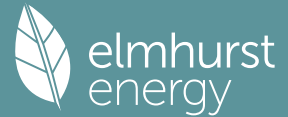


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Property Reference	OP-D320 APT Ground				Issued on Date	29/11/2024	
Assessment Reference	APT Ground			Prop Type Ref	APT Ground		
Property	APT Ground						
SAP Rating	81 B		DER	5.37		TER	15.89
Environmental	96 A		% DER < TER				66.21
CO ₂ Emissions (t/year)	0.26		DFEE	38.91		TFEE	40.52
Compliance Check	See BREL		% DFEE < TFEE				3.97
% DPER < TPER	32.53		DPER	56.82		TPER	84.22
Assessor Details	Mr. Matthew Stainrod					Assessor ID	AU83-0001
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5000	2.3700	122.0550
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		
Dwelling volume			122.0550

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(17)
Infiltration rate	0.1750	(18)
Number of sides sheltered	2	(19)

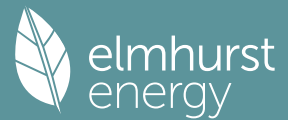
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487 (21)

	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 infiltr rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (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) =												72.8000 (23c)
Effective ac	0.3257	0.3219	0.3182	0.2996	0.2959	0.2773	0.2773	0.2736	0.2848	0.2959	0.3033	0.3108 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			10.2100	1.2357	12.6169		(27)
Ground Floor			51.5900	0.1100	5.6749		(28a)
External Wall		10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall	52.3800	2.1400	13.7400	0.1700	2.3358		(29a)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	29.9365	(33)
Party Ceiling			51.5900				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				7.8300	0.0500	0.3915	
E3 Sill				6.8100	0.0500	0.3405	
E4 Jamb				19.2000	0.0500	0.9600	

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Temperature during heating periods in the living area from Table 9, Th1 (C)											21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	27.3934	27.4722	27.5515	27.9547	28.0368	28.4544	28.4544	28.5394	28.2859	28.0368	27.8731	27.7114
alpha	2.8262	2.8315	2.8368	2.8636	2.8691	2.8970	2.8970	2.9026	2.8857	2.8691	2.8582	2.8474
util living area	0.8943	0.8528	0.7932	0.6904	0.5636	0.4357	0.3232	0.3538	0.5316	0.7245	0.8510	0.9030 (86)
Living	19.2818	19.5987	19.9975	20.4502	20.7563	20.9173	20.9740	20.9658	20.8478	20.4620	19.8219	19.2335
Non living	18.0913	18.4820	18.9694	19.5144	19.8608	20.0386	20.0882	20.0849	19.9714	19.5438	18.7741	18.0382
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.1211	19.5987	19.9975	20.4502	20.7563	20.9173	20.9740	20.9658	20.8478	20.4620	19.8219	19.4806 (87)
Th 2	20.0717	20.0741	20.0765	20.0886	20.0910	20.1032	20.1032	20.1056	20.0983	20.0910	20.0862	20.0813 (88)
util rest of house	0.8818	0.8364	0.7709	0.6590	0.5216	0.3818	0.2606	0.2893	0.4757	0.6889	0.8319	0.8915 (89)
MIT 2	19.2822	18.4820	18.9694	19.5144	19.8608	20.0386	20.0882	20.0849	19.9714	19.5438	18.7741	18.4063 (90)
Living area fraction									fLA = Living area / (4) =			0.4447 (91)
MIT	19.6552	18.9786	19.4265	19.9305	20.2590	20.4293	20.4821	20.4766	20.3611	19.9521	19.2400	18.8840 (92)
Temperature adjustment												0.0000
adjusted MIT	19.6552	18.9786	19.4265	19.9305	20.2590	20.4293	20.4821	20.4766	20.3611	19.9521	19.2400	18.8840 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8756	0.8142	0.7535	0.6532	0.5296	0.4018	0.2874	0.3165	0.4925	0.6831	0.8114	0.8737 (94)
Useful gains	449.0678	478.7944	486.5146	461.5900	391.2580	278.6078	191.1899	198.9948	289.7608	379.2460	411.6267	429.5452 (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	801.8873	733.1104	671.1830	564.4772	436.7153	293.0715	195.1741	204.3426	316.6546	477.1819	623.0716	758.0398 (97)
Space heating kWh	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000 (98a)
Space heating requirement - total per year (kWh/year)												1148.1950
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	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1148.1950
Space heating per m2										(98c) / (4) =		22.2950 (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 %)													238.4014 (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	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000	(98)
Space heating efficiency (main heating system 1)	238.4014	238.4014	238.4014	238.4014	238.4014	0.0000	0.0000	0.0000	0.0000	238.4014	238.4014	238.4014	(210)
Space heating fuel (main heating system)	110.1075	71.6860	57.6311	31.0731	14.1863	0.0000	0.0000	0.0000	0.0000	30.5637	63.8588	102.5162	(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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257	(64)
Efficiency of water heater	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	(216)
Fuel for water heating, kWh/month	112.7461	100.1073	107.0645	95.5076	93.5870	74.1601	73.2987	75.9774	76.5749	96.6679	101.3115	111.6669	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	12.3940	11.1946	12.3940	11.9942	12.3940	11.9942	12.3940	12.3940	11.9942	12.3940	11.9942	12.3940	(231)
Lighting	19.5572	15.6895	14.1267	10.3498	7.9945	6.5316	7.2928	9.4795	12.3130	16.1553	18.2473	20.1008	(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													481.6226 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													272.1716
Water heating fuel used													1118.6699 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.9800)													
mechanical ventilation fans (SFP = 0.9800)													145.9290 (230a)
Total electricity for the above, kWh/year													145.9290 (231)
Electricity for lighting (calculated in Appendix L)													157.8380 (232)

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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	1904.0594 (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	481.6226	0.1558	75.0603 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1118.6699	0.1415	158.3203 (264)
Space and water heating			233.3806 (265)
Pumps, fans and electric keep-hot	145.9290	0.1387	20.2421 (267)
Energy for lighting	157.8380	0.1443	22.7809 (268)
Total CO2, kg/year			276.4037 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.3700 (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	481.6226	1.5769	759.4860 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1118.6699	1.5234	1704.1323 (278)
Space and water heating			2463.6183 (279)
Pumps, fans and electric keep-hot	145.9290	1.5128	220.7613 (281)
Energy for lighting	157.8380	1.5338	242.0972 (282)
Total Primary energy kWh/year			2926.4769 (286)
Dwelling Primary energy Rate (DPER)			56.8200 (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)
Ground floor	51.5000 (1b)	2.3700 (2b)	122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 122.0550 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

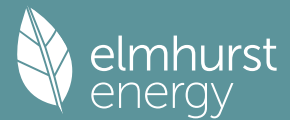
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1639 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4139	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3518 (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	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133 (22b)
Effective ac	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854 (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
TER Opaque door			2.1400	1.0000	2.1400		(26)

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TER Opening Type (Uw = 1.20)			10.2100	1.1450	11.6908	(27)
Ground Floor			51.5900	0.1300	6.7067	(28a)
External Wall	52.3800	10.2100	42.1700	0.1800	7.5906	(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1800	2.4732	(29a)
Total net area of external elements Aum(A, m2)			119.8500			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	30.6013		(33)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.8300	0.0500	0.3915
E3 Sill	6.8100	0.0500	0.3405
E4 Jamb	19.2000	0.0500	0.9600
E5 Ground floor (normal)	28.8000	0.1600	4.6080
E16 Corner (normal)	9.4800	0.0900	0.8532
E7 Party floor between dwellings (in blocks of flats)	28.8000	0.0700	2.0160
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.1692 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	39.7705 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	24.1905	24.0332	23.8790	23.1547	23.0191	22.3883	22.3883	22.2715	22.6313	23.0191	23.2933	23.5799	(38)
Heat transfer coeff	63.9610	63.8037	63.6495	62.9252	62.7897	62.1588	62.1588	62.0420	62.4018	62.7897	63.0638	63.3504	(39)
Average = Sum(39)m / 12 =												62.9245	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	1.2420	1.2389	1.2359	1.2218	1.2192	1.2070	1.2070	1.2047	1.2117	1.2192	1.2245	1.2301	(40)
HLP (average)												1.2218	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7343 (42)
Hot water usage for mixer showers													
	53.2983	52.4974	51.3302	49.0970	47.4490	45.6111	44.5665	45.7248	46.9946	48.9679	51.2490	53.0941	(42a)
Hot water usage for baths													
	23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654	(42b)
Hot water usage for other uses													
	32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	(42c)
Average daily hot water use (litres/day)													99.9505 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	108.7328	106.4117	103.5848	99.2851	95.7939	92.0404	90.5972	93.4120	96.3807	100.3213	104.6872	108.4507	(44)
Energy conte	172.2061	151.5289	159.2059	135.9164	128.9570	113.1744	109.5695	115.6636	118.8470	136.1350	149.1461	169.8075	(45)
Energy content (annual)										Total = Sum(45)m =		1660.1574	
Distribution loss (46)m = 0.15 x (45)m													
	25.8309	22.7293	23.8809	20.3875	19.3435	16.9762	16.4354	17.3495	17.8271	20.4203	22.3719	25.4711	(46)
Water storage loss:													
Store volume													230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7973 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9706 (55)
Total storage loss													30.0872 (56)
	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	
If cylinder contains dedicated solar storage													
	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(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													
	225.5557	199.7156	212.5555	187.5451	182.3066	164.8031	162.9191	169.0132	170.4757	189.4847	200.7747	223.1571	(62)
WWHRS	-24.3658	-21.5493	-22.5652	-18.6849	-17.4136	-14.9010	-13.9673	-14.8528	-15.4171	-18.1751	-20.5901	-23.9146	(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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426	(64)
12Total per year (kWh/year)													2061.9095 (64)
Electric shower(s)													2062 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month	99.9382	88.9327	95.6157	86.4951	85.5579	78.9334	79.1116	81.1378	80.8196	87.9446	90.8940	99.1407	(65)

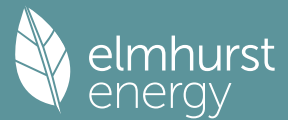
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(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)													
	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Water heating gains (Table 5)													
	134.3256	132.3404	128.5157	120.1321	114.9972	109.6298	106.3327	109.0562	112.2494	118.2051	126.2417	133.2536	(72)
Total internal gains	414.3053	422.1208	406.1117	391.8762	373.5599	357.7723	345.2458	346.4011	356.1074	370.9150	392.1329	406.5651	(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
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East	3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (76)
South	2.7100	46.7521	0.6300	0.7000	0.7700	38.7206 (78)
West	3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (80)

Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	498.0432	573.5987	631.9185	694.6885	727.9169	714.6865	687.3335	650.2822	609.1640	543.8082	494.1614	477.0434 (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	22.3661	22.4212	22.4755	22.7342	22.7833	23.0145	23.0145	23.0579	22.9249	22.7833	22.6843	22.5816
alpha	2.4911	2.4947	2.4984	2.5156	2.5189	2.5343	2.5343	2.5372	2.5283	2.5189	2.5123	2.5054
util living area	0.9142	0.8813	0.8333	0.7475	0.6334	0.4926	0.3738	0.4067	0.5847	0.7779	0.8807	0.9214 (86)
MIT	18.6484	18.9959	19.4760	20.0647	20.5248	20.8224	20.9356	20.9186	20.7117	20.1106	19.2963	18.5930 (87)
Th 2	19.8866	19.8890	19.8914	19.9026	19.9047	19.9144	19.9144	19.9162	19.9107	19.9047	19.9004	19.8960 (88)
util rest of house	0.9025	0.8657	0.8113	0.7143	0.5847	0.4246	0.2897	0.3212	0.5179	0.7410	0.8624	0.9106 (89)
MIT 2	17.1910	17.6226	18.2154	18.9304	19.4602	19.7805	19.8800	19.8700	19.6764	19.0052	18.0130	17.1277 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	17.8390	18.2333	18.7759	19.4348	19.9336	20.2438	20.3494	20.3363	20.1368	19.4967	18.5836	17.7793 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.8390	18.2333	18.7759	19.4348	19.9336	20.2438	20.3494	20.3363	20.1368	19.4967	18.5836	17.7793 (93)

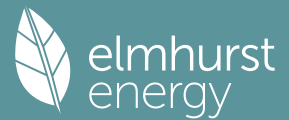
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8747	0.8370	0.7853	0.6986	0.5861	0.4461	0.3243	0.3554	0.5327	0.7254	0.8354	0.8836 (94)
Useful gains	435.6544	480.1279	496.2383	485.3152	426.5983	318.7983	222.9000	231.0941	324.4797	394.4626	412.8262	421.5065 (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	865.9706	850.7117	781.3575	662.9039	516.9857	350.8112	233.0591	244.2141	376.7062	558.6208	724.2009	860.2522 (97)
Space heating kWh	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98a)
Space heating requirement - total per year (kWh/year)	1649.1785											
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	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1649.1785											
Space heating per m2	(98c) / (4) = 32.0229 (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	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	346.8637	269.8074	229.8252	138.5307	72.8583	0.0000	0.0000	0.0000	0.0000	132.3225	242.8925	353.6585 (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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426 (64)
Efficiency of water heater (217)m	85.0963	84.8108	84.3076	83.4444	82.2138	79.8000	79.8000	79.8000	79.8000	83.3145	84.5509	85.1597 (216)
Fuel for water heating, kWh/month	236.4261	210.0751	225.3539	202.3626	200.5661	187.8473	186.6565	193.1835	194.3090	205.6180	213.1077	233.9636 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.9650	12.8078	11.5320	8.4488	6.5261	5.3319	5.9533	7.7384	10.0514	13.1879	14.8957	16.4088 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.7164	-25.8887	-38.5678	-45.0158	-50.0051	-47.2409	-46.6923	-43.3696	-37.7320	-30.3608	-19.8088	-15.2144 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.4190	-15.8442	-31.9252	-48.5774	-64.8287	-65.3266	-64.5286	-54.3394	-39.4593	-22.8331	-9.9643	-5.8471 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1786.7589 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	79.8000											

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Water heating fuel used	2489.4693 (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)	128.8471 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-848.5055 (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	3642.5697 (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	1786.7589	0.2100	375.2194 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2489.4693	0.2100	522.7885 (264)
Space and water heating			898.0079 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.8471	0.1443	18.5966 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	0.1338	-55.8814
PV Unit electricity exported	-430.8929	0.1255	-54.0888
Total			-109.9702 (269)
Total CO2, kg/year			818.5636 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8900 (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	1786.7589	1.1300	2019.0376 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2489.4693	1.1300	2813.1003 (278)
Space and water heating			4832.1378 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.8471	1.5338	197.6299 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	1.4945	-624.1223
PV Unit electricity exported	-430.8929	0.4608	-198.5361
Total			-822.6585 (283)
Total Primary energy kWh/year			4337.2101 (286)
Target Primary Energy Rate (TPER)			84.2200 (287)

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Property Reference	OP-D320 APT Ground				Issued on Date	29/11/2024
Assessment Reference	APT Ground		Prop Type Ref	APT Ground		
Property	APT Ground					
SAP Rating	81 B	DER	5.37	TER	15.89	
Environmental	96 A	% DER < TER				66.21
CO ₂ Emissions (t/year)	0.26	DFEE	38.91	TFEE	40.52	
Compliance Check	See BREL	% DFEE < TFEE				3.97
% DPER < TPER	32.53	DPER	56.82	TPER	84.22	
Assessor Details	Mr. Matthew Stainrod				Assessor ID	AU83-0001
Client						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5000 (1b)	2.3700 (2b)	122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		122.0550 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	122.0550 (5)

2. Ventilation rate

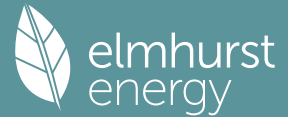
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) = 0.1639 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3389 (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) = 0.2880 (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 infiltr rate	0.3672	0.3600	0.3528	0.3168	0.3096	0.2736	0.2736	0.2664	0.2880	0.3096	0.3240	0.3384 (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	0.5674	0.5648	0.5622	0.5502	0.5479	0.5374	0.5374	0.5355	0.5415	0.5479	0.5525	0.5573 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			10.2100	1.2357	12.6169		(27)
Ground Floor			51.5900	0.1100	5.6749		(28a)
External Wall	52.3800	10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1700	2.3358		(29a)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)							(33)
Party Ceiling			51.5900				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				7.8300	0.0500	0.3915	
E3 Sill				6.8100	0.0500	0.3405	
E4 Jamb				19.2000	0.0500	0.9600	
E5 Ground floor (normal)				28.8000	0.1600	4.6080	
E16 Corner (normal)				9.4800	0.0900	0.8532	
E7 Party floor between dwellings (in blocks of flats)				28.8000	0.0700	2.0160	

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges
 Total fabric heat loss

(33) + (36) + (36a) = 39.1057 (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	22.8551	22.7497	22.6463	22.1607	22.0699	21.6470	21.6470	21.5686	21.8099	22.0699	22.2537	22.4458	(38)
Heat transfer coeff	61.9609	61.8554	61.7520	61.2664	61.1756	60.7527	60.7527	60.6744	60.9156	61.1756	61.3594	61.5515	(39)
Average = Sum(39)m / 12 =												61.2660	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2031	1.2011	1.1991	1.1896	1.1879	1.1797	1.1797	1.1781	1.1828	1.1879	1.1914	1.1952	(40)
HLP (average)												1.1896	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7343 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654	22.9654	(42b)
Hot water usage for other uses													
32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	32.3912	(42c)
Average daily hot water use (litres/day)												50.8112	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	55.4344	53.9143	52.2546	50.1881	48.3449	46.4293	46.0307	47.6872	49.3861	51.3534	53.4381	55.3565	(44)
Energy conte	87.7946	76.7733	80.3133	68.7050	65.0815	57.0902	55.6702	59.0467	60.8980	69.6861	76.1324	86.6749	(45)
Energy content (annual)										Total = Sum(45)m =		843.8662	
Distribution loss (46)m = 0.15 x (45)m													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
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													
74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	73.6737	(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													
74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	73.6737	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		717.2862	(64)
Electric shower(s)													
42.6831	38.0310	41.5284	39.6300	40.3737	38.5126	39.7963	40.3737	39.6300	41.5284	40.7475	42.6831	42.6831	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												485.5176	(64a)
Heat gains from water heating, kWh/month													
29.3271	25.8221	27.4487	24.5073	23.9232	21.7598	21.7790	22.6408	22.8483	25.1904	26.3650	29.0892	29.0892	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	79.3974	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	144.4605	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(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)													
-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Water heating gains (Table 5)													
39.4182	38.4257	36.8934	34.0379	32.1549	30.2219	29.2728	30.4312	31.7338	33.8580	36.6181	39.0984	39.0984	(72)
Total internal gains													
316.3978	325.2061	311.4894	302.7820	287.7176	278.3644	268.1859	267.7761	275.5918	283.5680	299.5093	309.4099	309.4099	(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			
East				3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (76)			
South				2.7100	46.7521	0.6300	0.7000	0.7700	38.7206 (78)			
West				3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (80)			
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	400.1358	476.6840	537.2962	605.5943	642.0746	635.2787	610.2736	571.6572	528.6483	456.4612	401.5378	379.8881 (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)													
tau	23.0881	23.1274	23.1661	23.3497	23.3844	23.5472	23.5472	23.5776	23.4842	23.3844	23.3144	23.2416	
alpha	2.5392	2.5418	2.5444	2.5566	2.5590	2.5698	2.5698	2.5718	2.5656	2.5590	2.5543	2.5494	
util living area													

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	0.9431	0.9135	0.8696	0.7871	0.6743	0.5307	0.4069	0.4454	0.6331	0.8257	0.9170	0.9493 (86)
MIT	18.4440	18.8195	19.3330	19.9663	20.4686	20.7975	20.9255	20.9040	20.6648	19.9865	19.1080	18.3745 (87)
Th 2	19.9175	19.9191	19.9207	19.9283	19.9297	19.9363	19.9375	19.9375	19.9338	19.9297	19.9269	19.9239 (88)
util rest of house												
	0.9348	0.9014	0.8512	0.7570	0.6273	0.4615	0.3188	0.3560	0.5672	0.7939	0.9034	0.9419 (89)
MIT 2	17.6095	17.9764	18.4747	19.0797	19.5361	19.8149	19.9044	19.8939	19.7164	19.1154	18.2705	17.5457 (90)
Living area fraction									FLA = Living area /	(4) =		0.4447 (91)
MIT	17.9806	18.3513	18.8564	19.4740	19.9507	20.2518	20.3585	20.3430	20.1381	19.5028	18.6429	17.9142 (92)
Temperature adjustment												0.0000
adjusted MIT	17.9806	18.3513	18.8564	19.4740	19.9507	20.2518	20.3585	20.3430	20.1381	19.5028	18.6429	17.9142 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9156	0.8796	0.8297	0.7426	0.6282	0.4830	0.3549	0.3914	0.5807	0.7792	0.8828	0.9237	(94)
Useful gains	366.3618	419.2888	445.7825	449.7268	403.3809	306.8393	216.5598	223.7441	307.0122	355.6787	354.4698	350.8967	(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	847.6608	832.0354	763.0298	647.8290	504.7428	343.3613	228.3375	239.2409	367.8146	544.6312	708.2670	844.1314	(97)
Space heating kWh	358.0864	277.3657	236.0320	142.6336	75.4133	0.0000	0.0000	0.0000	0.0000	140.5807	254.7340	366.9666	(98a)
Space heating requirement - total per year (kWh/year)												1851.8123	
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	358.0864	277.3657	236.0320	142.6336	75.4133	0.0000	0.0000	0.0000	0.0000	140.5807	254.7340	366.9666	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1851.8123	
Space heating per m2												35.9575	(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	571.0751	449.5698	461.1251	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7951	0.8510	0.8271	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	454.0515	382.5630	381.3802	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.6458	686.9559	643.2947	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	187.6279	226.4683	194.8644	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fc = cooled area /	(4) =			(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	46.9070	56.6171	48.7161	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												152.2401	(107)
Energy for space heating												35.9575	(99)
Energy for space cooling												2.9561	(108)
Total												38.9136	(109)
Fabric Energy Efficiency (DFEE)												38.9	(109)

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

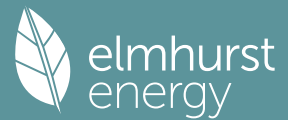
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	51.5000	2.3700	122.0550
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		
Dwelling volume			122.0550

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	20.0000 / (5) = 0.1639 (8)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4139 (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) = 0.3518 (21)

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Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	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													
	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133	(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	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854	(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	
TER Opaque door			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			10.2100	1.1450	11.6908			(27)
Ground Floor			51.5900	0.1300	6.7067			(28a)
External Wall	52.3800	10.2100	42.1700	0.1800	7.5906			(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1800	2.4732			(29a)
Total net area of external elements Aum(A, m2)			119.8500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	30.6013		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							100.0000	(35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				7.8300	0.0500		0.3915	
E3 Sill				6.8100	0.0500		0.3405	
E4 Jamb				19.2000	0.0500		0.9600	
E5 Ground floor (normal)				28.8000	0.1600		4.6080	
E6 Corner (normal)				9.4800	0.0900		0.8532	
E7 Party floor between dwellings (in blocks of flats)				28.8000	0.0700		2.0160	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							9.1692	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	39.7705	(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	24.1905	24.0332	23.8790	23.1547	23.0191	22.3883	22.3883	22.2715	22.6313	23.0191	23.2933	23.5799	(38)
Heat transfer coeff	63.9610	63.8037	63.6495	62.9252	62.7897	62.1588	62.1588	62.0420	62.4018	62.7897	63.0638	63.3504	(39)
Average = Sum(39)m / 12 =												62.9245	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.2420	1.2389	1.2359	1.2218	1.2192	1.2070	1.2070	1.2047	1.2117	1.2192	1.2245	1.2301	(40)
HLP (average)												1.2218	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

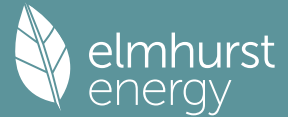
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7343	(42)
Hot water usage for mixer showers														(42a)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Hot water usage for baths														(42b)
	23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654		
Hot water usage for other uses														(42c)
	32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912		(43)
Average daily hot water use (litres/day)													50.8112	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	55.4344	53.9143	52.2546	50.1881	48.3449	46.4293	46.0307	47.6872	49.3861	51.3534	53.4381	55.3565	(44)	
Energy conte	87.7946	76.7733	80.3133	68.7050	65.0815	57.0902	55.6702	59.0467	60.8980	69.6861	76.1324	86.6749	(45)	
Energy content (annual)										Total = Sum(45)m =		843.8662		
Distribution loss (46)m = 0.15 x (45)m														(46)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		
Water storage loss:														
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														
	74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	(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	74.6254	65.2573	68.2663	58.3993	55.3193	48.5267	47.3197	50.1897	51.7633	59.2331	64.7125	73.6737	(64)	
										Total per year (kWh/year) = Sum(64)m =		717.2862	(64)	
12Total per year (kWh/year)												717		
Electric shower(s)														
	42.6831	38.0310	41.5284	39.6300	40.3737	38.5126	39.7963	40.3737	39.6300	41.5284	40.7475	42.6831	(64a)	
												485.5176	(64a)	
Heat gains from water heating, kWh/month														
	29.3271	25.8221	27.4487	24.5073	23.9232	21.7598	21.7790	22.6408	22.8483	25.1904	26.3650	29.0892	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(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)	

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Losses e.g. evaporation (negative values) (Table 5)	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Water heating gains (Table 5)	39.4182	38.4257	36.8934	34.0379	32.1549	30.2219	29.2728	30.4312	31.7338	33.8580	36.6181	(72)
Total internal gains	316.3978	325.2061	311.4894	302.7820	287.7176	278.3644	268.1859	267.7761	275.5918	283.5680	299.5093	(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	
East					3.7500	19.6403	0.6300	0.7000	0.7700		22.5087 (76)	
South					2.7100	46.7521	0.6300	0.7000	0.7700		38.7206 (78)	
West					3.7500	19.6403	0.6300	0.7000	0.7700		22.5087 (80)	
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	400.1358	476.6840	537.2962	605.5943	642.0746	635.2787	610.2736	571.6572	528.6483	456.4612	401.5378	379.8881 (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	22.3661	22.4212	22.4755	22.7342	22.7833	23.0145	23.0145	23.0579	22.9249	22.7833	22.6843	22.5816
alpha	2.4911	2.4947	2.4984	2.5156	2.5189	2.5343	2.5343	2.5372	2.5283	2.5189	2.5123	2.5054
util living area	0.9440	0.9153	0.8727	0.7919	0.6811	0.5378	0.4138	0.4523	0.6399	0.8295	0.9185	0.9500 (86)
MIT	18.3506	18.7300	19.2541	19.9112	20.4330	20.7820	20.9186	20.8958	20.6422	19.9390	19.0400	18.2900 (87)
Th 2	19.8866	19.8890	19.8914	19.9026	19.9047	19.9144	19.9144	19.9162	19.9107	19.9047	19.9004	19.8960 (88)
util rest of house	0.9358	0.9032	0.8543	0.7617	0.6335	0.4672	0.3230	0.3604	0.5730	0.7976	0.9049	0.9426 (89)
MIT 2	17.4978	17.8692	18.3789	19.0098	19.4854	19.7841	19.8799	19.8692	19.6793	19.0534	18.1870	17.4446 (90)
Living area fraction	17.8770	18.2520	18.7681	19.4106	19.9067	20.2278	20.3417	20.3257	20.1075	19.4472	18.5663	17.8205 (92)
MIT	17.8770	18.2520	18.7681	19.4106	19.9067	20.2278	20.3417	20.3257	20.1075	19.4472	18.5663	17.8205 (93)
Temperature adjustment												0.0000
adjusted MIT	17.8770	18.2520	18.7681	19.4106	19.9067	20.2278	20.3417	20.3257	20.1075	19.4472	18.5663	17.8205 (93)

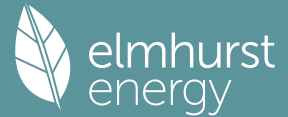
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9161	0.8809	0.8320	0.7463	0.6336	0.4886	0.3600	0.3965	0.5860	0.7821	0.8838	0.9241 (94)
Ext temp.	366.5806	419.8962	447.0275	451.9743	406.7983	310.3793	219.6687	226.6856	309.7969	356.9959	354.8941	351.0358 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	868.3982	851.9048	780.8575	661.3829	515.2988	349.8197	232.5824	243.5559	374.8768	555.5119	723.1080	862.8651 (97)
Space heating requirement - total per year (kWh/year)	373.3524	290.3098	248.3695	150.7742	80.7244	0.0000	0.0000	0.0000	0.0000	147.6959	265.1140	380.8010 (98a)
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)	373.3524	290.3098	248.3695	150.7742	80.7244	0.0000	0.0000	0.0000	0.0000	147.6959	265.1140	380.8010 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (99)
Space heating per m ²												

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	584.2931	459.9754	471.5193	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7850	0.8422	0.8179	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	458.6591	387.3926	385.6562	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	714.6458	686.9559	643.2947	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	184.3104	222.8751	191.6831	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	46.0776	55.7188	47.9208	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												149.7171 (107)
Energy for space heating												37.6144 (99)
Energy for space cooling												2.9071 (108)
Total												40.5215 (109)
Fabric Energy Efficiency (TFEE)												40.5 (109)

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Property Reference	OP-D320 APT Ground				Issued on Date	29/11/2024	
Assessment Reference	APT Ground			Prop Type Ref	APT Ground		
Property	APT Ground						
SAP Rating	81 B		DER	5.37		TER	15.89
Environmental	96 A		% DER < TER				66.21
CO ₂ Emissions (t/year)	0.26		DFEE	38.91		TFEE	40.52
Compliance Check	See BREL		% DFEE < TFEE				3.97
% DPER < TPER	32.53		DPER	56.82		TPER	84.22
Assessor Details	Mr. Matthew Stainrod					Assessor ID	AU83-0001
Client							

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	51.5000	2.3700	122.0550
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		
Dwelling volume			122.0550

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.5000	(17)
Infiltration rate		0.1750	(18)
Number of sides sheltered		2	(19)

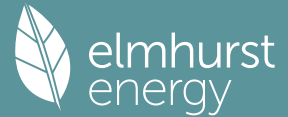
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.1487	(21)

	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 infiltr rate	0.1897	0.1859	0.1822	0.1636	0.1599	0.1413	0.1413	0.1376	0.1487	0.1599	0.1673	0.1748 (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) =												72.8000 (23c)
Effective ac	0.3257	0.3219	0.3182	0.2996	0.2959	0.2773	0.2773	0.2736	0.2848	0.2959	0.3033	0.3108 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Front Door			2.1400	1.0000	2.1400		(26)
Windows (Uw = 1.30)			10.2100	1.2357	12.6169		(27)
Ground Floor			51.5900	0.1100	5.6749		(28a)
External Wall		10.2100	42.1700	0.1700	7.1689		(29a)
Semi Exposed Wall	52.3800	2.1400	13.7400	0.1700	2.3358		(29a)
Total net area of external elements Aum(A, m ²)			119.8500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.9365		(33)
Party Ceiling			51.5900				(32b)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				7.8300	0.0500	0.3915	
E3 Sill				6.8100	0.0500	0.3405	
E4 Jamb				19.2000	0.0500	0.9600	

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E5 Ground floor (normal)	28.8000	0.1600	4.6080	
E16 Corner (normal)	9.4800	0.0900	0.8532	
E7 Party floor between dwellings (in blocks of flats)	28.8000	0.0700	2.0160	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				9.1692 (36)
Point Thermal bridges				0.0000
Total fabric heat loss			(33) + (36) + (36a) =	39.1057 (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	13.1168	12.9670	12.8173	12.0683	11.9186	11.1696	11.1696	11.0199	11.4692	11.9186	12.2181	12.5177 (38)
Heat transfer coeff	52.2226	52.0728	51.9230	51.1741	51.0243	50.2754	50.2754	50.1256	50.5749	51.0243	51.3238	51.6234 (39)
Average = Sum(39)m / 12 =												51.1366
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0140	1.0111	1.0082	0.9937	0.9908	0.9762	0.9762	0.9733	0.9820	0.9908	0.9966	1.0024 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

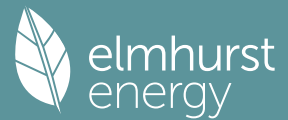
4. Water heating energy requirements (kWh/year)												
Assumed occupancy												1.7343 (42)
Hot water usage for mixer showers												
73.2852	72.1839	70.5790	67.5084	65.2424	62.7153	61.2789	62.8717	64.6176	67.3309	70.4674	73.0044	(42a)
Hot water usage for baths												
24.2561	23.8958	23.3885	22.4532	21.7528	20.9762	20.5567	21.0605	21.6089	22.4399	23.3945	24.1741	(42b)
Hot water usage for other uses												
34.0960	32.8561	31.6163	30.3764	29.1366	27.8967	27.8967	29.1366	30.3764	31.6163	32.8561	34.0960	(42c)
Average daily hot water use (litres/day)												121.0520 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
131.6372	128.9358	125.5838	120.3380	116.1317	111.5882	109.7324	113.0687	116.6029	121.3871	126.7181	131.2745	(44)
Energy conte	208.4812	183.6029	193.0176	164.7367	156.3356	137.2107	132.7118	140.0026	143.7830	164.7211	180.5331	205.5441 (45)
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m												2010.6806
31.2722	27.5404	28.9526	24.7105	23.4503	20.5816	19.9068	21.0004	21.5675	24.7082	27.0800	30.8316	(46)
Water storage loss:												230.0000 (47)
Store volume												1.8000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4040 (55)
Enter (49) or (54) in (55)												
Total storage loss												
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240	(56)
If cylinder contains dedicated solar storage												
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240	(57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	22.5120	54.8576	53.0880	54.8576	(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	(61)
Total heat required for water heating calculated for each month												
306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257	(62)
WWHRS	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	(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	(63c)
FGHRS	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												
306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257	(64)
12Total per year (kWh/year)												3044.7022 (64)
Electric shower(s)												3045 (64)
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												
113.2061	100.6870	108.0644	97.2454	95.8677	63.6322	62.7366	65.1608	65.8175	98.6558	102.4977	112.2295	(65)

5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(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	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Water heating gains (Table 5)												
152.1587	149.8318	145.2479	135.0630	128.8544	88.3780	84.3234	87.5817	91.4131	132.6019	142.3579	150.8461	(72)
Total internal gains												
429.1384	436.6122	419.8439	403.8070	384.4171	336.5205	323.2365	324.9266	335.2711	382.3119	405.2491	421.1576	(73)

6. Solar gains												
[Jan]			Area	Solar flux	g	FF		Access			Gains	
			m2	Table 6a	Specific data	Specific data		factor			W	
				W/m2	or Table 6b	or Table 6c		Table 6d				
East			3.7500	19.6403	0.6300	0.7000		0.7700			22.5087 (76)	
South			2.7100	46.7521	0.6300	0.7000		0.7700			38.7206 (78)	
West			3.7500	19.6403	0.6300	0.7000		0.7700			22.5087 (80)	
Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	512.8764	588.0901	645.6507	706.6194	738.7741	693.4347	665.3241	628.8077	588.3277	555.2051	507.2776	491.6358 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	27.3934	27.4722	27.5515	27.9547	28.0368	28.4544	28.4544	28.5394	28.2859	28.0368	27.8731	27.7114	
alpha	2.8262	2.8315	2.8368	2.8636	2.8691	2.8970	2.8970	2.9026	2.8857	2.8691	2.8582	2.8474	
util living area	0.8943	0.8528	0.7932	0.6904	0.5636	0.4357	0.3232	0.3538	0.5316	0.7245	0.8510	0.9030 (86)	
Living	19.2818	19.5987	19.9975	20.4502	20.7563	20.9173	20.9740	20.9658	20.8478	20.4620	19.8219	19.2335	
Non living	18.0913	18.4820	18.9694	19.5144	19.8608	20.0386	20.0882	20.0849	19.9714	19.5438	18.7741	18.0382	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.1211	19.5987	19.9975	20.4502	20.7563	20.9173	20.9740	20.9658	20.8478	20.4620	19.8219	19.4806 (87)	
Th 2	20.0717	20.0741	20.0765	20.0886	20.0910	20.1032	20.1032	20.1056	20.0983	20.0910	20.0862	20.0813 (88)	
util rest of house	0.8818	0.8364	0.7709	0.6590	0.5216	0.3818	0.2606	0.2893	0.4757	0.6889	0.8319	0.8915 (89)	
MIT 2	19.2822	18.4820	18.9694	19.5144	19.8608	20.0386	20.0882	20.0849	19.9714	19.5438	18.7741	18.4063 (90)	
Living area fraction									fLA = Living area / (4) =				0.4447 (91)
MIT	19.6552	18.9786	19.4265	19.9305	20.2590	20.4293	20.4821	20.4766	20.3611	19.9521	19.2400	18.8840 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.6552	18.9786	19.4265	19.9305	20.2590	20.4293	20.4821	20.4766	20.3611	19.9521	19.2400	18.8840 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8756	0.8142	0.7535	0.6532	0.5296	0.4018	0.2874	0.3165	0.4925	0.6831	0.8114	0.8737 (94)
Useful gains	449.0678	478.7944	486.5146	461.5900	391.2580	278.6078	191.1899	198.9948	289.7608	379.2460	411.6267	429.5452 (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	801.8873	733.1104	671.1830	564.4772	436.7153	293.0715	195.1741	204.3426	316.6546	477.1819	623.0716	758.0398 (97)
Space heating kWh	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000 (98a)
Space heating requirement - total per year (kWh/year)												1148.1950
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	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1148.1950
Space heating per m2										(98c) / (4) =		22.2950 (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 %)													238.4014 (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	262.4977	170.9003	137.3933	74.0788	33.8203	0.0000	0.0000	0.0000	0.0000	72.8643	152.2403	244.4000 (98)	
Space heating efficiency (main heating system 1)	238.4014	238.4014	238.4014	238.4014	238.4014	0.0000	0.0000	0.0000	0.0000	238.4014	238.4014	238.4014 (210)	
Space heating fuel (main heating system)	110.1075	71.6860	57.6311	31.0731	14.1863	0.0000	0.0000	0.0000	0.0000	30.5637	63.8588	102.5162 (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	306.8628	272.4637	291.3992	259.9447	254.7172	201.8427	199.4982	206.7890	208.4150	263.1027	275.7411	303.9257 (64)	
Efficiency of water heater	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716	272.1716 (216)	
Fuel for water heating, kWh/month	112.7461	100.1073	107.0645	95.5076	93.5870	74.1601	73.2987	75.9774	76.5749	96.6679	101.3115	111.6669 (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	12.3940	11.1946	12.3940	11.9942	12.3940	11.9942	12.3940	12.3940	11.9942	12.3940	11.9942	12.3940 (231)	
Lighting	19.5572	15.6895	14.1267	10.3498	7.9945	6.5316	7.2928	9.4795	12.3130	16.1553	18.2473	20.1008 (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													481.6226 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													272.1716
Water heating fuel used													1118.6699 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 0.9800)													
mechanical ventilation fans (SFP = 0.9800)													145.9290 (230a)
Total electricity for the above, kWh/year													145.9290 (231)
Electricity for lighting (calculated in Appendix L)													157.8380 (232)

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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	1904.0594 (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	481.6226	0.1558	75.0603 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1118.6699	0.1415	158.3203 (264)
Space and water heating			233.3806 (265)
Pumps, fans and electric keep-hot	145.9290	0.1387	20.2421 (267)
Energy for lighting	157.8380	0.1443	22.7809 (268)
Total CO2, kg/year			276.4037 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.3700 (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	481.6226	1.5769	759.4860 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1118.6699	1.5234	1704.1323 (278)
Space and water heating			2463.6183 (279)
Pumps, fans and electric keep-hot	145.9290	1.5128	220.7613 (281)
Energy for lighting	157.8380	1.5338	242.0972 (282)
Total Primary energy kWh/year			2926.4769 (286)
Dwelling Primary energy Rate (DPER)			56.8200 (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)
Ground floor	51.5000 (1b)	x 2.3700 (2b)	= 122.0550 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.5000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 122.0550 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

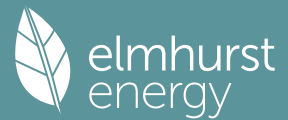
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1639 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.4139	(18)
Number of sides sheltered	2	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3518 (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	0.4485	0.4397	0.4309	0.3870	0.3782	0.3342	0.3342	0.3254	0.3518	0.3782	0.3958	0.4133 (22b)
Effective ac	0.6006	0.5967	0.5929	0.5749	0.5715	0.5558	0.5558	0.5529	0.5619	0.5715	0.5783	0.5854 (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
TER Opaque door			2.1400	1.0000	2.1400		(26)

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TER Opening Type (Uw = 1.20)			10.2100	1.1450	11.6908	(27)
Ground Floor			51.5900	0.1300	6.7067	(28a)
External Wall	52.3800	10.2100	42.1700	0.1800	7.5906	(29a)
Semi Exposed Wall	15.8800	2.1400	13.7400	0.1800	2.4732	(29a)
Total net area of external elements Aum(A, m2)			119.8500			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	30.6013		(33)

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

100.0000 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	7.8300	0.0500	0.3915
E3 Sill	6.8100	0.0500	0.3405
E4 Jamb	19.2000	0.0500	0.9600
E5 Ground floor (normal)	28.8000	0.1600	4.6080
E16 Corner (normal)	9.4800	0.0900	0.8532
E7 Party floor between dwellings (in blocks of flats)	28.8000	0.0700	2.0160
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			9.1692 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	39.7705 (37)

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	24.1905	24.0332	23.8790	23.1547	23.0191	22.3883	22.3883	22.2715	22.6313	23.0191	23.2933	23.5799	(38)
Average = Sum(39)m / 12 =	63.9610	63.8037	63.6495	62.9252	62.7897	62.1588	62.1588	62.0420	62.4018	62.7897	63.0638	63.3504	(39)
												62.9245	

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2420	1.2389	1.2359	1.2218	1.2192	1.2070	1.2070	1.2047	1.2117	1.2192	1.2245	1.2301	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7343 (42)
Hot water usage for mixer showers													
Hot water usage for baths	53.2983	52.4974	51.3302	49.0970	47.4490	45.6111	44.5665	45.7248	46.9946	48.9679	51.2490	53.0941	(42a)
Hot water usage for other uses	23.0433	22.7010	22.2191	21.3305	20.6652	19.9274	19.5289	20.0074	20.5285	21.3179	22.2248	22.9654	(42b)
Average daily hot water use (litres/day)	32.3912	31.2133	30.0354	28.8576	27.6797	26.5019	26.5019	27.6797	28.8576	30.0354	31.2133	32.3912	(42c)
												99.9505	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	108.7328	106.4117	103.5848	99.2851	95.7939	92.0404	90.5972	93.4120	96.3807	100.3213	104.6872	108.4507	(44)
Energy content (annual)	172.2061	151.5289	159.2059	135.9164	128.9570	113.1744	109.5695	115.6636	118.8470	136.1350	149.1461	169.8075	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss:	25.8309	22.7293	23.8809	20.3875	19.3435	16.9762	16.4354	17.3495	17.8271	20.4203	22.3719	25.4711	(46)
Store volume													230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.7973 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.9706 (55)
Total storage loss													
If cylinder contains dedicated solar storage	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(56)
Primary loss	30.0872	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872	(57)
Combi 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)
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
WWHRS	225.5557	199.7156	212.5555	187.5451	182.3066	164.8031	162.9191	169.0132	170.4757	189.4847	200.7747	223.1571	(62)
PV diverter	-24.3658	-21.5493	-22.5652	-18.6849	-17.4136	-14.9010	-13.9673	-14.8528	-15.4171	-18.1751	-20.5901	-23.9146	(63a)
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Total per year (kWh/year)	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426	(64)
Electric shower(s)													2061.9095 (64)
Heat gains from water heating, kWh/month	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)
	99.9382	88.9327	95.6157	86.4951	85.5579	78.9334	79.1116	81.1378	80.8196	87.9446	90.8940	99.1407	(65)

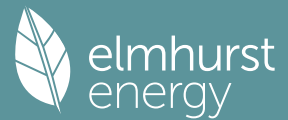
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	86.7160	(66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	76.8362	85.0687	76.8362	79.3974	76.8362	79.3974	76.8362	76.8362	79.3974	76.8362	79.3974	76.8362	(67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	151.1287	152.6969	148.7450	140.3318	129.7117	119.7303	113.0621	111.4939	115.4458	123.8589	134.4791	144.4605	(68)
Pumps, fans	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	31.6716	(69)
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Water heating gains (Table 5)	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	-69.3728	(71)
Total internal gains	134.3256	132.3404	128.5157	120.1321	114.9972	109.6298	106.3327	109.0562	112.2494	118.2051	126.2417	133.2536	(72)
	414.3053	422.1208	406.1117	391.8762	373.5599	357.7723	345.2458	346.4011	356.1074	370.9150	392.1329	406.5651	(73)

6. Solar gains

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

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East	3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (76)
South	2.7100	46.7521	0.6300	0.7000	0.7700	38.7206 (78)
West	3.7500	19.6403	0.6300	0.7000	0.7700	22.5087 (80)

Solar gains	83.7380	151.4779	225.8068	302.8123	354.3570	356.9142	342.0876	303.8811	253.0566	172.8932	102.0285	70.4783 (83)
Total gains	498.0432	573.5987	631.9185	694.6885	727.9169	714.6865	687.3335	650.2822	609.1640	543.8082	494.1614	477.0434 (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	22.3661	22.4212	22.4755	22.7342	22.7833	23.0145	23.0145	23.0579	22.9249	22.7833	22.6843	22.5816
alpha	2.4911	2.4947	2.4984	2.5156	2.5189	2.5343	2.5343	2.5372	2.5283	2.5189	2.5123	2.5054
util living area	0.9142	0.8813	0.8333	0.7475	0.6334	0.4926	0.3738	0.4067	0.5847	0.7779	0.8807	0.9214 (86)
MIT	18.6484	18.9959	19.4760	20.0647	20.5248	20.8224	20.9356	20.9186	20.7117	20.1106	19.2963	18.5930 (87)
Th 2	19.8866	19.8890	19.8914	19.9026	19.9047	19.9144	19.9144	19.9162	19.9107	19.9047	19.9004	19.8960 (88)
util rest of house	0.9025	0.8657	0.8113	0.7143	0.5847	0.4246	0.2897	0.3212	0.5179	0.7410	0.8624	0.9106 (89)
MIT 2	17.1910	17.6226	18.2154	18.9304	19.4602	19.7805	19.8800	19.8700	19.6764	19.0052	18.0130	17.1277 (90)
Living area fraction	FLA = Living area / (4) =											
MIT	17.8390	18.2333	18.7759	19.4348	19.9336	20.2438	20.3494	20.3363	20.1368	19.4967	18.5836	17.7793 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.8390	18.2333	18.7759	19.4348	19.9336	20.2438	20.3494	20.3363	20.1368	19.4967	18.5836	17.7793 (93)

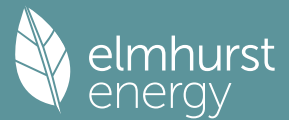
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8747	0.8370	0.7853	0.6986	0.5861	0.4461	0.3243	0.3554	0.5327	0.7254	0.8354	0.8836 (94)
Useful gains	435.6544	480.1279	496.2383	485.3152	426.5983	318.7983	222.9000	231.0941	324.4797	394.4626	412.8262	421.5065 (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	865.9706	850.7117	781.3575	662.9039	516.9857	350.8112	233.0591	244.2141	376.7062	558.6208	724.2009	860.2522 (97)
Space heating kWh	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98a)
Space heating requirement - total per year (kWh/year)	1649.1785											
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	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1649.1785											
Space heating per m2	(98c) / (4) = 32.0229 (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	320.1552	249.0323	212.1286	127.8638	67.2483	0.0000	0.0000	0.0000	0.0000	122.1337	224.1898	326.4268 (98)
Space heating efficiency (main heating system 1)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating fuel (main heating system)	346.8637	269.8074	229.8252	138.5307	72.8583	0.0000	0.0000	0.0000	0.0000	132.3225	242.8925	353.6585 (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	201.1900	178.1663	189.9904	168.8602	164.8930	149.9021	148.9519	154.1604	155.0586	171.3096	180.1846	199.2426 (64)
Efficiency of water heater (217)m	85.0963	84.8108	84.3076	83.4444	82.2138	79.8000	79.8000	79.8000	79.8000	83.3145	84.5509	85.1597 (216)
Fuel for water heating, kWh/month	236.4261	210.0751	225.3539	202.3626	200.5661	187.8473	186.6565	193.1835	194.3090	205.6180	213.1077	233.9636 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.9650	12.8078	11.5320	8.4488	6.5261	5.3319	5.9533	7.7384	10.0514	13.1879	14.8957	16.4088 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-17.7164	-25.8887	-38.5678	-45.0158	-50.0051	-47.2409	-46.6923	-43.3696	-37.7320	-30.3608	-19.8088	-15.2144 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-7.4190	-15.8442	-31.9252	-48.5774	-64.8287	-65.3266	-64.5286	-54.3394	-39.4593	-22.8331	-9.9643	-5.8471 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1	1786.7589 (211)											
Space heating fuel - main system 2	0.0000 (213)											
Space heating fuel - secondary	0.0000 (215)											
Efficiency of water heater	79.8000											

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Water heating fuel used	2489.4693 (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)	128.8471 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-848.5055 (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	3642.5697 (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	1786.7589	0.2100	375.2194 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2489.4693	0.2100	522.7885 (264)
Space and water heating			898.0079 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.8471	0.1443	18.5966 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	0.1338	-55.8814
PV Unit electricity exported	-430.8929	0.1255	-54.0888
Total			-109.9702 (269)
Total CO2, kg/year			818.5636 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			15.8900 (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	1786.7589	1.1300	2019.0376 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2489.4693	1.1300	2813.1003 (278)
Space and water heating			4832.1378 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.8471	1.5338	197.6299 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-417.6126	1.4945	-624.1223
PV Unit electricity exported	-430.8929	0.4608	-198.5361
Total			-822.6585 (283)
Total Primary energy kWh/year			4337.2101 (286)
Target Primary Energy Rate (TPER)			84.2200 (287)