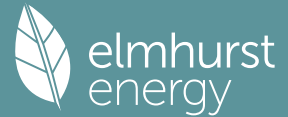


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Property Reference	OP-D320 Maisonette Ground				Issued on Date	29/11/2024	
Assessment Reference	Maisonette Ground			Prop Type Ref	Maisonette Ground		
Property	Maisonette Ground						
SAP Rating		82 B	DER	4.44	TER	11.80	
Environmental		96 A	% DER < TER				62.37
CO ₂ Emissions (t/year)		0.29	DFEE	31.49	TFEE	33.37	
Compliance Check		See BREL	% DFEE < TFEE				5.61
% DPER < TPER		23.89	DPER	47.04	TPER	61.80	
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	69.9800 (1b)	2.3200 (2b)	162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		162.3536 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.3536 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(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)

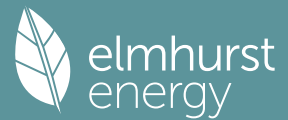
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	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)			8.0600	1.2357	9.9601		(27)
Ground Floor			69.9800	0.1100	7.6978		(28a)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Total net area of external elements Aum(A, m ²)			148.5400				(31)
Fabric heat loss, W/K = Sum (A x U)							(33)
Party Ceiling			69.9800		31.4191		(32b)

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)	6.5800	0.0500	0.3290
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	15.9000	0.0500	0.7950
E5 Ground floor (normal)	33.8600	0.1600	5.4176

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E16 Corner (normal)									9.2800	0.0900	0.8352	
E7 Party floor between dwellings (in blocks of flats)									33.8600	0.0700	2.3702	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												10.0250 (36)
Point Thermal bridges											(36a) =	0.0000
Total fabric heat loss										(33) + (36) + (36a) =		41.4441 (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	17.4476	17.2483	17.0491	16.0529	15.8537	14.8575	14.8575	14.6582	15.2560	15.8537	16.2522	16.6506 (38)
Average = Sum(39)m / 12 =	58.8917	58.6924	58.4932	57.4970	57.2978	56.3016	56.3016	56.1023	56.7000	57.2978	57.6962	58.0947 (39)
												57.4472
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8415	0.8387	0.8359	0.8216	0.8188	0.8045	0.8045	0.8017	0.8102	0.8188	0.8245	0.8302 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.8209

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers	85.0735	83.7950	81.9320	78.3675	75.7369	72.8034	71.1359	72.9849	75.0116	78.1613	81.8024	84.7475	(42a)
Hot water usage for baths	28.1369	27.7190	27.1306	26.0456	25.2331	24.3323	23.8457	24.4300	25.0662	26.0302	27.1375	28.0418	(42b)
Hot water usage for other uses	39.6080	38.1677	36.7274	35.2871	33.8468	32.4065	32.4065	33.8468	35.2871	36.7274	38.1677	39.6080	(42c)
Average daily hot water use (litres/day)													140.5295 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	152.8184	149.6817	145.7900	139.7002	134.8169	129.5422	127.3882	131.2617	135.3650	140.9190	147.1077	152.3973	(44)
Energy content (annual)	242.0270	213.1448	224.0738	191.2425	181.4895	159.2872	154.0649	162.5294	166.9185	191.2257	209.5819	238.6174	(45)
Distribution loss (46)m = 0.15 x (45)m	36.3040	31.9717	33.6111	28.6864	27.2234	23.8931	23.1097	24.3794	25.0378	28.6839	31.4373	35.7926	(46)
Water storage loss:													
Store volume													230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000 (48)
Temperature factor from Table 2b													0.7800 (49)
Enter (49) or (54) in (55)													1.4040 (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	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	0.0000	(61)
Total heat required for water heating calculated for each month	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990	(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	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990	(64)
12Total per year (kWh/year)													3368.2242 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	124.3600	110.5097	118.3906	106.0585	104.2313	70.9726	69.8365	72.6509	73.5100	107.4686	112.1564	123.2264	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	167.1506	164.4489	159.1272	147.3035	140.0959	98.5731	93.8663	97.6491	102.0972	144.4471	155.7727	165.6268	(72)
Total internal gains	532.5209	543.8056	521.3864	502.2965	477.5132	426.6773	409.5528	411.2888	424.6094	474.2255	503.1268	522.2940	(73)

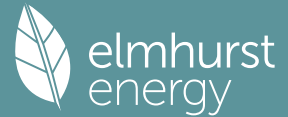
6. Solar gains

[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					2.4400	19.6403	0.6300	0.7000	0.7700	14.6457 (76)				
South					5.6200	46.7521	0.6300	0.7000	0.7700	80.2988 (78)				
Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294	(83)	
Total gains	627.4654	703.9644	736.0876	760.4420	759.1422	702.8777	677.2574	662.0493	654.4778	650.0656	616.5697	603.7234	(84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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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	33.0079	33.1199	33.2327	33.8085	33.9261	34.5264	34.5264	34.6490	34.2837	33.9261	33.6918	33.4607
alpha	3.2005	3.2080	3.2155	3.2539	3.2617	3.3018	3.3018	3.3099	3.2856	3.2617	3.2461	3.2307
util living area	0.8988	0.8604	0.8137	0.7298	0.6172	0.4835	0.3573	0.3791	0.5479	0.7310	0.8536	0.9070 (86)
Living	19.6311	19.8918	20.1852	20.5373	20.7883	20.9322	20.9810	20.9765	20.8923	20.6028	20.0945	19.5960
Non living	18.6249	18.9474	19.3089	19.7402	20.0301	20.1936	20.2375	20.2365	20.1512	19.8256	19.2124	18.5885
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	20.2997	19.8918	20.1852	20.5373	20.7883	20.9322	20.9810	20.9765	20.8923	20.6028	20.0945	19.7924 (87)
Th 2	20.2175	20.2199	20.2224	20.2346	20.2371	20.2494	20.2494	20.2519	20.2445	20.2371	20.2322	20.2273 (88)
util rest of house	0.8877	0.8460	0.7947	0.7029	0.5798	0.4338	0.2992	0.3210	0.4987	0.6996	0.8364	0.8968 (89)
MIT 2	19.5826	18.9474	19.3089	19.7402	20.0301	20.1936	20.2375	20.2365	20.1512	19.8256	19.2124	18.8838 (90)
Living area fraction									FLA = Living area / (4) =			0.4073 (91)
MIT	19.8746	19.3320	19.6658	20.0648	20.3389	20.4944	20.5403	20.5379	20.4530	20.1421	19.5716	19.2538 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8746	19.3320	19.6658	20.0648	20.3389	20.4944	20.5403	20.5379	20.4530	20.1421	19.5716	19.2538 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8824	0.8275	0.7797	0.6966	0.5850	0.4504	0.3220	0.3435	0.5127	0.6954	0.8198	0.8818 (94)
Useful gains	553.6829	582.5462	573.9399	529.6953	444.0682	316.5551	218.0686	227.3969	335.5379	452.0446	505.4541	532.3860 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	917.2163	847.0511	770.1089	641.9431	494.9879	331.8630	221.8435	232.1455	360.2167	546.7403	719.5664	874.5476 (97)
Space heating kWh	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98a)
Space heating requirement - total per year (kWh/year)												1192.0513
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	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1192.0513
Space heating per m2										(98c) / (4) =		17.0342 (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 %)												237.6855 (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	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98)
Space heating efficiency (main heating system 1)	237.6855	237.6855	237.6855	237.6855	237.6855	0.0000	0.0000	0.0000	0.0000	237.6855	237.6855	237.6855 (210)
Space heating fuel (main heating system)	113.7927	74.7826	61.4046	34.0022	15.9388	0.0000	0.0000	0.0000	0.0000	29.6415	64.8592	107.1030 (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	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990 (64)
Efficiency of water heater	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391 (216)
Fuel for water heating, kWh/month	126.0123	111.7963	119.3664	106.0382	103.6026	82.8904	81.7547	84.8881	85.7153	107.2067	112.8270	124.7502 (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	16.4861	14.8906	16.4861	15.9542	16.4861	15.9542	16.4861	16.4861	15.9542	16.4861	15.9542	16.4861 (231)
Lighting	24.8635	19.9464	17.9595	13.1579	10.1635	8.3037	9.2715	12.0515	15.6537	20.5385	23.1982	25.5545 (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												501.5247 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												270.1391
Water heating fuel used												1246.8482 (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)												194.1100 (230a)
Total electricity for the above, kWh/year												194.1100 (231)
Electricity for lighting (calculated in Appendix L)												200.6623 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												

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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	2143.1452 (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	501.5247	0.1558	78.1573 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1246.8482	0.1415	176.4671 (264)
Space and water heating			254.6245 (265)
Pumps, fans and electric keep-hot	194.1100	0.1387	26.9254 (267)
Energy for lighting	200.6623	0.1443	28.9618 (268)
Total CO2, kg/year			310.5117 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4400 (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	501.5247	1.5769	790.8561 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1246.8482	1.5234	1899.4155 (278)
Space and water heating			2690.2716 (279)
Pumps, fans and electric keep-hot	194.1100	1.5128	293.6496 (281)
Energy for lighting	200.6623	1.5338	307.7826 (282)
Total Primary energy kWh/year			3291.7038 (286)
Dwelling Primary energy Rate (DPER)			47.0400 (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	69.9800 (1b)	x 2.3200 (2b)	= 162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 162.3536 (5)

2. Ventilation rate

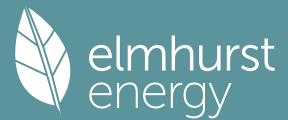
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1232 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3732 (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) = 0.3172 (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	0.4044	0.3965	0.3886	0.3489	0.3410	0.3013	0.3013	0.2934	0.3172	0.3410	0.3569	0.3727 (22b)
Effective ac	0.5818	0.5786	0.5755	0.5609	0.5581	0.5454	0.5454	0.5430	0.5503	0.5581	0.5637	0.5695 (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)			8.0600	1.1450	9.2290		(27)
Ground Floor			69.9800	0.1300	9.0974		(28a)

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External Wall 78.5600 10.2000 68.3600 0.1800 12.3048 (29a)
Total net area of external elements Aum(A, m2) 148.5400 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 32.7712 (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)	6.5800	0.0500	0.3290
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	15.9000	0.0500	0.7950
E5 Ground floor (normal)	33.8600	0.1600	5.4176
E16 Corner (normal)	9.2800	0.0900	0.8352
E7 Party floor between dwellings (in blocks of flats)	33.8600	0.0700	2.3702

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.0250 (36)

Point Thermal Bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 42.7962 (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	31.1702	31.0001	30.8333	30.0499	29.9033	29.2210	29.2210	29.0947	29.4838	29.9033	30.1998	30.5098 (38)
Heat transfer coeff	73.9664	73.7963	73.6295	72.8461	72.6995	72.0172	72.0172	71.8909	72.2800	72.6995	72.9960	73.3060 (39)
Average = Sum(39)m / 12 =												72.8454

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0570	1.0545	1.0522	1.0410	1.0389	1.0291	1.0291	1.0273	1.0329	1.0389	1.0431	1.0475 (40)
HLP (average)												1.0409
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2456 (42)

Hot water usage for mixer showers 61.8716 60.9418 59.5869 56.9945 55.0814 52.9479 51.7352 53.0799 54.5539 56.8446 59.4927 61.6346 (42a)

Hot water usage for baths 26.7301 26.3331 25.7740 24.7433 23.9715 23.1157 22.6534 23.2085 23.8129 24.7287 25.7807 26.6397 (42b)

Hot water usage for other uses 37.6276 36.2593 34.8910 33.5228 32.1545 30.7862 30.7862 32.1545 33.5228 34.8910 36.2593 37.6276 (42c)

Average daily hot water use (litres/day) 116.0334 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019 (44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319 (45)
Energy content (annual)										Total = Sum(45)m =		1927.2913
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698 (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	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (56)
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	253.2659	224.0978	238.1725	209.4146	203.0561	183.0129	180.5495	187.6246	189.5997	211.3906	224.7742	250.4815 (62)
WWHRS	-28.2851	-25.0156	-26.1949	-21.6904	-20.2147	-17.2978	-16.2140	-17.2419	-17.8970	-21.0986	-23.9022	-27.7613 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	224.9808	199.0822	211.9776	187.7242	182.8414	165.7151	164.3355	170.3826	171.7027	190.2920	200.8721	222.7202 (64)
12Total per year (kWh/year)												2292.6265 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	109.1519	97.0398	104.1333	93.7668	92.4571	84.9882	84.9736	87.3261	87.1783	95.2283	98.8738	108.2260 (65)

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

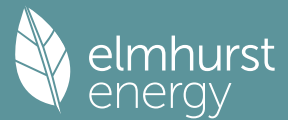
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	146.7095	144.4045	139.9641	130.2316	124.2703	118.0392	114.2119	117.3738	121.0810	127.9951	137.3248	145.4651 (72)
Total internal gains	515.0799	526.7612	505.2233	488.2246	464.6876	446.1434	429.8984	431.0135	443.5932	460.7735	487.6789	505.1323 (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	2.4400	19.6403	0.6300	0.7000	0.7700	14.6457 (76)
South	5.6200	46.7521	0.6300	0.7000	0.7700	80.2988 (78)

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Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294 (83)
Total gains	610.0243	686.9199	719.9246	746.3701	746.3166	722.3438	697.6030	681.7740	673.4615	636.6136	601.1217	586.5617 (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	26.2807	26.3413	26.4010	26.6849	26.7387	26.9920	26.9920	27.0394	26.8939	26.7387	26.6301	26.5175
alpha	2.7520	2.7561	2.7601	2.7790	2.7826	2.7995	2.7995	2.8026	2.7929	2.7826	2.7753	2.7678
util living area	0.9218	0.8932	0.8580	0.7932	0.6983	0.5579	0.4256	0.4499	0.6184	0.7953	0.8893	0.9284 (86)
MIT	18.9739	19.2684	19.6428	20.1234	20.5304	20.8238	20.9392	20.9271	20.7502	20.2429	19.5473	18.9245 (87)
Th 2	20.0361	20.0381	20.0401	20.0493	20.0511	20.0591	20.0591	20.0606	20.0560	20.0511	20.0476	20.0439 (88)
util rest of house	0.9118	0.8799	0.8397	0.7656	0.6559	0.4941	0.3440	0.3691	0.5583	0.7630	0.8734	0.9191 (89)
MIT 2	17.6880	18.0553	18.5213	19.1138	19.5936	19.9178	20.0234	20.0156	19.8437	19.2681	18.4163	17.6312 (90)
Living area fraction	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (92)
MIT	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (93)
Temperature adjustment												0.0000
adjusted MIT	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8876	0.8548	0.8161	0.7486	0.6522	0.5103	0.3741	0.3981	0.5689	0.7482	0.8496	0.8957 (94)
Useful gains	541.4702	587.1611	587.5224	558.7262	486.7432	368.5849	260.9757	271.4092	383.1462	476.3291	510.7156	525.3852 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.0000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1028.9961	1007.2694	918.7535	773.9884	601.5966	409.5446	273.4062	286.6182	441.8378	659.0279	859.6689	1023.1984 (97)
Space heating kWh	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (98a)
Space heating requirement - total per year (kWh/year)												1889.4550
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	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.4550
Space heating per m2										(98c) / (4) =		26.9999 (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	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (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)	392.9786	305.8643	266.9945	167.9186	92.5795	0.0000	0.0000	0.0000	0.0000	147.2675	272.2062	401.2709 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	224.9808	199.0822	211.9776	187.7242	182.8414	165.7151	164.3355	170.3826	171.7027	190.2920	200.8721	222.7202 (64)
Efficiency of water heater (217)m	85.1248	84.8428	84.3984	83.6334	82.4619	79.8000	79.8000	79.8000	79.8000	83.3186	84.5627	79.8000 (216)
Fuel for water heating, kWh/month	264.2954	234.6483	251.1629	224.4610	221.7284	207.6630	205.9342	213.5121	215.1663	228.3908	237.5421	261.4334 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.1541	18.5751	16.7248	12.2533	9.4648	7.7328	8.6341	11.2229	14.5775	19.1264	21.6033	23.7976 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-32.9219	-46.4980	-66.9512	-75.4114	-81.4365	-76.0700	-75.1608	-70.9273	-63.4280	-53.2750	-36.2372	-28.4556 (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	-18.3103	-38.5642	-76.7314	-115.3551	-152.6236	-153.3711	-151.5354	-128.2281	-93.9075	-55.1476	-24.4479	-14.4729 (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												2047.0802 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2765.9378 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	186.8666 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1729.4684 (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	3356.4163 (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	2047.0802	0.2100	429.8868 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2765.9378	0.2100	580.8469 (264)
Space and water heating			1010.7338 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	186.8666	0.1443	26.9706 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-706.7730	0.1345	-95.0918
PV Unit electricity exported	-1022.6954	0.1259	-128.7287
Total			-223.8204 (269)
Total CO2, kg/year			825.8132 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8000 (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	2047.0802	1.1300	2313.2006 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2765.9378	1.1300	3125.5098 (278)
Space and water heating			5438.7104 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	186.8666	1.5338	286.6223 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-706.7730	1.4972	-1058.2144
PV Unit electricity exported	-1022.6954	0.4620	-472.5220
Total			-1530.7364 (283)
Total Primary energy kWh/year			4324.6971 (286)
Target Primary Energy Rate (TPER)			61.8000 (287)

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Property Reference	OP-D320 Maisonette Ground				Issued on Date	29/11/2024
Assessment Reference	Maisonette Ground	Prop Type Ref	Maisonette Ground			
Property	Maisonette Ground					
SAP Rating	82 B	DER	4.44	TER	11.80	
Environmental	96 A	% DER < TER				62.37
CO ₂ Emissions (t/year)	0.29	DFEE	31.49	TFEE	33.37	
Compliance Check	See BREL	% DFEE < TFEE				5.61
% DPER < TPER	23.89	DPER	47.04	TPER	61.80	
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	69.9800 (1b)	2.3200 (2b)	162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.3536 (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) =	0.1232 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50		3.5000 (17)
Infiltration rate		0.2982 (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) =	0.2535 (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	0.3232	0.3168	0.3105	0.2788	0.2725	0.2408	0.2408	0.2345	0.2535	0.2725	0.2851	0.2978 (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	0.5522	0.5502	0.5482	0.5389	0.5371	0.5290	0.5290	0.5275	0.5321	0.5371	0.5407	0.5443 (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)			8.0600	1.2357	9.9601		(27)
Ground Floor			69.9800	0.1100	7.6978		(28a)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Total net area of external elements Aum(A, m ²)			148.5400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.4191	(33)
Party Ceiling			69.9800				(32b)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 100.0000 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	6.5800	0.0500	0.3290
E2 Other lintels (including other steel lintels)	5.5600	0.0500	0.2780
E3 Sill	15.9000	0.0500	0.7950
E4 Jamb	33.8600	0.1600	5.4176
E5 Ground floor (normal)	9.2800	0.0900	0.8352
E6 Corner (normal)	33.8600	0.0700	2.3702
E7 Party floor between dwellings (in blocks of flats)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.0250 (36)

$$\begin{aligned} (36a) &= 0.0000 \\ (33) + (36) + (36a) &= 41.4441 \quad (37) \end{aligned}$$
[illegible]

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2456 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397 (42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276 (42c)
Average daily hot water use (litres/day)												58.9899 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	64.3576	62.5924	60.6651	58.2661	56.1260	53.9019	53.4396	55.3630	57.3357	59.6197	62.0400	64.2673 (44)
Energy content (annual)	101.9268	89.1307	93.2400	79.7633	75.5563	66.2786	64.6306	68.5510	70.7006	80.9034	88.3873	100.6270 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m =											979.6957
	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 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (62)
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64a)m =											832.7414 (64a)
Electric shower(s)	49.5489	44.1484	48.2084	46.0047	46.8680	44.7075	46.1977	46.8680	46.0047	48.2084	47.3019	49.5489 (64a)
												563.6155 (64a)
Heat gains from water heating, kWh/month	34.0467	29.9774	31.8656	28.4509	27.7727	25.2611	25.2834	26.2841	26.5251	29.2441	30.6078	33.7705 (65)

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

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	45.7616	44.6092	42.8301	39.5151	37.3289	35.0848	33.9831	35.3280	36.8404	39.3066	42.5108	45.3904 (72)
Total internal gains	411.1320	423.9659	405.0893	394.5081	374.7462	363.1891	349.6697	348.9678	359.3526	369.0850	389.8649	402.0575 (73)

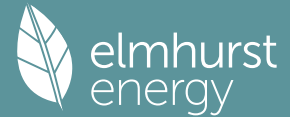
6. Solar gains

[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						2.4400	19.6403	0.6300	0.7000	0.7700			14.6457 (76)
South						5.6200	46.7521	0.6300	0.7000	0.7700			80.2988 (78)
Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294 (84)	
Total gains	506.0764	584.1246	619.7906	652.6536	656.3752	639.3895	617.3742	599.7282	589.2209	544.9251	503.3078	483.4870 (83)	

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	27.3671	27.4091	27.4503	27.6455	27.6824	27.8552	27.8552	27.8874	27.7884	27.6824	27.6080	27.5306
alpha	2.8245	2.8273	2.8300	2.8430	2.8455	2.8570	2.8570	2.8592	2.8526	2.8455	2.8405	2.8354
util living area	0.9462	0.9205	0.8890	0.8285	0.7381	0.5977	0.4609	0.4890	0.6628	0.8367	0.9204	0.9520 (86)

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MIT	18.8377	19.1520	19.5437	20.0485	20.4824	20.8017	20.9308	20.9158	20.7167	20.1578	19.4191	18.7759 (87)
Th 2	20.0708	20.0721	20.0734	20.0793	20.0805	20.0856	20.0856	20.0866	20.0837	20.0805	20.0782	20.0759 (88)
util rest of house	0.9390	0.9100	0.8739	0.8042	0.6983	0.5343	0.3768	0.4059	0.6044	0.8089	0.9082	0.9454 (89)
MIT 2	18.0990	18.4068	18.7894	19.2778	19.6810	19.9590	20.0531	20.0450	19.8917	19.3898	18.6775	18.0420 (90)
Living area fraction									fLA = Living area / (4) =			0.4073 (91)
MIT	18.3999	18.7103	19.0966	19.5917	20.0074	20.3022	20.4105	20.3996	20.2277	19.7026	18.9795	18.3409 (92)
Temperature adjustment												0.0000
adjusted MIT	18.3999	18.7103	19.0966	19.5917	20.0074	20.3022	20.4105	20.3996	20.2277	19.7026	18.9795	18.3409 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9223	0.8914	0.8552	0.7896	0.6949	0.5501	0.4077	0.4355	0.6143	0.7958	0.8903	0.9297	(94)
Useful gains	466.7747	520.6683	530.0390	515.3298	456.1083	351.7477	251.7223	261.1824	361.9335	433.6331	448.1024	449.4757	(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	1001.5126	979.4467	892.0263	751.7816	583.3541	397.9283	265.9185	278.7934	428.6552	639.1937	836.4429	998.4631	(97)
Space heating kWh	397.8450	308.2991	269.3185	170.2453	94.6709	0.0000	0.0000	0.0000	0.0000	152.9371	279.6052	408.4466	(98a)
Space heating requirement - total per year (kWh/year)												2081.3678	
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	397.8450	308.2991	269.3185	170.2453	94.6709	0.0000	0.0000	0.0000	0.0000	152.9371	279.6052	408.4466	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2081.3678	
Space heating per m2												29.7423	(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	655.9843	516.4132	529.7572	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7625	0.8295	0.8136	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	500.1993	428.3781	430.9853	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	696.5373	673.3009	654.9449	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	141.3634	182.2225	166.6259	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	35.3408	45.5556	41.6565	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												122.5529	(107)
Energy for space heating												29.7423	(99)
Energy for space cooling												1.7513	(108)
Total												31.4936	(109)
Fabric Energy Efficiency (DFEE)												31.5	(109)

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

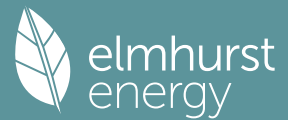
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Ground floor	69.9800 (1b)	x	2.3200 (2b)	= 162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)		= 162.3536 (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)+(7a)+(7b)+(7c) =	
Pressure test	20.0000 / (5) =	0.1232 (8)
Pressure Test Method	Yes	
Measured/design AP50	Blower Door	
Infiltration rate		5.0000 (17)
Number of sides sheltered		0.3732 (18)
		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3172 (21)

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Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infiltr rate	0.4044	0.3965	0.3886	0.3489	0.3410	0.3013	0.3013	0.2934	0.3172	0.3410	0.3569	0.3727 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5818	0.5786	0.5755	0.5609	0.5581	0.5454	0.5454	0.5430	0.5503	0.5581	0.5637	0.0000 (23c)
												0.5695 (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)			8.0600	1.1450	9.2290		(27)
Ground Floor			69.9800	0.1300	9.0974		(28a)
External Wall	78.5600	10.2000	68.3600	0.1800	12.3048		(29a)
Total net area of external elements Aum(A, m2)			148.5400				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 32.7712		(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)	6.5800	0.0500	0.3290
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	15.9000	0.0500	0.7950
E5 Ground floor (normal)	33.8600	0.1600	5.4176
E16 Corner (normal)	9.2800	0.0900	0.8352
E7 Party floor between dwellings (in blocks of flats)	33.8600	0.0700	2.3702

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

10.0250 (36)

Point Thermal bridges

Total fabric heat loss (33) + (36) + (36a) = 42.7962 (37)

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

(38)m	Jan 31.1702	Feb 31.0001	Mar 30.8333	Apr 30.0499	May 29.9033	Jun 29.2210	Jul 29.2210	Aug 29.0947	Sep 29.4838	Oct 29.9033	Nov 30.1998	Dec 30.5098 (38)
Heat transfer coeff	73.9664	73.7963	73.6295	72.8461	72.6995	72.0172	72.0172	71.8909	72.2800	72.6995	72.9960	73.3060 (39)
Average = Sum(39)m / 12 =												72.8454

HLP	Jan 1.0570	Feb 1.0545	Mar 1.0522	Apr 1.0410	May 1.0389	Jun 1.0291	Jul 1.0291	Aug 1.0273	Sep 1.0329	Oct 1.0389	Nov 1.0431	Dec 1.0475 (40)
HLP (average)												1.0409
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

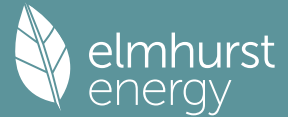
Assumed occupancy												2.2456 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397 (42b)
Hot water usage for other uses	37.6276	36.2593	34.8910	33.5228	32.1545	30.7862	30.7862	32.1545	33.5228	34.8910	36.2593	37.6276 (42c)
Average daily hot water use (litres/day)												58.9899 (43)

Daily hot water use	Jan 64.3576	Feb 62.5924	Mar 60.6651	Apr 58.2661	May 56.1260	Jun 53.9019	Jul 53.4396	Aug 55.3630	Sep 57.3357	Oct 59.6197	Nov 62.0400	Dec 64.2673 (44)
Energy conte	101.9268	89.1307	93.2400	79.7633	75.5563	66.2786	64.6306	68.5510	70.7006	80.9034	88.3873	100.6270 (45)
Energy content (annual)										Total = Sum(45)m =		979.6957
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (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)
FV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330 (64)
12Total per year (kWh/year)									Total per year (kWh/year) = Sum(64)m =			832.7414 (64)
Electric shower(s)	49.5489	44.1484	48.2084	46.0047	46.8680	44.7075	46.1977	46.8680	46.0047	48.2084	47.3019	49.5489 (64a)
												563.6155 (64a)
Heat gains from water heating, kWh/month	34.0467	29.9774	31.8656	28.4509	27.7727	25.2611	25.2834	26.2841	26.5251	29.2441	30.6078	33.7705 (65)

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

Metabolic gains (Table 5), Watts	Jan 112.2820	Feb 112.2820	Mar 112.2820	Apr 112.2820	May 112.2820	Jun 112.2820	Jul 112.2820	Aug 112.2820	Sep 112.2820	Oct 112.2820	Nov 112.2820	Dec 112.2820 (66)
(66)m												
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)												

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Total internal gains	45.7616	44.6092	42.8301	39.5151	37.3289	35.0848	33.9831	35.3280	36.8404	39.3066	42.5108	45.3904 (72)
	411.1320	423.9659	405.0893	394.5081	374.7462	363.1891	349.6697	348.9678	359.3526	369.0850	389.8649	402.0575 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
East	2.4400		19.6403		0.6300		0.7000		0.7700		14.6457 (76)	
South	5.6200		46.7521		0.6300		0.7000		0.7700		80.2988 (78)	
Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294 (83)
Total gains	506.0764	584.1246	619.7906	652.6536	656.3752	639.3895	617.3742	599.7282	589.2209	544.9251	503.3078	483.4870 (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	26.2807	26.3413	26.4010	26.6849	26.7387	26.9920	26.9920	27.0394	26.8939	26.7387	26.6301	26.5175
alpha	2.7520	2.7561	2.7601	2.7790	2.7826	2.7995	2.7995	2.8026	2.7929	2.7826	2.7753	2.7678
util living area	0.9475	0.9228	0.8926	0.8341	0.7464	0.6078	0.4713	0.4994	0.6723	0.8419	0.9225	0.9529 (86)
MIT	18.7245	19.0439	19.4484	19.9793	20.4358	20.7801	20.9212	20.9050	20.6884	20.0990	19.3346	18.6712 (87)
Th 2	20.0361	20.0381	20.0401	20.0493	20.0511	20.0591	20.0591	20.0606	20.0560	20.0511	20.0476	20.0439 (88)
util rest of house	0.9403	0.9124	0.8776	0.8098	0.7063	0.5428	0.3839	0.4132	0.6129	0.8141	0.9104	0.9464 (89)
MIT 2	17.9642	18.2777	18.6737	19.1903	19.6161	19.9190	20.0224	20.0139	19.8454	19.3132	18.5741	17.9173 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.2738	18.5897	18.9892	19.5116	19.9499	20.2697	20.3884	20.3768	20.1887	19.6332	18.8838	18.2243 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.2738	18.5897	18.9892	19.5116	19.9499	20.2697	20.3884	20.3768	20.1887	19.6332	18.8838	18.2243 (93)

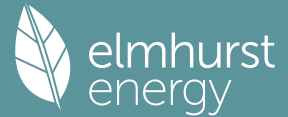
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9232	0.8932	0.8581	0.7941	0.7016	0.5582	0.4157	0.4434	0.6219	0.8000	0.8920	0.9303 (94)
Useful gains	467.2196	521.7176	531.8299	518.2798	460.5340	356.9167	256.6252	265.9448	366.4409	435.9181	448.9357	449.7847 (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	1033.5939	1010.2487	919.5750	773.0125	599.7666	408.3162	272.8328	285.8969	440.0929	656.7113	860.1718	1028.0687 (97)
Space heating kWh	421.3825	328.2929	288.4824	183.4075	103.5890	0.0000	0.0000	0.0000	0.0000	164.2701	296.0900	430.2433 (98a)
Space heating requirement - total per year (kWh/year)	2215.7578											
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	421.3825	328.2929	288.4824	183.4075	103.5890	0.0000	0.0000	0.0000	0.0000	164.2701	296.0900	430.2433 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2215.7578											
Space heating per m2	(98c) / (4) = 31.6627 (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	676.9620	532.9276	546.3707	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7472	0.8159	0.7997	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	505.8363	434.8394	436.9430	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	696.5373	673.3009	654.9449	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	137.3048	177.4153	162.1934	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
Intermittency factor (Table 10b)												1.0000 (105)
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh												
	0.0000	0.0000	0.0000	0.0000	0.0000	34.3262	44.3538	40.5484	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement	119.2284 (107)											
Energy for space heating	31.6627 (99)											
Energy for space cooling	1.7037 (108)											
Total	33.3665 (109)											
Fabric Energy Efficiency (TFEE)	33.4 (109)											

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Property Reference	OP-D320 Maisonette Ground				Issued on Date	29/11/2024
Assessment Reference	Maisonette Ground	Prop Type Ref	Maisonette Ground			
Property	Maisonette Ground					
SAP Rating	82 B	DER	4.44	TER	11.80	
Environmental	96 A	% DER < TER				62.37
CO ₂ Emissions (t/year)	0.29	DFEE	31.49	TFEE	33.37	
Compliance Check	See BREL	% DFEE < TFEE				5.61
% DPER < TPER	23.89	DPER	47.04	TPER	61.80	
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	69.9800 (1b)	2.3200 (2b)	162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		162.3536 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	162.3536 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.5000	(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)

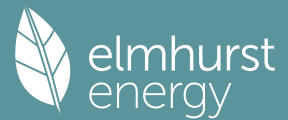
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1897	0.1859	0.1822	0.1636	0.1599	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)			8.0600	1.2357	9.9601		(27)
Ground Floor			69.9800	0.1100	7.6978		(28a)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Total net area of external elements Aum(A, m ²)			148.5400				(31)
Fabric heat loss, W/K = Sum (A x U)							(33)
Party Ceiling			69.9800		31.4191		(32b)

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)	6.5800	0.0500	0.3290
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	15.9000	0.0500	0.7950
E5 Ground floor (normal)	33.8600	0.1600	5.4176

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E16 Corner (normal)									9.2800	0.0900	0.8352	
E7 Party floor between dwellings (in blocks of flats)									33.8600	0.0700	2.3702	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												10.0250 (36)
Point Thermal bridges											(36a) =	0.0000
Total fabric heat loss										(33) + (36) + (36a) =		41.4441 (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	17.4476	17.2483	17.0491	16.0529	15.8537	14.8575	14.8575	14.6582	15.2560	15.8537	16.2522	16.6506 (38)
Average = Sum(39)m / 12 =	58.8917	58.6924	58.4932	57.4970	57.2978	56.3016	56.3016	56.1023	56.7000	57.2978	57.6962	58.0947 (39)
												57.4472
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.8415	0.8387	0.8359	0.8216	0.8188	0.8045	0.8045	0.8017	0.8102	0.8188	0.8245	0.8302 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers	85.0735	83.7950	81.9320	78.3675	75.7369	72.8034	71.1359	72.9849	75.0116	78.1613	81.8024	84.7475	(42a)
Hot water usage for baths	28.1369	27.7190	27.1306	26.0456	25.2331	24.3323	23.8457	24.4300	25.0662	26.0302	27.1375	28.0418	(42b)
Hot water usage for other uses	39.6080	38.1677	36.7274	35.2871	33.8468	32.4065	32.4065	33.8468	35.2871	36.7274	38.1677	39.6080	(42c)
Average daily hot water use (litres/day)													140.5295 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	152.8184	149.6817	145.7900	139.7002	134.8169	129.5422	127.3882	131.2617	135.3650	140.9190	147.1077	152.3973	(44)
Energy content (annual)	242.0270	213.1448	224.0738	191.2425	181.4895	159.2872	154.0649	162.5294	166.9185	191.2257	209.5819	238.6174	(45)
Distribution loss (46)m = 0.15 x (45)m	36.3040	31.9717	33.6111	28.6864	27.2234	23.8931	23.1097	24.3794	25.0378	28.6839	31.4373	35.7926	(46)
Water storage loss:													
Store volume													230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.8000 (48)
Temperature factor from Table 2b													0.7800 (49)
Enter (49) or (54) in (55)													1.4040 (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	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	0.0000	(61)
Total heat required for water heating calculated for each month	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990	(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	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990	(64)
12Total per year (kWh/year)													3368.2242 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)
Heat gains from water heating, kWh/month	124.3600	110.5097	118.3906	106.0585	104.2313	70.9726	69.8365	72.6509	73.5100	107.4686	112.1564	123.2264	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	(71)
Water heating gains (Table 5)	167.1506	164.4489	159.1272	147.3035	140.0959	98.5731	93.8663	97.6491	102.0972	144.4471	155.7727	165.6268	(72)
Total internal gains	532.5209	543.8056	521.3864	502.2965	477.5132	426.6773	409.5528	411.2888	424.6094	474.2255	503.1268	522.2940	(73)

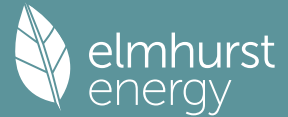
6. Solar gains

[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					2.4400	19.6403	0.6300		0.7000		0.7700	14.6457 (76)
South					5.6200	46.7521	0.6300		0.7000		0.7700	80.2988 (78)
Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294 (83)
Total gains	627.4654	703.9644	736.0876	760.4420	759.1422	702.8777	677.2574	662.0493	654.4778	650.0656	616.5697	603.7234 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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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	33.0079	33.1199	33.2327	33.8085	33.9261	34.5264	34.5264	34.6490	34.2837	33.9261	33.6918	33.4607
alpha	3.2005	3.2080	3.2155	3.2539	3.2617	3.3018	3.3018	3.3099	3.2856	3.2617	3.2461	3.2307
util living area	0.8988	0.8604	0.8137	0.7298	0.6172	0.4835	0.3573	0.3791	0.5479	0.7310	0.8536	0.9070 (86)
Living	19.6311	19.8918	20.1852	20.5373	20.7883	20.9322	20.9810	20.9765	20.8923	20.6028	20.0945	19.5960
Non living	18.6249	18.9474	19.3089	19.7402	20.0301	20.1936	20.2375	20.2365	20.1512	19.8256	19.2124	18.5885
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	20.2997	19.8918	20.1852	20.5373	20.7883	20.9322	20.9810	20.9765	20.8923	20.6028	20.0945	19.7924 (87)
Th 2	20.2175	20.2199	20.2224	20.2346	20.2371	20.2494	20.2494	20.2519	20.2445	20.2371	20.2322	20.2273 (88)
util rest of house	0.8877	0.8460	0.7947	0.7029	0.5798	0.4338	0.2992	0.3210	0.4987	0.6996	0.8364	0.8968 (89)
MIT 2	19.5826	18.9474	19.3089	19.7402	20.0301	20.1936	20.2375	20.2365	20.1512	19.8256	19.2124	18.8838 (90)
Living area fraction									FLA = Living area / (4) =			
MIT	19.8746	19.3320	19.6658	20.0648	20.3389	20.4944	20.5403	20.5379	20.4530	20.1421	19.5716	0.4073 (91)
Temperature adjustment												19.2538 (92)
adjusted MIT	19.8746	19.3320	19.6658	20.0648	20.3389	20.4944	20.5403	20.5379	20.4530	20.1421	19.5716	0.0000 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8824	0.8275	0.7797	0.6966	0.5850	0.4504	0.3220	0.3435	0.5127	0.6954	0.8198	0.8818 (94)
Useful gains	553.6829	582.5462	573.9399	529.6953	444.0682	316.5551	218.0686	227.3969	335.5379	452.0446	505.4541	532.3860 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	917.2163	847.0511	770.1089	641.9431	494.9879	331.8630	221.8435	232.1455	360.2167	546.7403	719.5664	874.5476 (97)
Space heating kWh	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98a)
Space heating requirement - total per year (kWh/year)												1192.0513
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	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1192.0513
Space heating per m2										(98c) / (4) =		17.0342 (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 %)												237.6855 (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	270.4688	177.7473	145.9498	80.8184	37.8843	0.0000	0.0000	0.0000	0.0000	70.4536	154.1609	254.5683 (98)
Space heating efficiency (main heating system 1)	237.6855	237.6855	237.6855	237.6855	237.6855	0.0000	0.0000	0.0000	0.0000	237.6855	237.6855	237.6855 (210)
Space heating fuel (main heating system)	113.7927	74.7826	61.4046	34.0022	15.9388	0.0000	0.0000	0.0000	0.0000	29.6415	64.8592	107.1030 (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	340.4086	302.0056	322.4554	286.4505	279.8711	223.9192	220.8513	229.3158	231.5505	289.6073	304.7899	336.9990 (64)
Efficiency of water heater	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391	270.1391 (216)
Fuel for water heating, kWh/month	126.0123	111.7963	119.3664	106.0382	103.6026	82.8904	81.7547	84.8881	85.7153	107.2067	112.8270	124.7502 (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	16.4861	14.8906	16.4861	15.9542	16.4861	15.9542	16.4861	16.4861	15.9542	16.4861	15.9542	16.4861 (231)
Lighting	24.8635	19.9464	17.9595	13.1579	10.1635	8.3037	9.2715	12.0515	15.6537	20.5385	23.1982	25.5545 (232)
Electricity generated by PVs (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 (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)	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)	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												501.5247 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												270.1391
Water heating fuel used												1246.8482 (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)												194.1100 (230a)
Total electricity for the above, kWh/year												194.1100 (231)
Electricity for lighting (calculated in Appendix L)												200.6623 (232)

Energy saving/generation technologies (Appendices M ,N and Q)

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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	2143.1452 (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	501.5247	0.1558	78.1573 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1246.8482	0.1415	176.4671 (264)
Space and water heating			254.6245 (265)
Pumps, fans and electric keep-hot	194.1100	0.1387	26.9254 (267)
Energy for lighting	200.6623	0.1443	28.9618 (268)
Total CO2, kg/year			310.5117 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.4400 (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	501.5247	1.5769	790.8561 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1246.8482	1.5234	1899.4155 (278)
Space and water heating			2690.2716 (279)
Pumps, fans and electric keep-hot	194.1100	1.5128	293.6496 (281)
Energy for lighting	200.6623	1.5338	307.7826 (282)
Total Primary energy kWh/year			3291.7038 (286)
Dwelling Primary energy Rate (DPER)			47.0400 (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	69.9800 (1b)	x 2.3200 (2b)	= 162.3536 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	69.9800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 162.3536 (5)

2. Ventilation rate

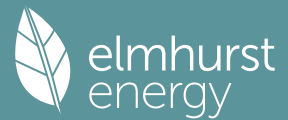
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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) = 0.1232 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3732 (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) = 0.3172 (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	0.4044	0.3965	0.3886	0.3489	0.3410	0.3013	0.3013	0.2934	0.3172	0.3410	0.3569	0.3727 (22b)
Effective ac	0.5818	0.5786	0.5755	0.5609	0.5581	0.5454	0.5454	0.5430	0.5503	0.5581	0.5637	0.5695 (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)			8.0600	1.1450	9.2290		(27)
Ground Floor			69.9800	0.1300	9.0974		(28a)

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External Wall 78.5600 10.2000 68.3600 0.1800 12.3048 (29a)
Total net area of external elements Aum(A, m2) 148.5400 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 32.7712 (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)	6.5800	0.0500	0.3290
E3 Sill	5.5600	0.0500	0.2780
E4 Jamb	15.9000	0.0500	0.7950
E5 Ground floor (normal)	33.8600	0.1600	5.4176
E16 Corner (normal)	9.2800	0.0900	0.8352
E7 Party floor between dwellings (in blocks of flats)	33.8600	0.0700	2.3702

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.0250 (36)
Point Thermal Bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 42.7962 (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	31.1702	31.0001	30.8333	30.0499	29.9033	29.2210	29.2210	29.0947	29.4838	29.9033	30.1998	30.5098 (38)
Heat transfer coeff	73.9664	73.7963	73.6295	72.8461	72.6995	72.0172	72.0172	71.8909	72.2800	72.6995	72.9960	73.3060 (39)
Average = Sum(39)m / 12 =												72.8454

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.0570	1.0545	1.0522	1.0410	1.0389	1.0291	1.0291	1.0273	1.0329	1.0389	1.0431	1.0475 (40)
HLP (average)												1.0409
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.2456 (42)

Hot water usage for mixer showers 61.8716 60.9418 59.5869 56.9945 55.0814 52.9479 51.7352 53.0799 54.5539 56.8446 59.4927 61.6346 (42a)

Hot water usage for baths 26.7301 26.3331 25.7740 24.7433 23.9715 23.1157 22.6534 23.2085 23.8129 24.7287 25.7807 26.6397 (42b)

Hot water usage for other uses 37.6276 36.2593 34.8910 33.5228 32.1545 30.7862 30.7862 32.1545 33.5228 34.8910 36.2593 37.6276 (42c)

Average daily hot water use (litres/day) 116.0334 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	126.2293	123.5342	120.2520	115.2606	111.2074	106.8498	105.1748	108.4429	111.8896	116.4643	121.5327	125.9019 (44)
Energy conte	199.9163	175.9111	184.8228	157.7860	149.7065	131.3843	127.1999	134.2750	137.9711	158.0410	173.1456	197.1319 (45)
Energy content (annual)										Total = Sum(45)m =		1927.2913
Distribution loss (46)m = 0.15 x (45)m	29.9874	26.3867	27.7234	23.6679	22.4560	19.7076	19.0800	20.1412	20.6957	23.7062	25.9718	29.5698 (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	27.1756	30.0872	29.1167	30.0872	29.1167	30.0872	30.0872	29.1167	30.0872	29.1167	30.0872 (56)
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	253.2659	224.0978	238.1725	209.4146	203.0561	183.0129	180.5495	187.6246	189.5997	211.3906	224.7742	250.4815 (62)
WWHRS	-28.2851	-25.0156	-26.1949	-21.6904	-20.2147	-17.2978	-16.2140	-17.2419	-17.8970	-21.0986	-23.9022	-27.7613 (63a)
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
Output from w/h	224.9808	199.0822	211.9776	187.7242	182.8414	165.7151	164.3355	170.3826	171.7027	190.2920	200.8721	222.7202 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2292.6265 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	109.1519	97.0398	104.1333	93.7668	92.4571	84.9882	84.9736	87.3261	87.1783	95.2283	98.8738	108.2260 (65)

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

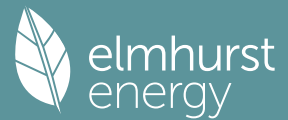
Metabolic gains (Table 5), Watts

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	115.1499	111.4354	115.1499	111.4354 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	197.2504	199.2972	194.1392	183.1585	169.2973	156.2698	147.5666	145.5197	150.6777	161.6584	175.5196	188.5472 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282	34.2282 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256	-89.8256 (71)
Water heating gains (Table 5)	146.7095	144.4045	139.9641	130.2316	124.2703	118.0392	114.2119	117.3738	121.0810	127.9951	137.3248	145.4651 (72)
Total internal gains	515.0799	526.7612	505.2233	488.2246	464.6876	446.1434	429.8984	431.0135	443.5932	460.7735	487.6789	505.1323 (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	2.4400	19.6403	0.6300	0.7000	0.7700	14.6457 (76)
South	5.6200	46.7521	0.6300	0.7000	0.7700	80.2988 (78)

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Solar gains	94.9444	160.1587	214.7013	258.1454	281.6290	276.2004	267.7046	250.7605	229.8683	175.8401	113.4429	81.4294 (83)
Total gains	610.0243	686.9199	719.9246	746.3701	746.3166	722.3438	697.6030	681.7740	673.4615	636.6136	601.1217	586.5617 (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	26.2807	26.3413	26.4010	26.6849	26.7387	26.9920	26.9920	27.0394	26.8939	26.7387	26.6301	26.5175
alpha	2.7520	2.7561	2.7601	2.7790	2.7826	2.7995	2.7995	2.8026	2.7929	2.7826	2.7753	2.7678
util living area	0.9218	0.8932	0.8580	0.7932	0.6983	0.5579	0.4256	0.4499	0.6184	0.7953	0.8893	0.9284 (86)
MIT	18.9739	19.2684	19.6428	20.1234	20.5304	20.8238	20.9392	20.9271	20.7502	20.2429	19.5473	18.9245 (87)
Th 2	20.0361	20.0381	20.0401	20.0493	20.0511	20.0591	20.0591	20.0606	20.0560	20.0511	20.0476	20.0439 (88)
util rest of house	0.9118	0.8799	0.8397	0.7656	0.6559	0.4941	0.3440	0.3691	0.5583	0.7630	0.8734	0.9191 (89)
MIT 2	17.6880	18.0553	18.5213	19.1138	19.5936	19.9178	20.0234	20.0156	19.8437	19.2681	18.4163	17.6312 (90)
Living area fraction	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (92)
MIT	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (93)
Temperature adjustment												0.0000
adjusted MIT	18.2117	18.5493	18.9781	19.5250	19.9751	20.2868	20.3964	20.3869	20.2129	19.6651	18.8769	18.1579 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8876	0.8548	0.8161	0.7486	0.6522	0.5103	0.3741	0.3981	0.5689	0.7482	0.8496	0.8957 (94)
Useful gains	541.4702	587.1611	587.5224	558.7262	486.7432	368.5849	260.9757	271.4092	383.1462	476.3291	510.7156	525.3852 (95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	14.0000	14.1000	10.6000	7.1000	4.2000 (96)
Heat loss rate W	1028.9961	1007.2694	918.7535	773.9884	601.5966	409.5446	273.4062	286.6182	441.8378	659.0279	859.6689	1023.1984 (97)
Space heating kWh	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (98a)
Space heating requirement - total per year (kWh/year)												1889.4550
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	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1889.4550
Space heating per m2										(98c) / (4) =		26.9999 (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	362.7192	282.3128	246.4359	154.9888	85.4509	0.0000	0.0000	0.0000	0.0000	135.9279	251.2464	370.3730 (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)	392.9786	305.8643	266.9945	167.9186	92.5795	0.0000	0.0000	0.0000	0.0000	147.2675	272.2062	401.2709 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	224.9808	199.0822	211.9776	187.7242	182.8414	165.7151	164.3355	170.3826	171.7027	190.2920	200.8721	222.7202 (64)
Efficiency of water heater (217)m	85.1248	84.8428	84.3984	83.6334	82.4619	79.8000	79.8000	79.8000	79.8000	83.3186	84.5627	79.8000 (216)
Fuel for water heating, kWh/month	264.2954	234.6483	251.1629	224.4610	221.7284	207.6630	205.9342	213.5121	215.1663	228.3908	237.5421	261.4334 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	23.1541	18.5751	16.7248	12.2533	9.4648	7.7328	8.6341	11.2229	14.5775	19.1264	21.6033	23.7976 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-32.9219	-46.4980	-66.9512	-75.4114	-81.4365	-76.0700	-75.1608	-70.9273	-63.4280	-53.2750	-36.2372	-28.4556 (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	-18.3103	-38.5642	-76.7314	-115.3551	-152.6236	-153.3711	-151.5354	-128.2281	-93.9075	-55.1476	-24.4479	-14.4729 (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												2047.0802 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												79.8000
Water heating fuel used												2765.9378 (219)
Space cooling fuel												0.0000 (221)

Electricity for pumps and fans:

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Total electricity for the above, kWh/year	86.0000 (231)
Electricity for lighting (calculated in Appendix L)	186.8666 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1729.4684 (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	3356.4163 (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	2047.0802	0.2100	429.8868 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2765.9378	0.2100	580.8469 (264)
Space and water heating			1010.7338 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	186.8666	0.1443	26.9706 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-706.7730	0.1345	-95.0918
PV Unit electricity exported	-1022.6954	0.1259	-128.7287
Total			-223.8204 (269)
Total CO2, kg/year			825.8132 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.8000 (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	2047.0802	1.1300	2313.2006 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2765.9378	1.1300	3125.5098 (278)
Space and water heating			5438.7104 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	186.8666	1.5338	286.6223 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-706.7730	1.4972	-1058.2144
PV Unit electricity exported	-1022.6954	0.4620	-472.5220
Total			-1530.7364 (283)
Total Primary energy kWh/year			4324.6971 (286)
Target Primary Energy Rate (TPER)			61.8000 (287)