²												(98c) / (4) = 34.7953 (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	557.7592	439.0870	450.0360	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9369	0.9686	0.9542	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	522.5638	425.3071	429.4442	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	783.4949	750.7585	693.2229	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	187.8704	242.1359	196.2513	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	46.9676	60.5340	49.0628	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												156.5644 (107)
Energy for space heating												34.7953 (99)
Energy for space cooling												3.1238 (108)
Total												37.9191 (109)
Fabric Energy Efficiency (TFEE)												37.9 (109)