Summary for Input Data

Plot Reference	A 310	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	85 B	DER	12.23	TER	12.59
Environmental	90 B	% DER < TER			2.86
CO_2 Emissions (t/year)	0.78	DFEE	32.19	TFEE	34.29
Compliance Check	See BREL	% DFEE < TFEE			6.11
% DPER < TPER	-6.76	DPER	70.70	TPER	66.22

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

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

Orientation	Northeast	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Mid-Terrace	
Position of Flat	Top-floor flat	
Which Floor	3	
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/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	Yes	
Smart gas meter fitted	Yes	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	17.75 m	70.02 m²	2.80 m

8.0 Living Area 33.12 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall 1	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.15	70.00	49.70	34.18	0.00	None	15.52	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	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	44.16	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	157.75

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Flat Roof	Plasterboard, insulated flat roof	0.10	9.00	70.02	70.02	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)

Party Floor 1	Lowest occupied	Precast concrete planks floor, screed, carpeted	40.00	70.02

12.0 Opening Types

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
Door	Window	External Wall 1	North East	2.42	
NW windows	Window	External Wall 1	North West	4.75	
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	8.25	0.05	0.05	No
E3 Sill	Independently assessed	4.76	0.04	0.04	No
E4 Jamb	Independently assessed	18.60	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	13.39	0.05	0.05	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
E25 Staggered party wall between dwellings	Independently assessed	5.60	0.05	0.05	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	15.77	0.00	0.00	No
E14 Flat roof	Independently assessed	17.75	0.05	0.05	No
E24 Eaves (insulation at ceiling level - inverted)	Independently assessed	8.80	0.05	0.05	No
P4 Party wall - Roof (insulation at ceiling level)	Independently assessed	6.97	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

21.0 Fixed Cooling System	No

Summary for Input Data

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22.0 Pressure Testing	Yes	
Designed AP_{50}	3.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	Lighting 1	75.00	15.00	1125.00	6

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

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
Cylinder Stat	Yes
Cylinder In Heated Space	Yes

Summary for Input Data

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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Plot Reference	A 310	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	85 B	DER	12.23	TER	12.59
Environmental	90 B	% DER < TER			2.86
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Compliance Check	See BREL	% DFEE < TFEE			6.11
% DPER < TPER	-6.76	DPER	70.70	TPER	66.22

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 (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	70.0200	(1b)	x 2.8000	(2b) =	196.0560	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	196.0560	(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	0 * 10 =	0.0000	(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) =	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)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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 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								
Window			15.5200	1.1450	17.7710			(27)
External Wall 1	49.7000	15.5200	34.1800	0.1500	5.1270	70.0000	2392.6001	(29a)
External Roof 1	70.0200		70.0200	0.1000	7.0020	9.0000	630.1800	(30)
Total net area of external elements Aum(A, m2)			119.7200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9000			(33)
Main dwelling								
Party Wall 1			44.1600	0.0000	0.0000	70.0000	3091.2000	(32)
Party Floor 1			70.0200			40.0000	2800.8000	(32d)
Internal Wall 1			157.7500			9.0000	1419.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 10334.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	147.5940	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125

E3 Sill	4.7600	0.0400	0.1904
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0500	0.6695
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
E25 Staggered party wall between dwellings	5.6000	0.0500	0.2800
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000
E14 Flat roof	17.7500	0.0500	0.8875
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.0500	0.4400
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.0500	0.3485

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.6104 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 34.5104 (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	16.9550	16.7488	16.5426	15.5115	15.3052	14.2741	14.2741	14.0679	14.6866	15.3052	15.7177	16.1301	(38)
Heat transfer coeff	51.4654	51.2592	51.0530	50.0219	49.8156	48.7845	48.7845	48.5783	49.1969	49.8156	50.2281	50.6405	(39)

Average = Sum(39)m / 12 = 49.9703

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.7350	0.7321	0.7291	0.7144	0.7114	0.6967	0.6967	0.6938	0.7026	0.7114	0.7173	0.7232	(40)
HLP (average)												0.7137	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2466 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	60.3243	59.4008	58.0397	55.9459	54.0699	51.4454	49.3696	51.7963	53.0169	55.6163	58.3234	60.2699	(42a)
Hot water usage for baths	26.1410	25.7464	25.1850	24.3443	23.5867	22.5436	21.7524	22.7200	23.2278	24.2612	25.3357	26.1203	(42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375	(42c)

Average daily hot water use (litres/day) 114.0692 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	124.1029	121.4161	118.1250	113.8218	109.8195	104.7834	101.9163	106.6793	109.7763	114.7778	119.9281	124.0277	(44)
Energy conte	182.7009	160.6580	168.7982	148.6798	141.5136	121.1785	112.6205	125.5635	127.3350	147.9029	162.0868	182.1438	(45)

Energy content (annual) Total = Sum(45)m = 1781.1813

Distribution loss (46)m = 0.15 x (45)m	27.4051	24.0987	25.3197	22.3020	21.2270	18.1768	16.8931	18.8345	19.1003	22.1854	24.3130	27.3216	(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	226.0513	199.8132	212.1486	190.6318	184.8640	163.1305	155.9709	168.9139	169.2870	191.2533	204.0388	225.4942	(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	226.0513	199.8132	212.1486	190.6318	184.8640	163.1305	155.9709	168.9139	169.2870	191.2533	204.0388	225.4942	(64)

Total per year (kWh/year) = Sum(64)m = 2291.5973 (64)

12Total per year (kWh/year) 2292 (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	95.4284	84.7429	90.8057	82.9976	81.7336	73.8534	72.1266	76.4302	75.9005	83.8580	87.4555	95.2431	(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	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	(71)
Water heating gains (Table 5)	128.2639	126.1056	122.0507	115.2745	109.8570	102.5742	96.9444	102.7287	105.4173	112.7124	121.4659	128.0150	(72)
Total internal gains	484.8572	495.4127	475.5313	461.0875	438.4839	418.4858	400.8303	404.5668	415.7342	433.6968	459.6364	475.9009	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.4200	11.2829	0.3500	0.7000	0.7700	4.6359	(75)
Southeast	8.3400	36.7938	0.3500	0.7000	0.7700	52.1003	(77)
Northwest	4.7600	11.2829	0.3500	0.7000	0.7700	9.1186	(81)

Solar gains	65.8549	116.7439	171.8694	233.2951	279.8759	286.0185	272.3539	236.3540	192.9447	132.2989	79.7109	55.8197	(83)
Total gains	550.7120	612.1566	647.4007	694.3826	718.3598	704.5044	673.1842	640.9208	608.6789	565.9957	539.3474	531.7205	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	55.7792	56.0036	56.2299	57.3890	57.6266	58.8446	58.8446	59.0944	58.3512	57.6266	57.1533	56.6878	
alpha	4.7186	4.7336	4.7487	4.8259	4.8418	4.9230	4.9230	4.9396	4.8901	4.8418	4.8102	4.7792	
util living area	0.9523	0.9234	0.8765	0.7670	0.6152	0.4386	0.3181	0.3474	0.5430	0.7902	0.9154	0.9575	(86)
MIT	20.1460	20.3366	20.5586	20.8136	20.9453	20.9918	20.9986	20.9979	20.9770	20.8182	20.4760	20.1260	(87)
Th 2	20.3100	20.3126	20.3152	20.3281	20.3307	20.3437	20.3437	20.3463	20.3385	20.3307	20.3255	20.3204	(88)
util rest of house	0.9450	0.9124	0.8594	0.7393	0.5774	0.3952	0.2710	0.2986	0.4953	0.7590	0.9017	0.9510	(89)
MIT 2	19.3171	19.5547	19.8273	20.1362	20.2809	20.3377	20.3430	20.3452	20.3205	20.1490	19.7402	19.3004	(90)
Living area fraction									fLA = Living area / (4) =			0.4730	(91)
MIT	19.7091	19.9245	20.1732	20.4566	20.5951	20.6471	20.6531	20.6539	20.6311	20.4655	20.0883	19.6909	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.5591	19.7745	20.0232	20.3066	20.4451	20.4971	20.5031	20.5039	20.4811	20.3155	19.9383	19.5409	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9355	0.9026	0.8515	0.7384	0.5840	0.4054	0.2824	0.3104	0.5057	0.7582	0.8927	0.9420	(94)
Useful gains	515.2171	552.5462	551.2608	512.7126	419.5569	285.6060	190.1396	198.9327	307.8391	429.1403	481.4936	500.8692	(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	785.3186	762.4571	690.3991	570.5801	435.6447	287.6871	190.4122	199.3623	313.9289	483.9837	644.8407	776.8736	(97)
Space heating kWh	200.9555	141.0601	103.5189	41.6646	11.9693	0.0000	0.0000	0.0000	0.0000	40.8035	117.6099	205.3473	(98a)
Space heating requirement - total per year (kWh/year)												862.9291	
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	200.9555	141.0601	103.5189	41.6646	11.9693	0.0000	0.0000	0.0000	0.0000	40.8035	117.6099	205.3473	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												862.9291	
Space heating per m2											(98c) / (4) =	12.3240	(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	200.9555	141.0601	103.5189	41.6646	11.9693	0.0000	0.0000	0.0000	0.0000	40.8035	117.6099	205.3473	(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)	226.3012	158.8515	116.5753	46.9196	13.4789	0.0000	0.0000	0.0000	0.0000	45.9499	132.4436	231.2470	(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	226.0513	199.8132	212.1486	190.6318	184.8640	163.1305	155.9709	168.9139	169.2870	191.2533	204.0388	225.4942	(64)
Efficiency of water heater												79.8000	(216)
(217)m	83.7969	83.2934	82.5435	81.2775	80.2949	79.8000	79.8000	79.8000	79.8000	81.2479	82.8711	83.8505	(217)
Fuel for water heating, kWh/month	269.7609	239.8907	257.0143	234.5443	230.2314	204.4242	195.4522	211.6715	212.1391	235.3946	246.2122	268.9242	(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	22.7940	20.5881	22.7940	22.0587	22.7940	22.0587	22.7940	22.7940	22.0587	22.7940	22.0587	22.7940	(231)
Lighting	22.2762	17.8708	16.0906	11.7887	9.1059	7.4396	8.3067	10.7974	14.0248	18.4012	20.7842	22.8953	(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	971.7670	(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	2805.6598	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7625)

mechanical ventilation fans (SFP = 0.7625)	182.3811	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	268.3811	(231)
Electricity for lighting (calculated in Appendix L)	179.7814	(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	4225.5893	(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	971.7670	0.2100	204.0711	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2805.6598	0.2100	589.1885	(264)
Space and water heating			793.2596	(265)
Pumps, fans and electric keep-hot	268.3811	0.1387	37.2278	(267)
Energy for lighting	179.7814	0.1443	25.9480	(268)
Total CO2, kg/year			856.4354	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			12.2300	(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	971.7670	1.1300	1098.0968	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2805.6598	1.1300	3170.3955	(278)
Space and water heating			4268.4923	(279)
Pumps, fans and electric keep-hot	268.3811	1.5128	406.0069	(281)
Energy for lighting	179.7814	1.5338	275.7548	(282)
Total Primary energy kWh/year			4950.2539	(286)
Dwelling Primary energy Rate (DPER)			70.7000	(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						
Ground floor	70.0200	(1b)	x 2.8000	(2b) =	196.0560	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	196.0560	(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) =	0.1020	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3520	(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) =	0.2992	(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	0.3815	0.3740	0.3665	0.3291	0.3217	0.2842	0.2842	0.2768	0.2992	0.3217	0.3366	0.3516	(22b)
Effective ac	0.5728	0.5699	0.5672	0.5542	0.5517	0.5404	0.5404	0.5383	0.5448	0.5517	0.5567	0.5618	(25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
TER Opening Type			15.5200	1.1450	17.7710			(27)
External Wall 1	49.7000	15.5200	34.1800	0.1800	6.1524			(29a)
External Roof 1	70.0200		70.0200	0.1100	7.7022			(30)
Total net area of external elements Aum(A, m2)			119.7200					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	31.6256			(33)
Main dwelling								
Party Wall 1			44.1600	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 147.5940 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E3 Sill	4.7600	0.0500	0.2380
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0700	0.9373
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
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000
E14 Flat roof	17.7500	0.0800	1.4200
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.2400	2.1120
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.1200	0.8364

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.8974 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 39.5230 (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	37.0572	36.8744	36.6952	35.8535	35.6961	34.9630	34.9630	34.8272	35.2454	35.6961	36.0146	36.3477	(38)
Heat transfer coeff													
	76.5802	76.3974	76.2182	75.3765	75.2191	74.4860	74.4860	74.3502	74.7683	75.2191	75.5376	75.8707	(39)
Average = Sum(39)m / 12 =												75.3758	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0937	1.0911	1.0885	1.0765	1.0743	1.0638	1.0638	1.0618	1.0678	1.0743	1.0788	1.0836	(40)
HLP (average)												1.0765	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2466 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers													
	61.8879	60.9579	59.6026	57.0095	55.0959	52.9618	51.7489	53.0939	54.5683	56.8596	59.5083	61.6508	(42a)
Hot water usage for baths													
	26.7371	26.3400	25.7808	24.7498	23.9778	23.1217	22.6593	23.2146	23.8192	24.7352	25.7874	26.6467	(42b)
Hot water usage for other uses													
	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375	(42c)
Average daily hot water use (litres/day)												116.0640	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	126.2625	123.5667	120.2836	115.2909	111.2366	106.8779	105.2025	108.4714	111.9190	116.4950	121.5647	125.9350	(44)
Energy conte	199.9689	175.9574	184.8715	157.8275	149.7459	131.4189	127.2333	134.3103	138.0074	158.0826	173.1911	197.1838	(45)
Energy content (annual)										Total = Sum(45)m =		1927.7986	
Distribution loss (46)m = 0.15 x (45)m													
	29.9953	26.3936	27.7307	23.6741	22.4619	19.7128	19.0850	20.1465	20.7011	23.7124	25.9787	29.5776	(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													
	249.2116	220.4346	234.1141	205.4817	198.9886	179.0731	176.4760	183.5530	185.6616	207.3253	220.8453	246.4264	(62)
WWHRS	-28.2926	-25.0222	-26.2018	-21.6961	-20.2200	-17.3024	-16.2182	-17.2465	-17.9017	-21.1042	-23.9085	-27.7686	(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													
	220.9190	195.4124	207.9124	183.7856	178.7686	161.7707	160.2578	166.3065	167.7598	186.2211	196.9369	218.6578	(64)
								Total per year (kWh/year) = Sum(64)m =				2244.7086	(64)
12Total per year (kWh/year)												2245	(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													
	105.8838	94.0876	100.8639	90.6010	89.1846	81.8201	81.6992	84.0523	84.0108	91.9566	95.7094	104.9577	(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	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	(71)
Water heating gains (Table 5)													
	142.3169	140.0113	135.5698	125.8347	119.8718	113.6391	109.8108	112.9735	116.6817	123.5976	132.9297	141.0722	(72)
Total internal gains													

	498.9102	509.3185	489.0504	471.6478	448.4988	429.5506	413.6967	414.8116	426.9985	444.5820	471.1003	488.9581	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.4200	11.2829	0.6300	0.7000	0.7700	8.3447	(75)
Southeast	8.3400	36.7938	0.6300	0.7000	0.7700	93.7806	(77)
Northwest	4.7600	11.2829	0.6300	0.7000	0.7700	16.4135	(81)

Solar gains	118.5388	210.1390	309.3649	419.9312	503.7766	514.8334	490.2369	425.4371	347.3004	238.1379	143.4797	100.4754	(83)
Total gains	617.4489	719.4575	798.4153	891.5790	952.2754	944.3840	903.9336	840.2488	774.2990	682.7200	614.5800	589.4335	(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	37.4862	37.5759	37.6643	38.0848	38.1646	38.5402	38.5402	38.6105	38.3946	38.1646	38.0036	37.8368	
alpha	3.4991	3.5051	3.5110	3.5390	3.5443	3.5693	3.5693	3.5740	3.5596	3.5443	3.5336	3.5225	
util living area													
	0.9579	0.9304	0.8848	0.7885	0.6479	0.4820	0.3563	0.3972	0.6041	0.8297	0.9315	0.9634	(86)
MIT	19.4196	19.7103	20.0820	20.5170	20.8092	20.9501	20.9869	20.9808	20.8886	20.5012	19.8977	19.3706	(87)
Th 2	20.0060	20.0081	20.0102	20.0201	20.0219	20.0305	20.0305	20.0321	20.0272	20.0219	20.0182	20.0143	(88)
util rest of house													
	0.9503	0.9185	0.8653	0.7550	0.5975	0.4162	0.2804	0.3176	0.5359	0.7943	0.9176	0.9567	(89)
MIT 2	18.1888	18.5514	19.0092	19.5309	19.8530	19.9965	20.0245	20.0226	19.9434	19.5283	18.7982	18.1330	(90)
Living area fraction										fLA = Living area / (4) =		0.4730	(91)
MIT	18.7710	19.0996	19.5166	19.9974	20.3053	20.4475	20.4797	20.4758	20.3905	19.9885	19.3183	18.7184	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7710	19.0996	19.5166	19.9974	20.3053	20.4475	20.4797	20.4758	20.3905	19.9885	19.3183	18.7184	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9384	0.9053	0.8542	0.7542	0.6127	0.4450	0.3160	0.3546	0.5623	0.7929	0.9057	0.9454	(94)
Useful gains	579.3893	651.2974	682.0056	672.4091	583.4787	420.2971	285.6114	297.9293	435.4260	541.3512	556.6000	557.2439	(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													
	1108.1921	1084.8109	992.1039	836.4799	647.2832	435.5602	288.9858	303.0387	470.3266	706.1920	922.9393	1101.5178	(97)
Space heating kWh													
	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397	(98a)
Space heating requirement - total per year (kWh/year)												1872.4106	
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													
	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1872.4106	
Space heating per m2											(98c) / (4) =	26.7411	(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													
	393.4293	291.3210	230.7131	118.1310	47.4706	0.0000	0.0000	0.0000	0.0000	122.6415	263.7643	404.9397	(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)													
	426.2506	315.6241	249.9600	127.9859	51.4308	0.0000	0.0000	0.0000	0.0000	132.8727	285.7685	438.7213	(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													
	220.9190	195.4124	207.9124	183.7856	178.7686	161.7707	160.2578	166.3065	167.7598	186.2211	196.9369	218.6578	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.3390	84.9534	84.2937	83.0952	81.5339	79.8000	79.8000	79.8000	79.8000	83.1461	84.7158	85.4219	(217)
Fuel for water heating, kWh/month													
	258.8724	230.0232	246.6523	221.1747	219.2567	202.7201	200.8243	208.4041	210.2254	223.9685	232.4678	255.9739	(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	20.6846	16.5939	14.9410	10.9464	8.4553	6.9081	7.7132	10.0260	13.0227	17.0865	19.2992	21.2595	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-23.8136	-34.6543	-51.4036	-59.7106	-66.0511	-62.2638	-61.5041	-57.2415	-49.9991	-40.4787	-26.5630	-20.4641	(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	-10.3607	-22.0863	-44.4395	-67.5398	-90.0782	-90.7843	-89.7131	-75.6047	-54.9512	-31.8444	-13.9169	-8.1712	(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	2028.6138	(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	2710.5635	(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)	166.9365	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1153.6379	(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	3838.4759	(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	2028.6138	0.2100	426.0089	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2710.5635	0.2100	569.2183	(264)
Space and water heating			995.2272	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	166.9365	0.1443	24.0941	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-554.1476	0.1339	-74.2097	
PV Unit electricity exported	-599.4903	0.1256	-75.2665	
Total			-149.4763	(269)
Total CO2, kg/year			881.7743	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.5900	(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	2028.6138	1.1300	2292.3336	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2710.5635	1.1300	3062.9367	(278)
Space and water heating			5355.2703	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	166.9365	1.5338	256.0528	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-554.1476	1.4949	-828.3932	
PV Unit electricity exported	-599.4903	0.4608	-276.2702	
Total			-1104.6634	(283)
Total Primary energy kWh/year			4636.7605	(286)
Target Primary Energy Rate (TPER)			66.2200	(287)

Full SAP Calculation Printout

Plot Reference	A 310	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	85 B	DER	12.23	TER	12.59
Environmental	90 B	% DER < TER			2.86
CO_2 Emissions (t/year)	0.78	DFEE	32.19	TFEE	34.29
Compliance Check	See BREL	% DFEE < TFEE			6.11
% DPER < TPER	-6.76	DPER	70.70	TPER	66.22

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 (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	70.0200 (1b)	x	2.8000 (2b)	=	196.0560	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 70.0200						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	196.0560	(5)

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2. Ventilation rate
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			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)	=	0.1020	(8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50			3.0000	(17)
Infiltration rate			0.2520	(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)	=	0.2142	(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	0.2731	0.2678	0.2624	0.2356	0.2303	0.2035	0.2035	0.1981	0.2142	0.2303	0.2410	0.2517	(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	0.5373	0.5358	0.5344	0.5278	0.5265	0.5207	0.5207	0.5196	0.5229	0.5265	0.5290	0.5317	(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								
Window			15.5200	1.1450	17.7710			(27)
External Wall 1	49.7000	15.5200	34.1800	0.1500	5.1270	70.0000	2392.6001	(29a)
External Roof 1	70.0200		70.0200	0.1000	7.0020	9.0000	630.1800	(30)
Total net area of external elements Aum(A, m2)			119.7200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.9000			(33)
Main dwelling								
Party Wall 1			44.1600	0.0000	0.0000	70.0000	3091.2000	(32)
Party Floor 1			70.0200			40.0000	2800.8000	(32d)
Internal Wall 1			157.7500			9.0000	1419.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 10334.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	147.5940	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E3 Sill	4.7600	0.0400	0.1904
E4 Jamb	18.6000	0.0400	0.7440
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0500	0.6695

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	
E25 Staggered party wall between dwellings	5.6000	0.0500	0.2800	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000	
E14 Flat roof	17.7500	0.0500	0.8875	
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.0500	0.4400	
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.0500	0.3485	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 4.6104 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 34.5104 (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	34.7623	34.6686	34.5767	34.1453	34.0646	33.6889	33.6889	33.6193	33.8336	34.0646	34.2279	34.3986	(38)
Heat transfer coeff	69.2727	69.1790	69.0871	68.6557	68.5750	68.1993	68.1993	68.1297	68.3440	68.5750	68.7383	68.9090	(39)

Average = Sum(39)m / 12 = 68.6553

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9893	0.9880	0.9867	0.9805	0.9794	0.9740	0.9740	0.9730	0.9761	0.9794	0.9817	0.9841	(40)
HLP (average)												0.9805	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2466 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.1410	25.7464	25.1850	24.3443	23.5867	22.5436	21.7524	22.7200	23.2278	24.2612	25.3357	26.1203	(42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375	(42c)
Average daily hot water use (litres/day)												58.4549	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	63.7786	62.0153	60.0853	57.8759	55.7496	53.3380	52.5467	54.8830	56.7594	59.1615	61.6046	63.7578	(44)
Energy conte	93.8930	82.0588	85.8606	75.6004	71.8390	61.6836	58.0657	64.5982	65.8381	76.2356	83.2607	93.6330	(45)
Energy content (annual)										Total = Sum(45)m =		912.5669	
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	79.8091	69.7500	72.9815	64.2604	61.0632	52.4311	49.3558	54.9085	55.9624	64.8002	70.7716	79.5881	(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	79.8091	69.7500	72.9815	64.2604	61.0632	52.4311	49.3558	54.9085	55.9624	64.8002	70.7716	79.5881	(64)
								Total per year (kWh/year) = Sum(64)m =				775.6819	(64)
12Total per year (kWh/year)												776	(64)
Electric shower(s)	49.5619	44.1601	48.2211	46.0168	46.8803	44.7192	46.2099	46.8803	46.0168	48.2211	47.3144	49.5619	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							563.7638	(64a)
Heat gains from water heating, kWh/month	32.3427	28.4775	30.3007	27.5693	26.9859	24.2876	23.8914	25.4472	25.4948	28.2553	29.5215	32.2875	(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	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	(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)	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	(71)
Water heating gains (Table 5)	43.4714	42.3772	40.7267	38.2907	36.2713	33.7328	32.1121	34.2032	35.4094	37.9776	41.0021	43.3972	(72)
Total internal gains	397.0647	408.6844	391.2073	381.1037	361.8983	349.6443	335.9980	336.0413	345.7263	355.9620	376.1726	388.2831	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.4200	11.2829	0.3500	0.7000	0.7700	4.6359	(75)
Southeast	8.3400	36.7938	0.3500	0.7000	0.7700	52.1003	(77)
Northwest	4.7600	11.2829	0.3500	0.7000	0.7700	9.1186	(81)

Solar gains	65.8549	116.7439	171.8694	233.2951	279.8759	286.0185	272.3539	236.3540	192.9447	132.2989	79.7109	55.8197	(83)
Total gains	462.9195	525.4283	563.0767	614.3988	641.7742	635.6629	608.3519	572.3953	538.6710	488.2609	455.8835	444.1027	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	41.4406	41.4968	41.5519	41.8130	41.8622	42.0929	42.0929	42.1359	42.0037	41.8622	41.7628	41.6593	
alpha	3.7627	3.7665	3.7701	3.7875	3.7908	3.8062	3.8062	3.8091	3.8002	3.7908	3.7842	3.7773	
util living area	0.9806	0.9679	0.9467	0.8913	0.7888	0.6251	0.4757	0.5211	0.7361	0.9104	0.9673	0.9833	(86)
MIT	19.3366	19.5672	19.8900	20.3283	20.6878	20.9070	20.9746	20.9640	20.8217	20.3624	19.7798	19.2913	(87)
Th 2	20.0922	20.0934	20.0945	20.0996	20.1006	20.1051	20.1051	20.1059	20.1033	20.1006	20.0986	20.0966	(88)
util rest of house	0.9769	0.9619	0.9363	0.8695	0.7466	0.5552	0.3860	0.4300	0.6732	0.8879	0.9600	0.9801	(89)
MIT 2	18.5736	18.8015	19.1187	19.5428	19.8705	20.0516	20.0951	20.0907	19.9901	19.5833	19.0175	18.5320	(90)
Living area fraction									fLA = Living area / (4) =			0.4730	(91)
MIT	18.9345	19.1637	19.4835	19.9143	20.2571	20.4562	20.5111	20.5038	20.3835	19.9518	19.3781	18.8911	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9345	19.1637	19.4835	19.9143	20.2571	20.4562	20.5111	20.5038	20.3835	19.9518	19.3781	18.8911	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9708	0.9542	0.9278	0.8644	0.7545	0.5837	0.4276	0.4716	0.6942	0.8836	0.9528	0.9745	(94)
Useful gains	449.4249	501.3541	522.4427	531.1095	484.1930	371.0358	260.1144	269.9487	373.9313	431.4140	434.3699	432.7903	(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	1013.7681	986.7481	896.9915	756.1973	586.8034	399.3885	266.7351	279.5916	429.4371	641.2999	843.9735	1012.3512	(97)
Space heating kWh	419.8713	326.1848	278.6643	162.0632	76.3421	0.0000	0.0000	0.0000	0.0000	156.1551	294.9146	431.1933	(98a)
Space heating requirement - total per year (kWh/year)												2145.3887	
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	419.8713	326.1848	278.6643	162.0632	76.3421	0.0000	0.0000	0.0000	0.0000	156.1551	294.9146	431.1933	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2145.3887	
Space heating per m2											(98c) / (4) =	30.6397	(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	641.0732	504.6747	517.7857	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8282	0.8895	0.8646	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	530.9275	448.9243	447.6794	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	705.7577	675.8709	635.6497	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	125.8778	168.8482	139.8499	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	31.4694	42.2121	34.9625	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												108.6440	(107)
Energy for space heating												30.6397	(99)
Energy for space cooling												1.5516	(108)
Total												32.1913	(109)
Fabric Energy Efficiency (DFEE)												32.2	(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						
Ground floor	70.0200	(1b)	x 2.8000	(2b) =	196.0560	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	70.0200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	196.0560	(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) =	0.1020	(8)

Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3520	(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) =	0.2992	(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	0.3815	0.3740	0.3665	0.3291	0.3217	0.2842	0.2842	0.2768	0.2992	0.3217	0.3366	0.3516	(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	0.5618	(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			15.5200	1.1450	17.7710			(27)
External Wall 1	49.7000	15.5200	34.1800	0.1800	6.1524			(29a)
External Roof 1	70.0200		70.0200	0.1100	7.7022			(30)
Total net area of external elements Aum(A, m2)			119.7200					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		31.6256			(33)
Main dwelling								
Party Wall 1			44.1600	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	147.5940	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E3 Sill	4.7600	0.0500	0.2380
E4 Jamb	18.6000	0.0500	0.9300
E7 Party floor between dwellings (in blocks of flats)	13.3900	0.0700	0.9373
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
E25 Staggered party wall between dwellings	5.6000	0.0600	0.3360
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	15.7700	0.0000	0.0000
E14 Flat roof	17.7500	0.0800	1.4200
E24 Eaves (insulation at ceiling level - inverted)	8.8000	0.2400	2.1120
P4 Party wall - Roof (insulation at ceiling level)	6.9700	0.1200	0.8364

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	7.8974	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	39.5230	(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	37.0572	36.8744	36.6952	35.8535	35.6961	34.9630	34.9630	34.8272	35.2454	35.6961	36.0146	36.3477	(38)
Heat transfer coeff	76.5802	76.3974	76.2182	75.3765	75.2191	74.4860	74.4860	74.3502	74.7683	75.2191	75.5376	75.8707	(39)
Average = Sum(39)m / 12 =												75.3758	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0937	1.0911	1.0885	1.0765	1.0743	1.0638	1.0638	1.0618	1.0678	1.0743	1.0788	1.0836	(40)
HLP (average)												1.0765	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.2466	(42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	26.7371	26.3400	25.7808	24.7498	23.9778	23.1217	22.6593	23.2146	23.8192	24.7352	25.7874	26.6467	(42b)
Hot water usage for other uses	37.6375	36.2689	34.9003	33.5316	32.1630	30.7943	30.7943	32.1630	33.5316	34.9003	36.2689	37.6375	(42c)
Average daily hot water use (litres/day)												59.0054	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	64.3746	62.6089	60.6811	58.2814	56.1407	53.9161	53.4537	55.3776	57.3508	59.6354	62.0563	64.2842	(44)
Energy conte	101.9536	89.1542	93.2645	79.7843	75.5762	66.2961	64.6476	68.5690	70.7193	80.9247	88.4106	100.6535	(45)
Energy content (annual)										Total = Sum(45)m =		979.9537	
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	86.6606	75.7811	79.2748	67.8167	64.2398	56.3517	54.9504	58.2837	60.1114	68.7860	75.1490	85.5555	(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	86.6606	75.7811	79.2748	67.8167	64.2398	56.3517	54.9504	58.2837	60.1114	68.7860	75.1490	85.5555	(64)
Total per year (kWh/year) = Sum(64)m =												832.9606	(64)
12Total per year (kWh/year)												833	(64)
Electric shower(s)	49.5619	44.1601	48.2211	46.0168	46.8803	44.7192	46.2099	46.8803	46.0168	48.2211	47.3144	49.5619	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												563.7638	(64a)
Heat gains from water heating, kWh/month	34.0556	29.9853	31.8740	28.4584	27.7800	25.2677	25.2901	26.2910	26.5320	29.2518	30.6158	33.7793	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	112.3305	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	99.5503	110.2164	99.5503	102.8687	99.5503	102.8687	99.5503	99.5503	102.8687	99.5503	102.8687	99.5503	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	197.3437	199.3915	194.2311	183.2452	169.3775	156.3437	147.6364	145.5886	150.7490	161.7349	175.6027	188.6364	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	34.2331	(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)													
	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	-89.8644	(71)
Water heating gains (Table 5)													
	45.7737	44.6210	42.8414	39.5255	37.3387	35.0941	33.9920	35.3373	36.8501	39.3169	42.5220	45.4024	(72)
Total internal gains													
	399.3669	410.9281	393.3220	382.3386	362.9657	351.0057	337.8780	337.1754	347.1669	357.3013	377.6925	390.2882	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Northeast	2.4200	11.2829	0.6300	0.7000	0.7700	8.3447	(75)
Southeast	8.3400	36.7938	0.6300	0.7000	0.7700	93.7806	(77)
Northwest	4.7600	11.2829	0.6300	0.7000	0.7700	16.4135	(81)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	118.5388	210.1390	309.3649	419.9312	503.7766	514.8334	490.2369	425.4371	347.3004	238.1379	143.4797	100.4754	(83)
Total gains	517.9057	621.0671	702.6869	802.2697	866.7423	865.8390	828.1149	762.6126	694.4674	595.4393	521.1722	490.7637	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	37.4862	37.5759	37.6643	38.0848	38.1646	38.5402	38.5402	38.6105	38.3946	38.1646	38.0036	37.8368	
alpha	3.4991	3.5051	3.5110	3.5390	3.5443	3.5693	3.5693	3.5740	3.5596	3.5443	3.5336	3.5225	
util living area													
	0.9744	0.9527	0.9147	0.8268	0.6901	0.5191	0.3869	0.4340	0.6535	0.8723	0.9558	0.9784	(86)
MIT	19.2200	19.5315	19.9353	20.4254	20.7656	20.9369	20.9830	20.9744	20.8563	20.3924	19.7261	19.1684	(87)
Th 2	20.0060	20.0081	20.0102	20.0201	20.0219	20.0305	20.0305	20.0321	20.0272	20.0219	20.0182	20.0143	(88)
util rest of house													
	0.9695	0.9439	0.8990	0.7964	0.6402	0.4502	0.3053	0.3485	0.5846	0.8423	0.9461	0.9742	(89)
MIT 2	18.3951	18.7014	19.0938	19.5599	19.8577	19.9964	20.0243	20.0221	19.9411	19.5431	18.9038	18.3504	(90)
Living area fraction										fLA = Living area / (4) =		0.4730	(91)
MIT	18.7853	19.0940	19.4919	19.9693	20.2871	20.4413	20.4778	20.4726	20.3740	19.9448	19.2928	18.7373	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.7853	19.0940	19.4919	19.9693	20.2871	20.4413	20.4778	20.4726	20.3740	19.9448	19.2928	18.7373	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9617	0.9341	0.8894	0.7947	0.6544	0.4801	0.3435	0.3881	0.6103	0.8396	0.9372	0.9671	(94)
Useful gains	498.0472	580.1195	624.9514	637.5771	567.1928	415.6936	284.4222	295.9725	423.8675	499.9564	488.4398	474.6312	(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													
	1109.2877	1084.3882	990.2166	834.3619	645.9139	435.0926	288.8398	302.7975	469.0955	702.9078	921.0123	1102.9577	(97)
Space heating kWh													
	454.7629	338.8686	271.7573	141.6850	58.5685	0.0000	0.0000	0.0000	0.0000	150.9958	311.4522	467.4749	(98a)
Space heating requirement - total per year (kWh/year)												2195.5653	
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													
	454.7629	338.8686	271.7573	141.6850	58.5685	0.0000	0.0000	0.0000	0.0000	150.9958	311.4522	467.4749	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2195.5653	
Space heating per m2											(98c) / (4) =	31.3563	(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	700.1682	551.1962	565.0617	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8890	0.9312	0.9099	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	622.4579	513.2484	514.1388	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	974.5650	932.4193	857.7902	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	253.5171	311.8632	255.6766	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	63.3793	77.9658	63.9192	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												205.2642	(107)
Energy for space heating												31.3563	(99)
Energy for space cooling												2.9315	(108)
Total												34.2878	(109)
Fabric Energy Efficiency (TFEE)												34.3	(109)