

Summary for Input Data



Plot Reference	A 618	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	85 B	DER	12.42	TER	13.99
Environmental	90 B	% DER < TER			11.22
CO ₂ Emissions (t/year)	0.84	DFEE	35.35	TFEE	37.01
Compliance Check	See BREL	% DFEE < TFEE			4.50
% DPER < TPER	4.40	DPER	71.59	TPER	74.89

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

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

Orientation	Northeast
Property Tenture	1
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	Flat, End-Terrace
Position of Flat	Top-floor flat
Which Floor	6
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	0.00 kJ/m ² K
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:	22.53 m	74.77 m ²	2.80 m

8.0 Living Area	33.46 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	48.55	34.09	0.00	None	14.46	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	14.52	12.10	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	34.03	0.00	None

Description	Construction	Kappa (kJ/m ² K)	Area (m ²)
Internal Wall 1	Plasterboard on timber frame	9.00	169.40

Description	Type	Construction	U-Value (W/m ² K)	Kappa (kJ/m ² K)	Gross Area(m ²)	Nett Area (m ²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	74.77	74.77	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data



Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	40.00	74.77

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	North East	2.42	
SW windows	Window	External Wall 1	South West	6.12	
NW windows	Window	External Wall 1	North West	8.34	

14.0 Conservatory

15.0 Draught Proofing

 %

16.0 Draught Lobby

17.0 Thermal Bridging

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	9.16	0.05	0.05	No
E4 Jamb	Independently assessed	21.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	12.98	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	5.19	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	4.36	0.05	0.05	No
E16 Corner (normal)	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
E25 Staggered party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	12.16	0.00	0.00	No
E3 Sill	Independently assessed	5.67	0.04	0.04	No
E14 Flat roof	Independently assessed	22.53	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	12.16	0.05	0.05	No

19.0 Mechanical Ventilation

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

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

Summary for Input Data

21.0 Fixed Cooling System	No				
22.0 Pressure Testing	Yes				
Designed AP ₅₀	3.00	m³/(h.m²) @ 50 Pa			
Test Method	Blower Door				
22.0 Lighting	No				
No Fixed Lighting	No				
	Name Lighting 1	Efficacy 75.00	Power 15.00	Capacity 1125.00	Count 7
24.0 Main Heating 1	Manufacturer				
Percentage of Heat	100.00				%
Fuel Type	Mains gas				
SAP Code	102				
In Winter	88.80				
In Summer	79.80				
Model Name	x				
Manufacturer	x				
Controls SAP Code	2110				
Delayed Start Stat	Yes				
Burner Control	Modulating				
Flue Type	Balanced				
Fan Assisted Flue	Yes				
Is MHS Pumped	Pump in heated space				
Heating Pump Age	2013 or later				
Heat Emitter	Radiators				
Flow Temperature	Enter value				
Flow Temperature Value	55.00				
Boiler Interlock	Yes				
25.0 Main Heating 2	None				
26.0 Heat Networks	None				
27.0 Secondary Heating	None				
28.0 Water Heating	Main Heating 1				
Water Heating	Main Heating 1				
SAP Code	901				
Flue Gas Heat Recovery System	No				
Waste Water Heat Recovery Instantaneous System 1	No				
Waste Water Heat Recovery Instantaneous System 2	No				
Waste Water Heat Recovery Storage System	No				
Solar Panel	No				
Water use <= 125 litres/person/day	Yes				
Cold Water Source	From header tank				
Bath Count	1				
28.1 Showers					
Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To
Shower 1	Combi boiler or unvented hot water system	8.00		No	
Shower 2	Combi boiler or unvented hot water system	8.00		No	
28.3 Waste Water Heat Recovery System					
29.0 Hot Water Cylinder	Hot Water Cylinder				

Summary for Input Data

Cylinder Stat	Yes	
Cylinder In Heated Space	Yes	
Independent Time Control	Yes	
Insulation Type	Measured Loss	
Cylinder Volume	180.00	L
Loss	1.20	kWh/day
Pipes insulation	Fully insulated primary pipework	

31.0 Thermal Store

None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout



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% DPER < TPER	4.40	DPER	71.59	TPER	74.89
Assessor Details	Mr. Robert Tanner			Assessor ID	W344-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	74.7700 (1b)	2.8000 (2b)	209.3560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.7700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	209.3560 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(17)
Infiltration rate	0.1500	(18)
Number of sides sheltered	2	(19)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1626	0.1594	0.1562	0.1403	0.1371	0.1211	0.1211	0.1179	0.1275	0.1371	0.1434	0.1498 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												80.1000 (23c)
Effective ac	0.2621	0.2589	0.2557	0.2397	0.2366	0.2206	0.2206	0.2174	0.2270	0.2366	0.2429	0.2493 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Door			2.4200	1.0000	2.4200		(26)
Window			14.4600	1.1450	16.5573		(27)
External Wall 1	48.5500	14.4600	34.0900	0.1500	5.1135	70.0000	2386.2999 (29a)
Corridor wall	14.5200	2.4200	12.1000	0.1900	2.2990	70.0000	847.0000 (29a)
External Roof 1	74.7700		74.7700	0.1000	7.4770	9.0000	672.9300 (30)
Total net area of external elements A _{um} (A, m ²)			137.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8668		(33)
Main dwelling							
Party Wall 1			34.0300	0.0000	0.0000	70.0000	2382.0999 (32)
Party Floor 1			74.7700			40.0000	2990.8000 (32d)
Internal Wall 1			169.4000			9.0000	1524.5999 (32c)
Heat capacity C _m = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		10803.7298 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							144.4928 (35)
List of Thermal Bridges							

Full SAP Calculation Printout



K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	9.1600	0.0500	0.4580
E4 Jamb	21.6000	0.0400	0.8640
E7 Party floor between dwellings (in blocks of flats)	12.9800	0.0500	0.6490
E7 Party floor between dwellings (in blocks of flats)	5.1900	0.0390	0.2024
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180
E16 Corner (normal)	2.8000	0.0500	0.1400
E18 Party wall between dwellings	5.6000	0.0500	0.2800
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.1600	0.0000	0.0000
E3 Sill	5.6700	0.0400	0.2268
E14 Flat roof	22.5300	0.0500	1.1265
P4 Party wall - Roof (insulation at ceiling level)	12.1600	0.0500	0.6080
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.9911 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			38.8579 (37) (33) + (36) + (36a) =

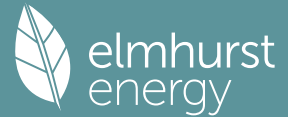
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	18.1052	17.8850	17.6648	16.5637	16.3435	15.2424	15.2424	15.0222	15.6829	16.3435	16.7839	17.2244 (38)
Average = Sum(39)m / 12 =	56.9631	56.7429	56.5227	55.4216	55.2014	54.1003	54.1003	53.8801	54.5407	55.2014	55.6418	56.0822 (39)
	55.3665											
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.7618	0.7589	0.7560	0.7412	0.7383	0.7236	0.7236	0.7206	0.7294	0.7383	0.7442	0.7501 (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												2.3562 (42)
Hot water usage for mixer showers												
Hot water usage for baths	62.1146	61.1637	59.7622	57.6062	55.6746	52.9722	50.8348	53.3335	54.5903	57.2669	60.0544	62.0586 (42a)
Hot water usage for other uses	26.9133	26.5070	25.9290	25.0635	24.2834	23.2096	22.3949	23.3911	23.9140	24.9780	26.0842	26.8919 (42b)
Average daily hot water use (litres/day)	38.7594	37.3499	35.9405	34.5311	33.1216	31.7122	31.7122	33.1216	34.5311	35.9405	37.3499	38.7594 (42c)
												117.4556 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	127.7873	125.0206	121.6317	117.2008	113.0797	107.8940	104.9419	109.8463	113.0354	118.1854	123.4885	127.7099 (44)
Energy content (annual)	188.1249	165.4275	173.8092	153.0935	145.7146	124.7758	115.9639	129.2911	131.1154	152.2938	166.8988	187.5514 (45)
Distribution loss (46)m = 0.15 x (45)m	28.2187	24.8141	26.0714	22.9640	21.8572	18.7164	17.3946	19.3937	19.6673	22.8441	25.0348	28.1327 (46)
Water storage loss (or HIU loss):												
Store volume												180.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.2000 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.6480 (55)
Total storage loss	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880 (56)
If cylinder contains dedicated solar storage	20.0880	18.1440	20.0880	19.4400	20.0880	19.4400	20.0880	20.0880	19.4400	20.0880	19.4400	20.0880 (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	231.4753	204.5827	217.1596	195.0455	189.0650	166.7278	159.3143	172.6415	173.0674	195.6442	208.8508	230.9018 (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	231.4753	204.5827	217.1596	195.0455	189.0650	166.7278	159.3143	172.6415	173.0674	195.6442	208.8508	230.9018 (64)
12Total per year (kWh/year)												2344.4761 (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	97.2319	86.3288	92.4719	84.4652	83.1304	75.0496	73.2383	77.6696	77.1575	85.3180	89.0554	97.0411 (65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	106.1428	117.5153	106.1428	109.6809	106.1428	109.6809	106.1428	109.6809	106.1428	109.6809	106.1428	106.1428 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	208.1648	210.3249	204.8815	193.2932	178.6651	164.9167	155.7319	153.5718	159.0151	170.6035	185.2316	198.9800 (68)
Pumps, fans	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462 (71)
Total internal gains	130.6880	128.4655	124.2902	117.3128	111.7344	104.2355	98.4386	104.3947	107.1631	114.6748	123.6881	130.4317 (72)
	506.3380	517.6480	496.6569	481.6293	457.8847	437.1754	418.6556	422.4516	434.2015	452.7634	479.9430	496.8968 (73)

6. Solar gains												
[Jan]												
	Area	Solar flux	g	FF	Access	Gains						
	m2	Table 6a	W/m2	Specific data	factor	W						
				or Table 6b	Table 6d							
Southwest	6.1200	36.7938	0.3500	0.7000	0.7700	38.2319 (79)						

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Northwest	8.3400		11.2829		0.3500		0.7000		0.7700		15.9767 (81)	
Solar gains	54.2086	97.6441	147.6968	206.6304	253.0087	260.6650	247.3613	211.3107	167.8771	111.7182	65.8958	45.7659 (83)
Total gains	560.5466	615.2922	644.3537	688.2596	710.8934	697.8404	666.0169	633.7623	602.0786	564.4816	545.8388	542.6628 (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	52.6839	52.8883	53.0944	54.1492	54.3652	55.4717	55.4717	55.6984	55.0238	54.3652	53.9349	53.5114
alpha	4.5123	4.5259	4.5396	4.6099	4.6243	4.6981	4.6981	4.7132	4.6683	4.6243	4.5957	4.5674
util living area												
	0.9601	0.9385	0.9026	0.8109	0.6691	0.4867	0.3556	0.3882	0.5970	0.8291	0.9308	0.9642 (86)
MIT	20.0057	20.1903	20.4261	20.7275	20.9086	20.9839	20.9970	20.9956	20.9589	20.7428	20.3579	19.9880 (87)
Th 2	20.2865	20.2891	20.2917	20.3046	20.3071	20.3201	20.3201	20.3227	20.3149	20.3071	20.3020	20.2968 (88)
util rest of house												
	0.9538	0.9292	0.8879	0.7851	0.6300	0.4380	0.3014	0.3322	0.5455	0.8002	0.9190	0.9585 (89)
MIT 2	19.1252	19.3571	19.6500	20.0194	20.2223	20.3082	20.3185	20.3202	20.2820	20.0453	19.5786	19.1110 (90)
Living area fraction												
	19.5192	19.7300	19.9973	20.3363	20.5294	20.6106	20.6221	20.6224	20.5849	20.3574	19.9273	19.5035 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.3692	19.5800	19.8473	20.1863	20.3794	20.4606	20.4721	20.4724	20.4349	20.2074	19.7773	19.3535 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9439	0.9183	0.8776	0.7804	0.6342	0.4482	0.3136	0.3447	0.5547	0.7956	0.9086	0.9492 (94)
Useful gains	529.1132	565.0501	565.4848	537.0879	450.8518	312.7601	208.8560	218.4525	333.9994	449.1185	495.9658	515.1131 (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												
	858.3906	832.9844	754.4247	625.5057	479.1156	317.0582	209.4836	219.4221	345.5108	530.3425	705.3905	849.8403 (97)
Space heating kWh												
	244.9824	180.0518	140.5714	63.6608	21.0283	0.0000	0.0000	0.0000	0.0000	60.4307	150.7858	249.0370 (98a)
Space heating requirement - total per year (kWh/year)												1110.5482
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												
	244.9824	180.0518	140.5714	63.6608	21.0283	0.0000	0.0000	0.0000	0.0000	60.4307	150.7858	249.0370 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1110.5482
Space heating per m2										(98c) / (4) =		14.8529 (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 %)												88.8000 (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												
	244.9824	180.0518	140.5714	63.6608	21.0283	0.0000	0.0000	0.0000	0.0000	60.4307	150.7858	249.0370 (98)
Space heating efficiency (main heating system 1)												
	88.8000	88.8000	88.8000	88.8000	88.8000	0.0000	0.0000	0.0000	0.0000	88.8000	88.8000	88.8000 (210)
Space heating fuel (main heating system)												
	275.8811	202.7611	158.3011	71.6901	23.6805	0.0000	0.0000	0.0000	0.0000	68.0526	169.8038	280.4471 (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												
	231.4753	204.5827	217.1596	195.0455	189.0650	166.7278	159.3143	172.6415	173.0674	195.6442	208.8508	230.9018 (64)
Efficiency of water heater (217)m												
	84.1872	83.7746	83.1100	81.8411	80.6178	79.8000	79.8000	79.8000	79.8000	81.7554	83.3415	79.8000 (216)
Fuel for water heating, kWh/month												
	274.9532	244.2062	261.2920	238.3222	234.5201	208.9321	199.6420	216.3428	216.8764	239.3043	250.5964	84.2297 (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												
	23.8448	21.5372	23.8448	23.0756	23.8448	23.0756	23.8448	23.8448	23.0756	23.8448	23.0756	23.8448 (231)
Lighting												
	22.9732	18.4299	16.5941	12.1576	9.3909	7.6724	8.5667	11.1353	14.4636	18.9770	21.4345	23.6117 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)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 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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												1250.6173 (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												2859.1212 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)	
mechanical ventilation fans (SFP = 0.7625)	194.7534 (230a)
central heating pump	41.0000 (230c)
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	280.7534 (231)
Electricity for lighting (calculated in Appendix L)	185.4068 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (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	4575.8987 (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	1250.6173	0.2100	262.6296 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2859.1212	0.2100	600.4155 (264)
Space and water heating			863.0451 (265)
Pumps, fans and electric keep-hot	280.7534	0.1387	38.9440 (267)
Energy for lighting	185.4068	0.1443	26.7599 (268)
Total CO2, kg/year			928.7490 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.4200 (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	1250.6173	1.1300	1413.1975 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2859.1212	1.1300	3230.8070 (278)
Space and water heating			4644.0045 (279)
Pumps, fans and electric keep-hot	280.7534	1.5128	424.7238 (281)
Energy for lighting	185.4068	1.5338	284.3832 (282)
Total Primary energy kWh/year			5353.1115 (286)
Dwelling Primary energy Rate (DPER)			71.5900 (287)

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

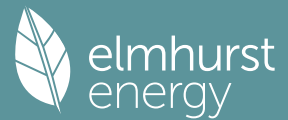
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	74.7700 (1b)	x 2.8000 (2b)	= 209.3560 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	209.3560 (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) = 0.1433 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3933 (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) = 0.3343 (21)
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	0.4262 0.4179 0.4095 0.3677 0.3594 0.3176 0.3176 0.3092 0.3343 0.3594 0.3761 0.3928 (22b)
Effective ac	0.5908 0.5873 0.5839 0.5676 0.5646 0.5504 0.5504 0.5478 0.5559 0.5646 0.5707 0.5771 (25)

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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			14.4600	1.1450	16.5573			(27)
External Wall 1	48.5500	14.4600	34.0900	0.1800	6.1362			(29a)
Corridor wall	14.5200	2.4200	12.1000	0.1800	2.1780			(29a)
External Roof 1	74.7700		74.7700	0.1100	8.2247			(30)
Total net area of external elements Aum(A, m2)			137.8400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)... (30) + (32) =	35.5162		(33)
Main dwelling								
Party Wall 1			34.0300	0.0000	0.0000			(32)

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

144.4928 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	9.1600	0.0500	0.4580	
E4 Jamb	21.6000	0.0500	1.0800	
E7 Party floor between dwellings (in blocks of flats)	12.9800	0.0700	0.9086	
E7 Party floor between dwellings (in blocks of flats)	5.1900	0.0700	0.3633	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E18 Party wall between dwellings	5.6000	0.0600	0.3360	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.1600	0.0000	0.0000	
E3 Sill	5.6700	0.0500	0.2835	
E14 Flat roof	22.5300	0.0800	1.8024	
P4 Party wall - Roof (insulation at ceiling level)	12.1600	0.1200	1.4592	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				7.3662 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 42.8824 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.8195	40.5758	40.3370	39.2150	39.0051	38.0279	38.0279	37.8469	38.4043	39.0051	39.4297	39.8737	(38)
Heat transfer coeff	83.7019	83.4582	83.2193	82.0973	81.8874	80.9102	80.9102	80.7293	81.2866	81.8874	82.3121	82.7560	(39)
Average = Sum(39)m / 12 =												82.0963	
HLP	1.1195	1.1162	1.1130	1.0980	1.0952	1.0821	1.0821	1.0797	1.0872	1.0952	1.1009	1.1068	(40)
HLP (average)												1.0980	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.3562 (42)
Hot water usage for mixer showers	63.7246	62.7670	61.3715	58.7015	56.7310	54.5337	53.2847	54.6696	56.1877	58.5471	61.2744	63.4805	(42a)
Hot water usage for baths	27.5269	27.1181	26.5424	25.4809	24.6861	23.8048	23.3287	23.9004	24.5228	25.4659	26.5492	27.4338	(42b)
Hot water usage for other uses	38.7594	37.3499	35.9405	34.5311	33.1216	31.7122	31.7122	33.1216	34.5311	35.9405	37.3499	38.7594	(42c)
Average daily hot water use (litres/day)													119.5095 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	130.0109	127.2350	123.8544	118.7134	114.5388	110.0506	108.3256	111.6916	115.2416	119.9534	125.1736	129.6737	(44)
Energy conte	205.9055	181.1809	190.3596	162.5128	154.1912	135.3201	131.0104	138.2976	142.1045	162.7757	178.3327	203.0377	(45)
Energy content (annual)										Total = Sum(45)m =			1985.0286
Distribution loss (46)m = 0.15 x (45)m	30.8858	27.1771	28.5539	24.3769	23.1287	20.2980	19.6516	20.7446	21.3157	24.4164	26.7499	30.4556	(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	255.1482	225.6582	239.6022	210.1670	203.4339	182.9743	180.2531	187.5402	189.7587	212.0184	225.9869	252.2803	(62)
WWHRS	-29.1322	-25.7648	-26.9794	-22.3400	-20.8201	-17.8159	-16.6996	-17.7583	-18.4330	-21.7305	-24.6180	-28.5928	(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	(64a)
Output from w/h	226.0159	199.8934	212.6228	187.8270	182.6138	165.1584	163.5535	169.7819	171.3256	190.2879	201.3689	223.6876	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2294.1367 (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	107.8577	95.8245	102.6887	92.1589	90.6627	83.1173	82.9551	85.3781	85.3731	93.5171	97.4190	106.9042	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.1428	117.5153	106.1428	109.6809	106.1428	109.6809	106.1428	106.1428	109.6809	106.1428	109.6809	106.1428	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	208.1648	210.3249	204.8815	193.2932	178.6651	164.9167	155.7319	153.5718	159.0151	170.6035	185.2316	198.9800	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	(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)	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462 (71)
Water heating gains (Table 5)	144.9700	142.5959	138.0224	127.9984	121.8585	115.4407	111.4988	114.7555	118.5737	125.6950	135.3042	143.6884 (72)
Total internal gains	520.6200	531.7785	510.3891	492.3149	468.0087	448.3806	431.7158	432.8124	445.6121	463.7836	491.5590	510.1536 (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			
Southwest				6.1200	36.7938	0.6300	0.7000	0.7700	68.8174 (79)			
Northwest				8.3400	11.2829	0.6300	0.7000	0.7700	28.7581 (81)			
Solar gains	97.5755	175.7594	265.8543	371.9347	455.4157	469.1970	445.2503	380.3593	302.1787	201.0927	118.6125	82.3787 (83)
Total gains	618.1955	707.5379	776.2435	864.2496	923.4244	917.5776	876.9661	813.1717	747.7908	664.8763	610.1715	592.5322 (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	35.8539	35.9586	36.0618	36.5546	36.6483	37.0909	37.0909	37.1741	36.9192	36.6483	36.4592	36.2636
alpha	3.3903	3.3972	3.4041	3.4370	3.4432	3.4727	3.4727	3.4783	3.4613	3.4432	3.4306	3.4176
util living area	0.9639	0.9430	0.9073	0.8252	0.6953	0.5278	0.3952	0.4399	0.6542	0.8598	0.9424	0.9682 (86)
MIT	19.2601	19.5311	19.9080	20.3885	20.7390	20.9265	20.9794	20.9701	20.8431	20.3885	19.7590	19.2220 (87)
Th 2	19.9850	19.9876	19.9902	20.0025	20.0048	20.0155	20.0155	20.0174	20.0113	20.0048	20.0001	19.9953 (88)
util rest of house	0.9573	0.9329	0.8906	0.7948	0.6454	0.4576	0.3112	0.3525	0.5849	0.8282	0.9304	0.9623 (89)
MIT 2	17.9775	18.3181	18.7872	19.3734	19.7690	19.9641	20.0058	20.0023	19.8901	19.3895	18.6174	17.9363 (90)
Living area fraction	18.5515	18.8609	19.2888	19.8277	20.2031	20.3948	20.4415	20.4354	20.3166	19.8366	19.1283	18.5117 (92)
MIT	18.5515	18.8609	19.2888	19.8277	20.2031	20.3948	20.4415	20.4354	20.3166	19.8366	19.1283	18.5117 (93)
Temperature adjustment												0.0000
adjusted MIT	18.5515	18.8609	19.2888	19.8277	20.2031	20.3948	20.4415	20.4354	20.3166	19.8366	19.1283	18.5117 (93)

8. Space heating requirement

Utilisation	0.9451	0.9188	0.8769	0.7889	0.6559	0.4854	0.3481	0.3905	0.6074	0.8221	0.9174	0.9508 (94)
Useful gains	584.2263	650.0900	680.6884	681.7722	605.6498	445.4251	305.2892	317.5337	454.2343	546.5633	559.7769	563.4006 (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	1192.8732	1165.1508	1064.2737	897.1353	696.2948	468.8581	310.8132	325.7774	505.3247	756.3609	990.0726	1184.3780 (97)
Space heating kWh	452.8333	346.1209	285.3875	155.0614	67.4399	0.0000	0.0000	0.0000	0.0000	156.0894	309.8129	462.0072 (98a)
Space heating requirement - total per year (kWh/year)												2234.7525
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	452.8333	346.1209	285.3875	155.0614	67.4399	0.0000	0.0000	0.0000	0.0000	156.0894	309.8129	462.0072 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2234.7525
Space heating per m ²												(98c) / (4) = 29.8884 (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	452.8333	346.1209	285.3875	155.0614	67.4399	0.0000	0.0000	0.0000	0.0000	156.0894	309.8129	462.0072 (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)	490.6103	374.9955	309.1956	167.9972	73.0660	0.0000	0.0000	0.0000	0.0000	169.1110	335.6586	500.5495 (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	226.0159	199.8934	212.6228	187.8270	182.6138	165.1584	163.5535	169.7819	171.3256	190.2879	201.3689	223.6876 (64)
Efficiency of water heater (217)m	85.5863	85.2789	84.7206	83.6332	82.0426	79.8000	79.8000	79.8000	79.8000	83.6191	85.0226	79.8000 (216)
Fuel for water heating, kWh/month	264.0796	234.3995	250.9696	224.5843	222.5841	206.9654	204.9543	212.7593	214.6938	227.5651	236.8416	261.1683 (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	22.0544	17.6928	15.9304	11.6713	9.0153	7.3656	8.2240	10.6899	13.8851	18.2180	20.5772	22.6673 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-14.1328	-21.3755	-32.9342	-39.7781	-45.3496	-43.2354	-42.7083	-39.0855	-33.1565	-25.6109	-16.0433	-12.0554 (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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-4.1135	-8.9194	-18.2382	-28.1633	-38.0108	-38.4799	-38.0294	-31.8435	-22.8784	-13.0038	-5.5697	-3.2336	(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													2421.1836	(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													2761.5648	(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)													177.9915	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-615.9491	(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													4830.7910	(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	2421.1836	0.2100	508.4486 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2761.5648	0.2100	579.9286 (264)
Space and water heating			1088.3772 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	177.9915	0.1443	25.6897 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-365.4655	0.1331	-48.6593
PV Unit electricity exported	-250.4835	0.1251	-31.3335
Total			-79.9927 (269)
Total CO2, kg/year			1046.0034 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.9900 (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	2421.1836	1.1300	2735.9375 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2761.5648	1.1300	3120.5683 (278)
Space and water heating			5856.5058 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	177.9915	1.5338	273.0094 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-365.4655	1.4920	-545.2718
PV Unit electricity exported	-250.4835	0.4591	-115.0055
Total			-660.2773 (283)
Total Primary energy kWh/year			5599.3387 (286)
Target Primary Energy Rate (TPER)			74.8900 (287)

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Plot Reference	A 618			Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref			
Plot Address				SAP Version	10.2
SAP Rating	85 B	DER	12.42	TER	13.99
Environmental	90 B	% DER < TER			11.22
CO ₂ Emissions (t/year)	0.84	DFEE	35.35	TFEE	37.01
Compliance Check	See BREL	% DFEE < TFEE			4.50
% DPER < TPER	4.40	DPER	71.59	TPER	74.89
Assessor Details	Mr. Robert Tanner			Assessor ID	W344-0001
Client					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	74.7700 (1b)	2.8000 (2b)	209.3560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.7700		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	209.3560 (5)

2. Ventilation rate

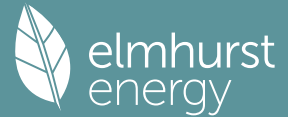
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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) = 0.1433 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.0000 (17)
Infiltration rate	0.2933 (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) = 0.2493 (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	0.3179	0.3116	0.3054	0.2742	0.2680	0.2368	0.2368	0.2306	0.2493	0.2680	0.2805	0.2929 (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	0.5505	0.5486	0.5466	0.5376	0.5359	0.5280	0.5280	0.5266	0.5311	0.5359	0.5393	0.5429 (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			14.4600	1.1450	16.5573		(27)
External Wall 1	48.5500	14.4600	34.0900	0.1500	5.1135	70.0000	2386.2999 (29a)
Corridor wall	14.5200	2.4200	12.1000	0.1900	2.2990	70.0000	847.0000 (29a)
External Roof 1	74.7700		74.7700	0.1000	7.4770	9.0000	672.9300 (30)
Total net area of external elements A _{um} (A, m ²)			137.8400				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8668		(33)
Main dwelling							
Party Wall 1			34.0300	0.0000	0.0000	70.0000	2382.0999 (32)
Party Floor 1			74.7700			40.0000	2990.8000 (32a)
Internal Wall 1			169.4000			9.0000	1524.5999 (32c)
Heat capacity C _m = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	10803.7298 (34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K							144.4928 (35)
List of Thermal Bridges							
K1 Element					Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate					9.1600	0.0500	0.4580
E4 Jamb					21.6000	0.0400	0.8640

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E7 Party floor between dwellings (in blocks of flats)	12.9800	0.0500	0.6490	
E7 Party floor between dwellings (in blocks of flats)	5.1900	0.0390	0.2024	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0500	0.2180	
E16 Corner (normal)	2.8000	0.0500	0.1400	
E18 Party wall between dwellings	5.6000	0.0500	0.2800	
E18 Party wall between dwellings	2.8000	0.0390	0.1092	
E25 Staggered party wall between dwellings	2.8000	0.0390	0.1092	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.1600	0.0000	0.0000	
E3 Sill	5.6700	0.0400	0.2268	
E14 Flat roof	22.5300	0.0500	1.1265	
P4 Party wall - Roof (insulation at ceiling level)	12.1600	0.0500	0.6080	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			4.9911	(36)
Point Thermal Bridges			0.0000	
Total fabric heat loss		(33) + (36) + (36a) =	38.8579	(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	38.0339	37.8983	37.7655	37.1415	37.0248	36.4814	36.4814	36.3807	36.6907	37.0248	37.2610	37.5079	(38)
Average = Sum(39)m / 12 =	76.8917	76.7562	76.6234	75.9994	75.8827	75.3392	75.3392	75.2386	75.5485	75.8827	76.1188	76.3657	(39)
												75.9988	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0284	1.0266	1.0248	1.0164	1.0149	1.0076	1.0076	1.0063	1.0104	1.0149	1.0180	1.0213	(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													2.3562	(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	0.0000	(42a)
Hot water usage for baths	26.9133	26.5070	25.9290	25.0635	24.2834	23.2096	22.3949	23.3911	23.9140	24.9780	26.0842	26.8919	26.8919	(42b)
Hot water usage for other uses	38.7594	37.3499	35.9405	34.5311	33.1216	31.7122	31.7122	33.1216	34.5311	35.9405	37.3499	38.7594	38.7594	(42c)
Average daily hot water use (litres/day)													60.1908	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	65.6726	63.8569	61.8695	59.5946	57.4051	54.9218	54.1072	56.5128	58.4450	60.9185	63.4341	65.6513	65.6513	(44)
Energy content (annual)	96.6815	84.4956	88.4103	77.8454	73.9722	63.5153	59.7900	66.5166	67.7933	78.4996	85.7333	96.4137	96.4137	(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	0.0000	(46)
Water storage loss (or HIU loss):														
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage														
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	0.0000	(57)
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	0.0000	(59)
Total heat required for water heating calculated for each month														
WWHRS	82.1792	71.8213	75.1487	66.1686	62.8764	53.9880	50.8215	56.5391	57.6243	66.7247	72.8733	81.9517	81.9517	(62)
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	0.0000	(63a)
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	0.0000	(63b)
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	0.0000	(63c)
Output from w/h	82.1792	71.8213	75.1487	66.1686	62.8764	53.9880	50.8215	56.5391	57.6243	66.7247	72.8733	81.9517	81.9517	(64)
12Total per year (kWh/year)													798.7168	(64)
Electric shower(s)	51.0328	45.4707	49.6522	47.3825	48.2716	46.0464	47.5813	48.2716	47.3825	49.6522	48.7186	51.0328	51.0328	(64a)
Heat gains from water heating, kWh/month	33.3030	29.3230	31.2002	28.3878	27.7870	25.0086	24.6007	26.2027	26.2517	29.0942	30.3980	33.2461	33.2461	(65)
													580.4952	(64a)

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

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	106.1428	117.5153	106.1428	109.6809	106.1428	109.6809	106.1428	106.1428	109.6809	106.1428	109.6809	106.1428	106.1428	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	208.1648	210.3249	204.8815	193.2932	178.6651	164.9167	155.7319	153.5718	159.0151	170.6035	185.2316	198.9800	198.9800	(68)
Pumps, fans	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	(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	0.0000	(70)
Water heating gains (Table 5)	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	(71)
Total internal gains	44.7621	43.6354	41.9358	39.4275	37.3481	34.7342	33.0655	35.2187	36.4607	39.1051	42.2194	44.6856	44.6856	(72)
	417.4121	429.8179	411.3025	400.7439	380.4983	367.6741	353.2825	353.2756	363.4991	374.1937	395.4743	408.1508	408.1508	(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
Southwest				6.1200	36.7938		0.3500		0.7000		0.7700		38.2319 (79)
Northwest				8.3400	11.2829		0.3500		0.7000		0.7700		15.9767 (81)
Solar gains	54.2086	97.6441	147.6968	206.6304	253.0087	260.6650	247.3613	211.3107	167.8771	111.7182	65.8958		45.7659 (83)
Total gains	471.6207	527.4621	558.9993	607.3743	633.5071	628.3391	600.6438	564.5863	531.3762	485.9119	461.3701		453.9168 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	39.0294	39.0983	39.1661	39.4876	39.5484	39.8336	39.8336	39.8869	39.7233	39.5484	39.4257	39.2982	
alpha	3.6020	3.6066	3.6111	3.6325	3.6366	3.6556	3.6556	3.6591	3.6482	3.6366	3.6284	3.6199	
util living area	0.9827	0.9729	0.9566	0.9118	0.8245	0.6717	0.5219	0.5689	0.7773	0.9264	0.9716	0.9848 (86)	
MIT	19.1737	19.3910	19.7161	20.1833	20.5903	20.8654	20.9596	20.9443	20.7578	20.2426	19.6390	19.1360 (87)	
Th 2	20.0598	20.0613	20.0627	20.0697	20.0710	20.0770	20.0770	20.0781	20.0747	20.0710	20.0683	20.0656 (88)	
util rest of house	0.9793	0.9677	0.9478	0.8930	0.7854	0.6003	0.4240	0.4711	0.7168	0.9068	0.9653	0.9819 (89)	
MIT 2	18.3908	18.6066	18.9279	19.3852	19.7634	19.9976	20.0607	20.0540	19.9170	19.4498	18.8590	18.3577 (90)	
Living area fraction	fLA = Living area / (4) =												0.4475 (91)
MIT	18.7412	18.9576	19.2806	19.7423	20.1335	20.3859	20.4630	20.4524	20.2933	19.8045	19.2081	18.7060 (92)	
Temperature adjustment													0.0000
adjusted MIT	18.7412	18.9576	19.2806	19.7423	20.1335	20.3859	20.4630	20.4524	20.2933	19.8045	19.2081	18.7060 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9732	0.9598	0.9387	0.8853	0.7883	0.6255	0.4662	0.5124	0.7324	0.9001	0.9577	0.9763 (94)
Useful gains	458.9599	506.2744	524.7399	537.6859	499.3778	393.0180	280.0446	289.2965	389.1794	437.3673	441.8655	443.1395 (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	1110.4052	1079.0079	979.2945	824.0111	639.9530	435.9084	291.0340	304.8958	467.8933	698.4650	921.6526	1107.7626 (97)
Space heating kWh	484.6753	384.8769	338.1886	206.1541	104.5879	0.0000	0.0000	0.0000	0.0000	194.2567	345.4467	494.4796 (98a)
Space heating requirement - total per year (kWh/year)												2552.6659
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	484.6753	384.8769	338.1886	206.1541	104.5879	0.0000	0.0000	0.0000	0.0000	194.2567	345.4467	494.4796 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2552.6659
Space heating per m2												(98c) / (4) = 34.1402 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	708.1887	557.5102	571.8132	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.7769	0.8476	0.8177	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	550.1734	472.5603	467.5884	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	693.4551	663.2758	623.0769	0.0000	0.0000	0.0000	0.0000 (103)
Cooled fraction		0.0000	0.0000	0.0000	0.0000	103.1628	141.8924	115.6835	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)	fc = cooled area / (4) =											1.0000 (105)
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	25.7907	35.4731	28.9209	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												90.1847 (107)
Energy for space heating												34.1402 (99)
Energy for space cooling												1.2062 (108)
Total												35.3464 (109)
Fabric Energy Efficiency (DFEE)												35.3 (109)

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	74.7700 (1b)	x 2.8000 (2b)	= 209.3560 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	74.7700		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	209.3560 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1433 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3933 (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) = 0.3343 (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	0.4262	0.4179	0.4095	0.3677	0.3594	0.3176	0.3176	0.3092	0.3343	0.3594	0.3761	0.3928	(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	0.5908	0.5873	0.5839	0.5676	0.5646	0.5504	0.5504	0.5478	0.5559	0.5646	0.5707	0.5771	(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			14.4600	1.1450	16.5573			(27)
External Wall 1	48.5500	14.4600	34.0900	0.1800	6.1362			(29a)
Corridor wall	14.5200	2.4200	12.1000	0.1800	2.1780			(29a)
External Roof 1	74.7700		74.7700	0.1100	8.2247			(30)
Total net area of external elements Aum(A, m2)			137.8400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 35.5162			(33)
Main dwelling								
Party Wall 1			34.0300	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							144.4928	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E1 Steel lintel with perforated steel base plate	9.1600	0.0500	0.4580	
E4 Jamb	21.6000	0.0500	1.0800	
E7 Party floor between dwellings (in blocks of flats)	12.9800	0.0700	0.9086	
E7 Party floor between dwellings (in blocks of flats)	5.1900	0.0700	0.3633	
E9 Balcony between dwellings, wall insulation continuous	4.3600	0.0200	0.0872	
E16 Corner (normal)	2.8000	0.0900	0.2520	
E18 Party wall between dwellings	5.6000	0.0600	0.3360	
E18 Party wall between dwellings	2.8000	0.0600	0.1680	
E25 Staggered party wall between dwellings	2.8000	0.0600	0.1680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	12.1600	0.0000	0.0000	
E3 Sill	5.6700	0.0500	0.2835	
E14 Flat roof	22.5300	0.0800	1.8024	
P4 Party wall - Roof (insulation at ceiling level)	12.1600	0.1200	1.4592	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.3662	(36)
Point Thermal bridges			0.0000	(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 42.8824	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	40.8195	40.5758	40.3370	39.2150	39.0051	38.0279	38.0279	37.8469	38.4043	39.0051	39.4297	39.8737	(38)
Heat transfer coeff	83.7019	83.4582	83.2193	82.0973	81.8874	80.9102	80.9102	80.7293	81.2866	81.8874	82.3121	82.7560	(39)
Average = Sum(39)m / 12 =												82.0963	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1195	1.1162	1.1130	1.0980	1.0952	1.0821	1.0821	1.0797	1.0872	1.0952	1.1009	1.1068	(40)
HLP (average)												1.0980	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3562 (42)

Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)

Hot water usage for baths 27.5269 27.1181 26.5424 25.4809 24.6861 23.8048 23.3287 23.9004 24.5228 25.4659 26.5492 27.4338 (42b)

Hot water usage for other uses 38.7594 37.3499 35.9405 34.5311 33.1216 31.7122 31.7122 33.1216 34.5311 35.9405 37.3499 38.7594 (42c)

Average daily hot water use (litres/day) 60.7576 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	66.2863	64.4680	62.4829	60.0120	57.8077	55.5170	55.0409	57.0220	59.0539	61.4064	63.8992	66.1932	(44)
Energy conte	104.9813	91.8016	96.0339	82.1534	77.8203	68.2646	66.5672	70.6052	72.8194	83.3279	91.0361	103.6426	(45)
Energy content (annual)										Total = Sum(45)m = 1009.0534			
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	89.2341	78.0314	81.6288	69.8304	66.1473	58.0249	56.5821	60.0144	61.8965	70.8287	77.3806	88.0962	(62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h	89.2341	78.0314	81.6288	69.8304	66.1473	58.0249	56.5821	60.0144	61.8965	70.8287	77.3806	88.0962	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m = 857.6954					(64)
Electric shower(s)	51.0328	45.4707	49.6522	47.3825	48.2716	46.0464	47.5813	48.2716	47.3825	49.6522	48.7186	51.0328	(64a)

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Heat gains from water heating, kWh/month
35.0667 30.8755 32.8203 29.3032 28.6047 26.0178 26.0409 27.0715 27.3197 30.1202 31.5248 34.7822 (65)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 580.4952 (64a)

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

Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	117.8077	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	106.1428	117.5153	106.1428	109.6809	106.1428	109.6809	106.1428	106.1428	109.6809	106.1428	109.6809	106.1428	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	208.1648	210.3249	204.8815	193.2932	178.6651	164.9167	155.7319	153.5718	159.0151	170.6035	185.2316	198.9800	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	34.7808	(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)	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	-94.2462	(71)
Water heating gains (Table 5)	47.1327	45.9457	44.1132	40.6989	38.4472	36.1359	35.0012	36.3864	37.9441	40.4842	43.7844	46.7503	(72)
Total internal gains	419.7827	432.1282	413.4799	402.0154	381.5974	369.0758	355.2182	354.4433	364.9825	375.5728	397.0393	410.2155	(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			
Southwest				6.1200	36.7938	0.6300	0.7000	0.7700	68.8174 (79)			
Northwest				8.3400	11.2829	0.6300	0.7000	0.7700	28.7581 (81)			
Solar gains	97.5755	175.7594	265.8543	371.9347	455.4157	469.1970	445.2503	380.3593	302.1787	201.0927	118.6125	82.3787 (83)
Total gains	517.3582	607.8877	679.3343	773.9501	837.0131	838.2728	800.4685	734.8027	667.1612	576.6655	515.6518	492.5942 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	35.8539	35.9586	36.0618	36.5546	36.6483	37.0909	37.0909	37.1741	36.9192	36.6483	36.4592	36.2636	
alpha	3.3903	3.3972	3.4041	3.4370	3.4432	3.4727	3.4727	3.4783	3.4613	3.4432	3.4306	3.4176	
util living area	0.9781	0.9618	0.9328	0.8601	0.7370	0.5676	0.4295	0.4809	0.7044	0.8975	0.9632	0.9812	(86)
MIT	19.0651	19.3518	19.7546	20.2848	20.6840	20.9079	20.9733	20.9606	20.8009	20.2704	19.5881	19.0253	(87)
Th 2	19.9850	19.9876	19.9902	20.0025	20.0048	20.0155	20.0155	20.0174	20.0113	20.0048	20.0001	19.9953	(88)
util rest of house	0.9738	0.9546	0.9198	0.8333	0.6888	0.4950	0.3396	0.3876	0.6361	0.8718	0.9550	0.9775	(89)
MIT 2	18.2296	18.5133	18.9083	19.4208	19.7786	19.9645	20.0055	20.0016	19.8884	19.4207	18.7584	18.1977	(90)
Living area fraction									fLA = Living area / (4) =			0.4475	(91)
MIT	18.6035	18.8886	19.2870	19.8074	20.1838	20.3866	20.4386	20.4308	20.2968	19.8009	19.1297	18.5681	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.6035	18.8886	19.2870	19.8074	20.1838	20.3866	20.4386	20.4308	20.2968	19.8009	19.1297	18.5681	(93)

8. Space heating requirement

Utilisation	0.9661	0.9446	0.9089	0.8275	0.6981	0.5233	0.3790	0.4279	0.6571	0.8656	0.9459	0.9706	(94)
Useful gains	499.8302	574.2398	617.4490	640.4096	584.2878	438.6713	303.3808	314.4510	438.4229	499.1568	487.7511	478.1001	(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	1197.2298	1167.4593	1064.1284	895.4715	694.7172	468.1989	310.5817	325.4011	503.7140	753.4393	990.1893	1189.0448	(97)
Space heating kWh	518.8653	398.6435	332.3294	183.6446	82.1594	0.0000	0.0000	0.0000	0.0000	189.1862	361.7555	528.9428	(98a)
Space heating requirement - total per year (kWh/year)												2595.5268	
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	518.8653	398.6435	332.3294	183.6446	82.1594	0.0000	0.0000	0.0000	0.0000	189.1862	361.7555	528.9428	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2595.5268	
Space heating per m2										(98c) / (4) =		34.7135	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	760.5561	598.7357	613.5424	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8501	0.9022	0.8744	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	646.5711	540.1600	536.4625	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	938.5955	896.5104	821.8339	0.0000	0.0000	0.0000	0.0000	(103)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	52.5644	66.2812	53.0791	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												171.9247	(107)
Energy for space heating												34.7135	(99)
Energy for space cooling												2.2994	(108)

Total
Fabric Energy Efficiency (TFEE)

37.0129 (109)
37.0 (109)