Summary for Input Data

Plot Reference	A 102	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	13.03	TER	15.05
Environmental	90 B	% DER < TER			13.42
CO_2 Emissions (t/year)	0.86	DFEE	38.72	TFEE	40.10
Compliance Check	See BREL	% DFEE < TFEE			3.45
% DPER < TPER	7.75	DPER	74.98	TPER	81.28

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

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

Orientation	Northwest	
Property Tenture	1	
Transaction Type	6	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2026	
4.0 Sheltered Sides	2	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	238.39	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:	31.07 m	73.53 m²	2.80 m

8.0 Living Area	33.80	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	47.07	29.69	0.00	None	17.38	Enter Gross Area
Corridor wall	Cavity Wall	Cavity wall : dense plaster, AAC block, filled cavity, any outside structure	0.22	70.00	39.93	37.51	0.70	Stairwell Access Corridor 3	2.42	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	16.20	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	155.20

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Precast concrete planks floor, screed, carpeted	30.00	73.53

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heatloss Floor 1	Exposed Floor - Solid	Lowest occupied	Other	0.10	None	0.00	110.00	73.53

Summary for Input Data

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12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Windows	Manufacturer	Window	Double Low-E Soft 0.1			0.35		0.70	1.20
Door	Manufacturer	Door to Corridor				0.00			1.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
Door	Door	Corridor wall	North West	2.42	
S windows	Windows	External Wall 1	South	9.77	
SE windows	Windows	External Wall 1	South East	7.61	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	

17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E1 Steel lintel with perforated steel base plate	Independently assessed	8.25	0.05	0.05	No
E4 Jamb	Independently assessed	24.00	0.04	0.04	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	8.27	0.05	0.05	No
E7 Party floor between dwellings (in blocks of flats)	Independently assessed	14.26	0.04	0.04	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	8.54	0.10	0.10	No
E9 Balcony between dwellings, wall insulation continuous	Independently assessed	8.54	0.05	0.05	No
E16 Corner (normal)	Independently assessed	8.40	0.05	0.05	No
E16 Corner (normal)	Independently assessed	5.60	0.04	0.04	No
E17 Corner (inverted – internal area greater than external area)	Table K1 - Default	5.60	0.00	0.00	No
E18 Party wall between dwellings	Independently assessed	2.80	0.05	0.05	No
E18 Party wall between dwellings	Independently assessed	2.80	0.04	0.04	No
E20 Exposed floor (normal)	Independently assessed	8.27	0.10	0.10	No
E21 Exposed floor (inverted)	Independently assessed	14.26	0.10	0.10	No
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	Table K1 - Default	5.79	0.00	0.00	No
P7 Party Wall - Exposed floor (normal)	Independently assessed	5.79	0.08	0.08	No

Y-value	0.05	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

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

20.0 Fans, Open Fireplaces, Flues

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

Summary for Input Data

elmhurst energy

Number of flueless gas fires	0	
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 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	
Controls description	Time and temperature zone control by arrangement	
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	
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 102	Issued on Date	19/03/2026
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Plot Address		SAP Version	10.2

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% DPER < TPER	7.75	DPER	74.98	TPER	81.28

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	73.5300	(1b)	x 2.8000	(2b) =	205.8840	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 73.5300						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		205.8840	(5)

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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)

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)

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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								
Windows			17.3800	1.1450	19.9008			(27)
Door			2.4200	1.0000	2.4200			(26)
Heatloss Floor 1			73.5300	0.1000	7.3530	110.0000	8088.3000	(28b)
External Wall 1	47.0700	17.3800	29.6900	0.1500	4.4535	70.0000	2078.3000	(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1900	7.1269	70.0000	2625.7000	(29a)
Total net area of external elements Aum(A, m2)			160.5300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.2542			(33)
Main dwelling								
Party Wall 1			16.2000	0.0000	0.0000	70.0000	1134.0001	(32)
Party Ceiling 1			73.5300			30.0000	2205.9000	(32b)
Internal Wall 1			155.2000			9.0000	1396.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 17529.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	238.3925	(35)
List of Thermal Bridges		

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E4 Jamb	24.0000	0.0400	0.9600
E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0500	0.4135
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0390	0.5561
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.1000	0.8540
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0500	0.4270
E16 Corner (normal)	8.4000	0.0500	0.4200
E16 Corner (normal)	5.6000	0.0390	0.2184
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E20 Exposed floor (normal)	8.2700	0.1000	0.8270
E21 Exposed floor (inverted)	14.2600	0.1000	1.4260
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	5.7900	0.0800	0.4632

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.2269 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 48.4811 (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	17.8050	17.5884	17.3718	16.2890	16.0725	14.9896	14.9896	14.7731	15.4228	16.0725	16.5056	16.9387	(38)
Heat transfer coeff	66.2861	66.0695	65.8530	64.7701	64.5536	63.4707	63.4707	63.2542	63.9039	64.5536	64.9867	65.4198	(39)
Average = Sum(39)m / 12 =												64.7160	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9015	0.8985	0.8956	0.8809	0.8779	0.8632	0.8632	0.8602	0.8691	0.8779	0.8838	0.8897	(40)
HLP (average)												0.8801	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3287 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	61.6657	60.7216	59.3303	57.1899	55.2722	52.5894	50.4674	52.9481	54.1958	56.8531	59.6204	61.6101	(42a)
Hot water usage for baths	26.7196	26.3163	25.7425	24.8832	24.1087	23.0426	22.2338	23.2229	23.7419	24.7983	25.8965	26.6984	(42b)
Hot water usage for other uses	38.4781	37.0789	35.6797	34.2805	32.8813	31.4821	31.4821	32.8813	34.2805	35.6797	37.0789	38.4781	(42c)
Average daily hot water use (litres/day)												116.6065	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.8635	124.1168	120.7525	116.3536	112.2622	107.1141	104.1833	109.0522	112.2182	117.3310	122.5958	126.7867	(44)
Energy conte	186.7649	164.2316	172.5528	151.9869	144.6613	123.8739	115.1256	128.3565	130.1675	151.1929	165.6923	186.1955	(45)
Energy content (annual)										Total = Sum(45)m =		1820.8016	
Distribution loss (46)m = 0.15 x (45)m	28.0147	24.6347	25.8829	22.7980	21.6992	18.5811	17.2688	19.2535	19.5251	22.6789	24.8538	27.9293	(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	230.1153	203.3868	215.9032	193.9389	188.0117	165.8259	158.4760	171.7069	172.1195	194.5433	207.6443	229.5459	(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	230.1153	203.3868	215.9032	193.9389	188.0117	165.8259	158.4760	171.7069	172.1195	194.5433	207.6443	229.5459	(64)
								Total per year (kWh/year) = Sum(64)m =				2331.2176	(64)
12Total per year (kWh/year)												2331	(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	96.7797	85.9312	92.0541	84.0972	82.7802	74.7497	72.9596	77.3589	76.8423	84.9519	88.6543	96.5903	(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	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.5966	114.6962	103.5966	107.0498	103.5966	107.0498	103.5966	103.5966	107.0498	103.5966	107.0498	103.5966	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.3918	207.5231	202.1522	190.7183	176.2850	162.7197	153.6573	151.5260	156.8969	168.3308	182.7641	196.3294	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	(71)
Water heating gains (Table 5)	130.0802	127.8738	123.7287	116.8017	111.2637	103.8190	98.0640	103.9770	106.7254	114.1827	123.1309	129.8257	(72)
Total internal gains	499.9989	511.0234	490.4078	475.5001	452.0756	431.5188	413.2482	417.0298	428.6024	447.0404	473.8751	490.6820	(73)

6. Solar gains

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

Southeast				7.6100	36.7938	0.3500	0.7000	0.7700	47.5400	(77)			
South				9.7700	46.7521	0.3500	0.7000	0.7700	77.5523	(78)			
Solar gains	125.0923	207.9889	272.5870	320.1407	344.3175	336.0341	326.3482	308.8781	288.9785	226.4911	148.8679	107.6966	(83)
Total gains	625.0911	719.0123	762.9947	795.6408	796.3931	767.5529	739.5963	725.9080	717.5808	673.5315	622.7430	598.3786	(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	73.4569	73.6976	73.9400	75.1761	75.4283	76.7151	76.7151	76.9778	76.1952	75.4283	74.9256	74.4295	
alpha	5.8971	5.9132	5.9293	6.0117	6.0286	6.1143	6.1143	6.1319	6.0797	6.0286	5.9950	5.9620	
util living area	0.9847	0.9657	0.9326	0.8508	0.7147	0.5241	0.3770	0.4000	0.6018	0.8563	0.9639	0.9877	(86)
MIT	20.2196	20.4131	20.6132	20.8298	20.9503	20.9937	20.9993	20.9990	20.9855	20.8491	20.5171	20.1913	(87)
Th 2	20.1662	20.1687	20.1712	20.1838	20.1863	20.1989	20.1989	20.2014	20.1939	20.1863	20.1813	20.1763	(88)
util rest of house	0.9806	0.9571	0.9162	0.8185	0.6636	0.4607	0.3087	0.3310	0.5366	0.8190	0.9533	0.9843	(89)
MIT 2	19.2722	19.5150	19.7607	20.0209	20.1468	20.1953	20.1987	20.2010	20.1849	20.0487	19.6569	19.2445	(90)
Living area fraction									fLA = Living area / (4) =			0.4597	(91)
MIT	19.7077	19.9278	20.1526	20.3927	20.5161	20.5623	20.5667	20.5678	20.5529	20.4166	20.0523	19.6797	(92)
Temperature adjustment												-0.1500	
adjusted MIT	19.5577	19.7778	20.0026	20.2427	20.3661	20.4123	20.4167	20.4178	20.4029	20.2666	19.9023	19.5297	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9768	0.9522	0.9124	0.8211	0.6753	0.4778	0.3273	0.3497	0.5538	0.8230	0.9490	0.9809	(94)
Useful gains	610.5820	684.6713	696.1565	653.2629	537.8252	366.7283	242.0704	253.8796	397.4108	554.3078	590.9721	586.9589	(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	1011.3721	982.9713	889.1847	734.6705	559.4282	368.9124	242.2475	254.1446	402.7782	624.0135	831.9784	1002.8681	(97)
Space heating kWh	298.1878	200.4576	143.6130	58.6135	16.0726	0.0000	0.0000	0.0000	0.0000	51.8610	173.5246	309.4364	(98a)
Space heating requirement - total per year (kWh/year)												1251.7664	
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	298.1878	200.4576	143.6130	58.6135	16.0726	0.0000	0.0000	0.0000	0.0000	51.8610	173.5246	309.4364	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1251.7664	
Space heating per m2											(98c) / (4) =	17.0239	(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	298.1878	200.4576	143.6130	58.6135	16.0726	0.0000	0.0000	0.0000	0.0000	51.8610	173.5246	309.4364	(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)	335.7971	225.7406	161.7263	66.0062	18.0998	0.0000	0.0000	0.0000	0.0000	58.4020	195.4106	348.4644	(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	230.1153	203.3868	215.9032	193.9389	188.0117	165.8259	158.4760	171.7069	172.1195	194.5433	207.6443	229.5459	(64)
Efficiency of water heater												79.8000	(216)
(217)m	84.6420	84.0273	83.1671	81.7223	80.4421	79.8000	79.8000	79.8000	79.8000	81.5394	83.6600	84.7302	(217)
Fuel for water heating, kWh/month	271.8691	242.0487	259.6017	237.3146	233.7230	207.8018	198.5915	215.1715	215.6886	238.5882	248.2001	270.9139	(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	23.5705	21.2895	23.5705	22.8102	23.5705	22.8102	23.5705	23.5705	22.8102	23.5705	22.8102	23.5705	(231)
Lighting	23.5733	18.9114	17.0276	12.4752	9.6362	7.8728	8.7904	11.4261	14.8414	19.4728	21.9944	24.2285	(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	1409.6468	(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	2839.5126	(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)	191.5236	(230a)
central heating pump	41.0000	(230c)
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	277.5236	(231)
Electricity for lighting (calculated in Appendix L)	190.2502	(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	4716.9332	(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	1409.6468	0.2100	296.0258	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2839.5126	0.2100	596.2976	(264)
Space and water heating			892.3235	(265)
Pumps, fans and electric keep-hot	277.5236	0.1387	38.4959	(267)
Energy for lighting	190.2502	0.1443	27.4590	(268)
Total CO2, kg/year			958.2784	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.0300	(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	1409.6468	1.1300	1592.9009	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2839.5126	1.1300	3208.6492	(278)
Space and water heating			4801.5501	(279)
Pumps, fans and electric keep-hot	277.5236	1.5128	419.8377	(281)
Energy for lighting	190.2502	1.5338	291.8121	(282)
Total Primary energy kWh/year			5513.1999	(286)
Dwelling Primary energy Rate (DPER)			74.9800	(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	73.5300	(1b)	x 2.8000	(2b) =	205.8840	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.5300					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	205.8840	(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)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1457	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3957	(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) =	0.3364	(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	0.4289	0.4204	0.4120	0.3700	0.3616	0.3195	0.3195	0.3111	0.3364	0.3616	0.3784	0.3952	(22b)
Effective ac	0.5920	0.5884	0.5849	0.5684	0.5654	0.5511	0.5511	0.5484	0.5566	0.5654	0.5716	0.5781	(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 Opaque door			2.4200	1.0000	2.4200			(26)
TER Opening Type			15.9500	1.1450	18.2634			(27)
Heatloss Floor 1			73.5300	0.1300	9.5589			(28b)
External Wall 1	47.0700	15.9500	31.1200	0.1800	5.6016			(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1800	6.7518			(29a)
Total net area of external elements Aum(A, m2)			160.5300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.5957			(33)
Main dwelling								
Party Wall 1			16.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 238.3925 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E4 Jamb	24.0000	0.0500	1.2000
E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0700	0.5789
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0700	0.9982
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0200	0.1708
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0200	0.1708
E16 Corner (normal)	8.4000	0.0900	0.7560
E16 Corner (normal)	5.6000	0.0900	0.5040
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	8.2700	0.3200	2.6464
E21 Exposed floor (inverted)	14.2600	0.3200	4.5632
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	5.7900	0.1600	0.9264

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 12.7592 (36)

Point Thermal bridges (36a) = 0.0000

Total fabric heat loss (33) + (36) + (36a) = 55.3549 (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	40.2186	39.9760	39.7382	38.6213	38.4123	37.4394	37.4394	37.2593	37.8142	38.4123	38.8350	39.2770	(38)
Heat transfer coeff	95.5735	95.3309	95.0931	93.9761	93.7671	92.7943	92.7943	92.6141	93.1690	93.7671	94.1899	94.6319	(39)

Average = Sum(39)m / 12 = 93.9751

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2998	1.2965	1.2933	1.2781	1.2752	1.2620	1.2620	1.2595	1.2671	1.2752	1.2810	1.2870	(40)
HLP (average)												1.2781	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3287 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	63.2641	62.3134	60.9280	58.2772	56.3211	54.1395	52.8996	54.2745	55.7817	58.1240	60.8316	63.0217	(42a)
Hot water usage for baths	27.3289	26.9230	26.3514	25.2976	24.5085	23.6335	23.1609	23.7284	24.3464	25.2827	26.3582	27.2365	(42b)
Hot water usage for other uses	38.4781	37.0789	35.6797	34.2805	32.8813	31.4821	31.4821	32.8813	34.2805	35.6797	37.0789	38.4781	(42c)
Average daily hot water use (litres/day)												118.6456	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	129.0711	126.3152	122.9591	117.8553	113.7108	109.2551	107.5425	110.8842	114.4085	119.0863	124.2687	128.7363	(44)
Energy conte	204.4170	179.8712	188.9835	161.3380	153.0766	134.3419	130.0634	137.2978	141.0772	161.5990	177.0436	201.5699	(45)
Energy content (annual)										Total = Sum(45)m =		1970.6791	
Distribution loss (46)m = 0.15 x (45)m	30.6625	26.9807	28.3475	24.2007	22.9615	20.1513	19.5095	20.5947	21.1616	24.2398	26.5565	30.2355	(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	253.6597	224.3485	238.2262	208.9922	202.3193	181.9961	179.3060	186.5405	188.7314	210.8416	224.6978	250.8126	(62)
WWHRS	-28.9217	-25.5786	-26.7844	-22.1786	-20.6696	-17.6871	-16.5789	-17.6300	-18.2998	-21.5735	-24.4401	-28.3861	(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	224.7380	198.7699	211.4418	186.8136	181.6497	164.3090	162.7272	168.9105	170.4316	189.2682	200.2577	222.4264	(64)
								Total per year (kWh/year) = Sum(64)m =				2281.7434	(64)
12Total per year (kWh/year)												2282	(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	107.3628	95.3890	102.2312	91.7682	90.2921	82.7920	82.6402	85.0457	85.0315	93.1258	96.9903	106.4161	(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	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.6878	114.7972	103.6878	107.1441	103.6878	107.1441	103.6878	103.6878	107.1441	103.6878	107.1441	103.6878	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													

	205.3918	207.5231	202.1522	190.7183	176.2850	162.7197	153.6573	151.5260	156.8969	168.3308	182.7641	196.3294	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	(71)
Water heating gains (Table 5)													
	144.3048	141.9479	137.4075	127.4559	121.3604	114.9890	111.0755	114.3087	118.0993	125.1691	134.7088	143.0324	(72)
Total internal gains													
	514.3147	525.1985	504.1778	486.2486	462.2635	442.7831	426.3510	427.4528	440.0706	458.1180	485.5473	503.9799	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	6.9900	36.7938	0.6300	0.7000	0.7700	78.6003	(77)
South	8.9600	46.7521	0.6300	0.7000	0.7700	128.0208	(78)

Solar gains	206.6211	343.5505	450.2639	528.8326	568.7855	555.1085	539.1052	510.2345	477.3462	374.1153	245.8933	177.8872	(83)
Total gains	720.9358	868.7490	954.4418	1015.0812	1031.0489	997.8916	965.4562	937.6873	917.4168	832.2333	731.4406	681.8671	(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	50.9468	51.0765	51.2042	51.8128	51.9283	52.4727	52.4727	52.5748	52.2616	51.9283	51.6952	51.4538	
alpha	4.3965	4.4051	4.4136	4.4542	4.4619	4.4982	4.4982	4.5050	4.4841	4.4619	4.4463	4.4303	
util living area													
	0.9831	0.9629	0.9297	0.8598	0.7427	0.5704	0.4178	0.4472	0.6511	0.8752	0.9654	0.9864	(86)
MIT	19.6941	19.9717	20.2758	20.6094	20.8429	20.9634	20.9927	20.9900	20.9326	20.6352	20.1093	19.6469	(87)
Th 2	19.8410	19.8436	19.8461	19.8581	19.8603	19.8707	19.8707	19.8727	19.8667	19.8603	19.8558	19.8510	(88)
util rest of house													
	0.9781	0.9526	0.9103	0.8225	0.6792	0.4798	0.3132	0.3412	0.5624	0.8338	0.9538	0.9824	(89)
MIT 2	18.3677	18.7154	19.0893	19.4885	19.7372	19.8512	19.8686	19.8694	19.8261	19.5295	18.9011	18.3154	(90)
Living area fraction										fLA = Living area / (4) =		0.4597	(91)
MIT	18.9774	19.2929	19.6347	20.0037	20.2455	20.3624	20.3853	20.3845	20.3348	20.0377	19.4565	18.9275	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.9774	19.2929	19.6347	20.0037	20.2455	20.3624	20.3853	20.3845	20.3348	20.0377	19.4565	18.9275	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9732	0.9465	0.9062	0.8277	0.7019	0.5203	0.3614	0.3900	0.6006	0.8411	0.9488	0.9780	(94)
Useful gains	701.6275	822.2559	864.8937	840.2250	723.7432	519.2216	348.8772	365.6513	550.9966	699.9730	694.0013	666.8873	(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													
	1402.7707	1372.0841	1249.0196	1043.4860	801.2851	534.7191	351.2522	369.0233	580.8859	884.9494	1163.8540	1393.6890	(97)
Space heating kWh													
	521.6505	369.4846	285.7896	146.3479	57.6912	0.0000	0.0000	0.0000	0.0000	137.6225	338.2939	540.7405	(98a)
Space heating requirement - total per year (kWh/year)												2397.6207	
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													
	521.6505	369.4846	285.7896	146.3479	57.6912	0.0000	0.0000	0.0000	0.0000	137.6225	338.2939	540.7405	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2397.6207	
Space heating per m2											(98c) / (4) =	32.6074	(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													
	521.6505	369.4846	285.7896	146.3479	57.6912	0.0000	0.0000	0.0000	0.0000	137.6225	338.2939	540.7405	(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)													
	565.1685	400.3083	309.6312	158.5568	62.5040	0.0000	0.0000	0.0000	0.0000	149.1034	366.5156	585.8510	(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													
	224.7380	198.7699	211.4418	186.8136	181.6497	164.3090	162.7272	168.9105	170.4316	189.2682	200.2577	222.4264	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.8835	85.4298	84.7361	83.5183	81.7983	79.8000	79.8000	79.8000	79.8000	83.3568	85.2258	85.9740	(217)
Fuel for water heating, kWh/month													
	261.6777	232.6704	249.5297	223.6799	222.0701	205.9010	203.9187	211.6673	213.5734	227.0579	234.9729	258.7136	(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	21.5443	17.2836	15.5620	11.4014	8.8068	7.1952	8.0338	10.4427	13.5640	17.7967	20.1013	22.1431	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-9.7229	-14.9668	-23.4641	-28.8518	-33.3536	-31.9671	-31.5789	-28.6770	-24.0010	-18.1432	-11.1263	-8.2659	(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	-2.2396	-4.8948	-10.0851	-15.6913	-21.2984	-21.6063	-21.3536	-17.8249	-12.7361	-7.1730	-3.0434	-1.7578	(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	2597.6389	(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	2745.4327	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	86.0000	(231)
Electricity for lighting (calculated in Appendix L)	173.8747	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-403.8227	(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	5199.1236	(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	2597.6389	0.2100	545.5042	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2745.4327	0.2100	576.5409	(264)
Space and water heating			1122.0450	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	173.8747	0.1443	25.0955	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-264.1186	0.1328	-35.0741	
PV Unit electricity exported	-139.7042	0.1249	-17.4461	
Total			-52.5202	(269)
Total CO2, kg/year			1106.5496	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.0500	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2597.6389	1.1300	2935.3320	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2745.4327	1.1300	3102.3390	(278)
Space and water heating			6037.6709	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	173.8747	1.5338	266.6948	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-264.1186	1.4907	-393.7194	
PV Unit electricity exported	-139.7042	0.4583	-64.0321	
Total			-457.7516	(283)
Total Primary energy kWh/year			5976.7150	(286)
Target Primary Energy Rate (TPER)			81.2800	(287)

Full SAP Calculation Printout

elmhurst energy

Plot Reference	A 102	Issued on Date	19/03/2026
Assessment Reference	Be Lean	Plot Type Ref	
Plot Address		SAP Version	10.2

SAP Rating	84 B	DER	13.03	TER	15.05
Environmental	90 B	% DER < TER			13.42
CO_2 Emissions (t/year)	0.86	DFEE	38.72	TFEE	40.10
Compliance Check	See BREL	% DFEE < TFEE			3.45
% DPER < TPER	7.75	DPER	74.98	TPER	81.28

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	73.5300 (1b)	x	2.8000 (2b)	=	205.8840	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 73.5300						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	205.8840	(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	3 * 10 =	30.0000	(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) =	30.0000 / (5) =	0.1457	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.0000	(17)
Infiltration rate		0.2957	(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) =	0.2514	(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	0.3205	0.3142	0.3079	0.2765	0.2702	0.2388	0.2388	0.2325	0.2514	0.2702	0.2828	0.2953	(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	0.5514	0.5494	0.5474	0.5382	0.5365	0.5285	0.5285	0.5270	0.5316	0.5365	0.5400	0.5436	(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								
Windows			17.3800	1.1450	19.9008			(27)
Door			2.4200	1.0000	2.4200			(26)
Heatloss Floor 1			73.5300	0.1000	7.3530	110.0000	8088.3000	(28b)
External Wall 1	47.0700	17.3800	29.6900	0.1500	4.4535	70.0000	2078.3000	(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1900	7.1269	70.0000	2625.7000	(29a)
Total net area of external elements Aum(A, m2)			160.5300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.2542			(33)
Main dwelling								
Party Wall 1			16.2000	0.0000	0.0000	70.0000	1134.0001	(32)
Party Ceiling 1			73.5300			30.0000	2205.9000	(32b)
Internal Wall 1			155.2000			9.0000	1396.8000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 17529.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	238.3925	(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
E4 Jamb	24.0000	0.0400	0.9600

E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0500	0.4135
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0390	0.5561
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.1000	0.8540
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0500	0.4270
E16 Corner (normal)	8.4000	0.0500	0.4200
E16 Corner (normal)	5.6000	0.0390	0.2184
E17 Corner (inverted - internal area greater than external area)	5.6000	0.0000	0.0000
E18 Party wall between dwellings	2.8000	0.0500	0.1400
E18 Party wall between dwellings	2.8000	0.0390	0.1092
E20 Exposed floor (normal)	8.2700	0.1000	0.8270
E21 Exposed floor (inverted)	14.2600	0.1000	1.4260
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	5.7900	0.0800	0.4632

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 7.2269 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 48.4811 (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	37.4599	37.3244	37.1916	36.5679	36.4511	35.9079	35.9079	35.8073	36.1171	36.4511	36.6872	36.9341	(38)
Heat transfer coeff	85.9410	85.8055	85.6727	85.0490	84.9323	84.3890	84.3890	84.2884	84.5982	84.9323	85.1683	85.4152	(39)

Average = Sum(39)m / 12 = 85.0484

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1688	1.1669	1.1651	1.1567	1.1551	1.1477	1.1477	1.1463	1.1505	1.1551	1.1583	1.1616	(40)
HLP (average)												1.1566	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.3287 (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	26.7196	26.3163	25.7425	24.8832	24.1087	23.0426	22.2338	23.2229	23.7419	24.7983	25.8965	26.6984	(42b)
Hot water usage for other uses	38.4781	37.0789	35.6797	34.2805	32.8813	31.4821	31.4821	32.8813	34.2805	35.6797	37.0789	38.4781	(42c)
Average daily hot water use (litres/day)												59.7555	(43)
Daily hot water use	65.1977	63.3952	61.4222	59.1636	56.9900	54.5247	53.7159	56.1041	58.0224	60.4779	62.9754	65.1765	(44)
Energy conte	95.9823	83.8846	87.7710	77.2825	73.4374	63.0560	59.3576	66.0356	67.3031	77.9319	85.1134	95.7165	(45)
Energy content (annual)										Total = Sum(45)m =		932.8720	
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	81.5850	71.3019	74.6054	65.6901	62.4218	53.5976	50.4540	56.1303	57.2076	66.2421	72.3464	81.3590	(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	81.5850	71.3019	74.6054	65.6901	62.4218	53.5976	50.4540	56.1303	57.2076	66.2421	72.3464	81.3590	(64)
								Total per year (kWh/year) = Sum(64)m =				792.9412	(64)
12Total per year (kWh/year)												793	(64)
Electric shower(s)	50.6640	45.1420	49.2934	47.0401	47.9228	45.7137	47.2375	47.9228	47.0401	49.2934	48.3665	50.6640	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							576.3001	(64a)
Heat gains from water heating, kWh/month	33.0622	29.1110	30.9747	28.1826	27.5861	24.8278	24.4229	26.0133	26.0619	28.8839	30.1782	33.0058	(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	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	103.5966	114.6962	103.5966	107.0498	103.5966	107.0498	103.5966	103.5966	107.0498	103.5966	107.0498	103.5966	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	205.3918	207.5231	202.1522	190.7183	176.2850	162.7197	153.6573	151.5260	156.8969	168.3308	182.7641	196.3294	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	(71)
Water heating gains (Table 5)	44.4385	43.3199	41.6326	39.1424	37.0781	34.4831	32.8264	34.9641	36.1971	38.8224	41.9142	44.3626	(72)
Total internal gains	411.3572	423.4696	405.3118	394.8408	374.8900	362.1829	348.0106	348.0169	358.0741	368.6801	389.6584	402.2188	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	7.6100	36.7938	0.3500	0.7000	0.7700	47.5400	(77)
South	9.7700	46.7521	0.3500	0.7000	0.7700	77.5523	(78)

Solar gains	125.0923	207.9889	272.5870	320.1407	344.3175	336.0341	326.3482	308.8781	288.9785	226.4911	148.8679	107.6966	(83)
Total gains	536.4495	631.4584	677.8987	714.9816	719.2076	698.2170	674.3588	656.8951	647.0525	595.1712	538.5262	509.9155	(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	56.6571	56.7465	56.8345	57.2513	57.3300	57.6991	57.6991	57.7680	57.5564	57.3300	57.1711	57.0059	
alpha	4.7771	4.7831	4.7890	4.8168	4.8220	4.8466	4.8466	4.8512	4.8371	4.8220	4.8114	4.8004	
util living area	0.9943	0.9870	0.9742	0.9400	0.8646	0.7086	0.5365	0.5706	0.7834	0.9460	0.9876	0.9955	(86)
MIT	19.6400	19.8562	20.1220	20.4603	20.7459	20.9314	20.9855	20.9805	20.8837	20.5157	20.0148	19.5996	(87)
Th 2	19.9451	19.9465	19.9480	19.9548	19.9561	19.9621	19.9621	19.9632	19.9598	19.9561	19.9535	19.9508	(88)
util rest of house	0.9925	0.9830	0.9660	0.9196	0.8176	0.6178	0.4170	0.4516	0.7035	0.9235	0.9830	0.9941	(89)
MIT 2	18.7203	18.9353	19.1975	19.5275	19.7850	19.9301	19.9583	19.9576	19.8985	19.5857	19.0993	18.6847	(90)
Living area fraction									fLA = Living area / (4) =			0.4597	(91)
MIT	19.1431	19.3586	19.6225	19.9563	20.2267	20.3903	20.4305	20.4278	20.3514	20.0132	19.5201	19.1052	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1431	19.3586	19.6225	19.9563	20.2267	20.3903	20.4305	20.4278	20.3514	20.0132	19.5201	19.1052	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9907	0.9802	0.9628	0.9196	0.8311	0.6573	0.4722	0.5064	0.7360	0.9250	0.9805	0.9925	(94)
Useful gains	531.4567	618.9442	652.6791	657.5182	597.7225	458.9480	318.4191	332.6793	476.2292	550.5064	528.0504	506.1147	(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	1275.6284	1240.6275	1124.2374	940.3274	724.1914	488.6415	323.2527	339.4951	528.8556	799.4851	1057.7988	1273.1334	(97)
Space heating kWh	553.6637	417.7712	350.8394	203.6227	94.0928	0.0000	0.0000	0.0000	0.0000	185.2401	381.4189	570.6619	(98a)
Space heating requirement - total per year (kWh/year)												2757.3106	
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	553.6637	417.7712	350.8394	203.6227	94.0928	0.0000	0.0000	0.0000	0.0000	185.2401	381.4189	570.6619	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2757.3106	
Space heating per m2											(98c) / (4) =	37.4991	(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	793.2564	624.4784	640.5916	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8203	0.8957	0.8797	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	650.7047	559.3544	563.5141	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	777.0543	751.2805	732.7542	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	90.9717	142.7930	125.9146	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	22.7429	35.6983	31.4787	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												89.9198	(107)
Energy for space heating												37.4991	(99)
Energy for space cooling												1.2229	(108)
Total												38.7220	(109)
Fabric Energy Efficiency (DFEE)												38.7	(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	73.5300	(1b)	x 2.8000	(2b) =	205.8840	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	73.5300					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	205.8840	(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)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1457 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3957 (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) =	0.3364 (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													
	0.4289	0.4204	0.4120	0.3700	0.3616	0.3195	0.3195	0.3111	0.3364	0.3616	0.3784	0.3952	(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	0.5920	0.5884	0.5849	0.5684	0.5654	0.5511	0.5511	0.5484	0.5566	0.5654	0.5716	0.5781	(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 Opaque door			2.4200	1.0000	2.4200			(26)
TER Opening Type			15.9500	1.1450	18.2634			(27)
Heatloss Floor 1			73.5300	0.1300	9.5589			(28b)
External Wall 1	47.0700	15.9500	31.1200	0.1800	5.6016			(29a)
Corridor wall	39.9300	2.4200	37.5100	0.1800	6.7518			(29a)
Total net area of external elements Aum(A, m2)			160.5300					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.5957			(33)
Main dwelling								
Party Wall 1			16.2000	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	238.3925	(35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E1 Steel lintel with perforated steel base plate	8.2500	0.0500	0.4125
E4 Jamb	24.0000	0.0500	1.2000
E7 Party floor between dwellings (in blocks of flats)	8.2700	0.0700	0.5789
E7 Party floor between dwellings (in blocks of flats)	14.2600	0.0700	0.9982
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0200	0.1708
E9 Balcony between dwellings, wall insulation continuous	8.5400	0.0200	0.1708
E16 Corner (normal)	8.4000	0.0900	0.7560
E16 Corner (normal)	5.6000	0.0900	0.5040
E17 Corner (inverted - internal area greater than external area)	5.6000	-0.0900	-0.5040
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E18 Party wall between dwellings	2.8000	0.0600	0.1680
E20 Exposed floor (normal)	8.2700	0.3200	2.6464
E21 Exposed floor (inverted)	14.2600	0.3200	4.5632
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.7900	0.0000	0.0000
P7 Party Wall - Exposed floor (normal)	5.7900	0.1600	0.9264

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	12.7592	(36)
Point Thermal bridges	(36a) = 0.0000	
Total fabric heat loss	(33) + (36) + (36a) = 55.3549	(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	40.2186	39.9760	39.7382	38.6213	38.4123	37.4394	37.4394	37.2593	37.8142	38.4123	38.8350	39.2770	(38)
Heat transfer coeff													
	95.5735	95.3309	95.0931	93.9761	93.7671	92.7943	92.7943	92.6141	93.1690	93.7671	94.1899	94.6319	(39)
Average = Sum(39)m / 12 =												93.9751	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2998	1.2965	1.2933	1.2781	1.2752	1.2620	1.2620	1.2595	1.2671	1.2752	1.2810	1.2870	(40)
HLP (average)												1.2781	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.3287	(42)

Hot water usage for mixer showers

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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													
	27.3289	26.9230	26.3514	25.2976	24.5085	23.6335	23.1609	23.7284	24.3464	25.2827	26.3582	27.2365	(42b)
Hot water usage for other uses													
	38.4781	37.0789	35.6797	34.2805	32.8813	31.4821	31.4821	32.8813	34.2805	35.6797	37.0789	38.4781	(42c)
Average daily hot water use (litres/day)												60.3182	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	65.8069	64.0019	62.0311	59.5781	57.3898	55.1156	54.6429	56.6097	58.6269	60.9623	63.4371	65.7146	(44)
Energy conte	104.2221	91.1378	95.3395	81.5594	77.2577	67.7710	66.0859	70.0946	72.2928	82.7253	90.3778	102.8931	(45)
Energy content (annual)										Total = Sum(45)m =		1001.7571	
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													
	88.5888	77.4671	81.0386	69.3255	65.6690	57.6054	56.1730	59.5804	61.4489	70.3165	76.8211	87.4591	(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													
	88.5888	77.4671	81.0386	69.3255	65.6690	57.6054	56.1730	59.5804	61.4489	70.3165	76.8211	87.4591	(64)

Total per year (kWh/year) = Sum(64)m = 851.4935 (64)

12Total per year (kWh/year) 851 (64)

Electric shower(s)

	50.6640	45.1420	49.2934	47.0401	47.9228	45.7137	47.2375	47.9228	47.0401	49.2934	48.3665	50.6640	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 576.3001 (64a)

Heat gains from water heating, kWh/month

	34.8132	30.6523	32.5830	29.0914	28.3979	25.8298	25.8526	26.8758	27.1222	29.9025	31.2969	34.5308	(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	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	116.4344	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	103.6878	114.7972	103.6878	107.1441	103.6878	107.1441	103.6878	103.6878	107.1441	103.6878	107.1441	103.6878	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	205.3918	207.5231	202.1522	190.7183	176.2850	162.7197	153.6573	151.5260	156.8969	168.3308	182.7641	196.3294	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	34.6434	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	-93.1475	(71)
Water heating gains (Table 5)													
	46.7919	45.6135	43.7943	40.4047	38.1693	35.8747	34.7481	36.1234	37.6698	40.1915	43.4679	46.4123	(72)
Total internal gains													
	413.8019	425.8642	407.5647	396.1974	376.0724	363.6688	350.0236	349.2675	359.6410	370.1404	391.3064	404.3598	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	6.9900	36.7938	0.6300	0.7000	0.7700	78.6003	(77)
South	8.9600	46.7521	0.6300	0.7000	0.7700	128.0208	(78)

Solar gains	206.6211	343.5505	450.2639	528.8326	568.7855	555.1085	539.1052	510.2345	477.3462	374.1153	245.8933	177.8872	(83)
Total gains	620.4229	769.4146	857.8286	925.0300	944.8579	918.7773	889.1288	859.5020	836.9872	744.2558	637.1997	582.2471	(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	50.9468	51.0765	51.2042	51.8128	51.9283	52.4727	52.4727	52.5748	52.2616	51.9283	51.6952	51.4538	
alpha	4.3965	4.4051	4.4136	4.4542	4.4619	4.4982	4.4982	4.5050	4.4841	4.4619	4.4463	4.4303	
util living area													
	0.9903	0.9756	0.9496	0.8899	0.7827	0.6111	0.4516	0.4849	0.6967	0.9081	0.9787	0.9926	(86)
MIT	19.5553	19.8452	20.1686	20.5362	20.8041	20.9519	20.9900	20.9862	20.9116	20.5575	19.9875	19.5072	(87)
Th 2	19.8410	19.8436	19.8461	19.8581	19.8603	19.8707	19.8707	19.8727	19.8667	19.8603	19.8558	19.8510	(88)
util rest of house													
	0.9873	0.9684	0.9346	0.8576	0.7220	0.5173	0.3396	0.3714	0.6074	0.8738	0.9711	0.9902	(89)
MIT 2	18.5566	18.8429	19.1574	19.5086	19.7376	19.8502	19.8684	19.8691	19.8239	19.5381	18.9952	18.5167	(90)
Living area fraction									fLA = Living area / (4) =			0.4597	(91)
MIT	19.0156	19.3036	19.6222	19.9809	20.2279	20.3566	20.3839	20.3826	20.3239	20.0067	19.4513	18.9720	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0156	19.3036	19.6222	19.9809	20.2279	20.3566	20.3839	20.3826	20.3239	20.0067	19.4513	18.9720	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9845	0.9642	0.9312	0.8615	0.7430	0.5590	0.3912	0.4237	0.6454	0.8789	0.9677	0.9878	(94)
Useful gains	610.8147	741.8348	798.7819	796.9163	702.0371	513.6396	347.8561	364.1426	540.2153	654.1243	616.5982	575.1716	(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													
	1406.4260	1373.1123	1247.8349	1041.3445	799.6329	534.1829	351.1288	368.8456	579.8738	882.0349	1163.3707	1397.9040	(97)
Space heating kWh													
	591.9348	424.2185	334.0955	175.9883	72.6113	0.0000	0.0000	0.0000	0.0000	169.5655	393.6762	612.1129	(98a)
Space heating requirement - total per year (kWh/year)												2774.2030	
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													
	591.9348	424.2185	334.0955	175.9883	72.6113	0.0000	0.0000	0.0000	0.0000	169.5655	393.6762	612.1129	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2774.2030	
Space heating per m2											(98c) / (4) =	37.7289	(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	872.2665	686.6778	703.8675	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8804	0.9342	0.9218	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	767.9092	641.5262	648.8082	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1034.5149	1001.8879	969.2763	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	191.9561	268.1091	238.4282	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	47.9890	67.0273	59.6071	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												174.6234	(107)
Energy for space heating												37.7289	(99)
Energy for space cooling												2.3749	(108)
Total												40.1037	(109)
Fabric Energy Efficiency (TFEE)												40.1	(109)