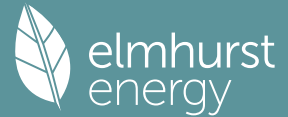


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Property Reference	OP-D320 Maisonette Top				Issued on Date	29/11/2024
Assessment Reference	Maisonette Top	Prop Type Ref	Maisonette Top			
Property	Maisonette Top					
SAP Rating	83 B	DER	4.27	TER	11.09	
Environmental	97 A	% DER < TER				61.50
CO ₂ Emissions (t/year)	0.28	DFEE	29.10	TFEE	30.02	
Compliance Check	See BREL	% DFEE < TFEE				3.06
% DPER < TPER	21.78	DPER	45.36	TPER	57.99	
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)	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

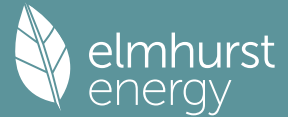
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978		(30)
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 Floor			69.9800				(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				6.5800	0.0500		0.3290
E3 Sill				5.5600	0.0500		0.2780
E4 Jamb				14.1000	0.0500		0.7050
E10 Eaves (insulation at ceiling level)				19.5200	0.0600		1.1712

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E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604
E16 Corner (normal)	9.4400	0.0900	0.8496
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)			6.5634 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.9825 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	17.4476	17.2483	17.0491	16.0529	15.8537	14.8575	14.8575	14.6582	15.2560	15.8537	16.2522	16.6506 (38)
Heat transfer coeff	55.4301	55.2308	55.0316	54.0354	53.8362	52.8400	52.8400	52.6407	53.2384	53.8362	54.2346	54.6331 (39)
Average = Sum(39)m / 12 =												53.9856
HLP	0.7921	0.7892	0.7864	0.7722	0.7693	0.7551	0.7551	0.7522	0.7608	0.7693	0.7750	0.7807 (40)
HLP (average)												0.7714
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												84.7475 (42a)
Hot water usage for baths												28.0418 (42b)
Hot water usage for other uses												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
	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		2334.2026
Distribution loss (46)m = 0.15 x (45)m												35.7926 (46)
Water storage loss:												230.0000 (47)
Store volume												1.8000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4040 (55)
Enter (49) or (54) in (55)												
Total storage loss												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)
If cylinder contains dedicated solar storage												
	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	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)										Total per year (kWh/year) = Sum(64)m =		3368.2242 (64)
Electric shower(s)												3368 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	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)

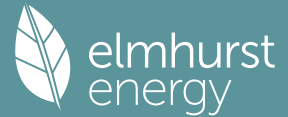
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	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]												Gains
				Area	Solar flux		g		FF	Access		W
				m2	Table 6a		Specific data		Specific data	factor		
					W/m2		or Table 6b		or Table 6c	Table 6d		
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)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	35.0692	35.1957	35.3232	35.9744	36.1075	36.7882	36.7882	36.9275	36.5129	36.1075	35.8422	35.5808
alpha	3.3379	3.3464	3.3549	3.3983	3.4072	3.4525	3.4525	3.4618	3.4342	3.4072	3.3895	3.3721
util living area												
	0.8920	0.8505	0.8004	0.7112	0.5948	0.4604	0.3376	0.3585	0.5246	0.7123	0.8428	0.9008 (86)
Living	19.7826	20.0326	20.3039	20.6210	20.8351	20.9507	20.9870	20.9839	20.9191	20.6749	20.2156	19.7502
Non living	18.8429	19.1516	19.4847	19.8726	20.1186	20.2517	20.2842	20.2843	20.2172	19.9433	19.3915	18.8102
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	20.3772	20.0326	20.3039	20.6210	20.8351	20.9507	20.9870	20.9839	20.9191	20.6749	20.2156	19.9250 (87)
Th 2	20.2602	20.2627	20.2651	20.2775	20.2800	20.2924	20.2924	20.2949	20.2875	20.2800	20.2751	20.2701 (88)
util rest of house												
	0.8808	0.8360	0.7813	0.6847	0.5591	0.4146	0.2853	0.3060	0.4785	0.6814	0.8255	0.8903 (89)
MIT 2	19.6952	19.1516	19.4847	19.8726	20.1186	20.2517	20.2842	20.2843	20.2172	19.9433	19.3915	19.0733 (90)
Living area fraction										fLA = Living area / (4) =		0.4073 (91)
MIT	19.9730	19.5104	19.8184	20.1774	20.4104	20.5364	20.5704	20.5692	20.5030	20.2412	19.7272	19.4202 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9730	19.5104	19.8184	20.1774	20.4104	20.5364	20.5704	20.5692	20.5030	20.2412	19.7272	19.4202 (93)

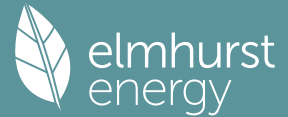
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8760	0.8194	0.7687	0.6809	0.5658	0.4306	0.3060	0.3266	0.4927	0.6797	0.8109	0.8764 (94)
Useful gains	549.6772	576.8484	565.8409	517.7499	429.4852	302.6599	207.2515	216.2354	322.4796	441.8192	499.9823	529.1309 (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	868.7529	806.9426	732.9306	609.3795	468.9339	313.6791	209.7982	219.4685	340.8874	519.0476	684.8289	831.5250 (97)
Space heating kWh	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98a)
Space heating requirement - total per year (kWh/year)												1027.1822
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	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1027.1822
Space heating per m2										(98c) / (4) =		14.6782 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												238.0569 (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	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98)
Space heating efficiency (main heating system 1)	238.0569	238.0569	238.0569	238.0569	238.0569	0.0000	0.0000	0.0000	0.0000	238.0569	238.0569	238.0569 (210)
Space heating fuel (main heating system)	99.7208	64.9523	52.2206	27.7132	12.3289	0.0000	0.0000	0.0000	0.0000	24.1362	55.9066	94.5073 (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 (217)m	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914 (216)
Fuel for water heating, kWh/month	125.5234	111.3625	118.9033	105.6267	103.2006	82.5687	81.4375	84.5587	85.3827	106.7907	112.3892	124.2661 (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	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												431.4859 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												271.1914
Water heating fuel used												1242.0101 (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)

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2068.2683 (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	431.4859	0.1561	67.3561 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1242.0101	0.1415	175.7824 (264)
Space and water heating			243.1385 (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			299.0257 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2700 (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	431.4859	1.5779	680.8310 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1242.0101	1.5234	1892.0452 (278)
Space and water heating			2572.8762 (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			3174.3083 (286)
Dwelling Primary energy Rate (DPER)			45.3600 (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

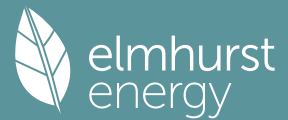
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number 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)

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External Wall	78.5600	10.2000	68.3600	0.1800	12.3048	(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978	(30)
Total net area of external elements Aum(A, m2)			148.5400			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	31.3716		(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	14.1000	0.0500	0.7050			
E10 Eaves (insulation at ceiling level)	19.5200	0.0600	1.1712			
E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604			
E16 Corner (normal)	9.4400	0.0900	0.8496			
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)			6.5634			(36)
Point Thermal bridges			0.0000			(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	37.9350		(37)

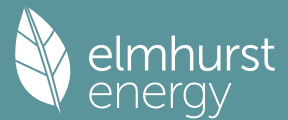
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	31.1702	31.0001	30.8333	30.0499	29.9033	29.2210	29.2210	29.0947	29.4838	29.9033	30.1998	30.5098	(38)
Average = Sum(39)m / 12 =	69.1052	68.9351	68.7683	67.9849	67.8383	67.1560	67.1560	67.0297	67.4188	67.8383	68.1348	68.4448	(39)
												67.9842	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9875	0.9851	0.9827	0.9715	0.9694	0.9596	0.9596	0.9578	0.9634	0.9694	0.9736	0.9781	(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													
Hot water usage for baths	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 other uses	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)
Average daily hot water use (litres/day)	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)
												116.0334	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	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 content (annual)	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)
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)
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													
(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	Solar flux	g	FF	Access	Gains							
	m2	Table 6a	Specific data	Specific data	factor	W							
		W/m2	or Table 6b	or Table 6c	Table 6d								

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East	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	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	28.1294	28.1988	28.2672	28.5929	28.6547	28.9459	28.9459	29.0004	28.8330	28.6547	28.5300	28.4008
alpha	2.8753	2.8799	2.8845	2.9062	2.9103	2.9297	2.9297	2.9334	2.9222	2.9103	2.9020	2.8934
util living area	0.9177	0.8867	0.8487	0.7790	0.6789	0.5345	0.4032	0.4270	0.5961	0.7812	0.8824	0.9247 (86)
MIT	19.1650	19.4523	19.8054	20.2508	20.6138	20.8636	20.9556	20.9462	20.8015	20.3528	19.7068	19.1176 (87)
Th 2	20.0938	20.0958	20.0978	20.1072	20.1089	20.1171	20.1171	20.1186	20.1139	20.1089	20.1054	20.1017 (88)
util rest of house	0.9075	0.8732	0.8303	0.7516	0.6377	0.4748	0.3291	0.3532	0.5390	0.7492	0.8663	0.9153 (89)
MIT 2	17.9627	18.3203	18.7589	19.3063	19.7318	20.0069	20.0905	20.0849	19.9443	19.4382	18.6502	17.9088 (90)
Living area fraction	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (92)
MIT	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (93)
Temperature adjustment												0.0000
adjusted MIT	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8846	0.8499	0.8090	0.7376	0.6368	0.4916	0.3570	0.3804	0.5512	0.7373	0.8444	0.8931 (94)
Useful gains	539.6491	583.8258	582.4180	550.4873	475.2330	355.0707	249.0605	259.3751	371.1932	469.3602	507.5684	523.8402 (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	977.9991	956.9101	872.3321	733.6211	569.2289	386.5387	258.0692	270.5087	417.5525	624.8362	816.2925	971.9898 (97)
Space heating kWh	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (98a)
Space heating requirement - total per year (kWh/year)												1665.7091
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	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1665.7091
Space heating per m2										(98c) / (4) =		23.8026 (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	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (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)	353.3395	271.6280	233.6903	142.8562	75.7670	0.0000	0.0000	0.0000	0.0000	125.3241	240.8249	361.2386 (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	84.8915	84.5780	84.0988	83.2826	82.1021	79.8000	79.8000	79.8000	79.8000	82.9795	84.2874	79.8000 (216)
Fuel for water heating, kWh/month	265.0216	235.3829	252.0577	225.4063	222.7000	207.6630	205.9342	213.5121	215.1663	229.3241	238.3179	84.9626 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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												1804.6685 (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												2772.6252 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
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	3120.6919 (238)

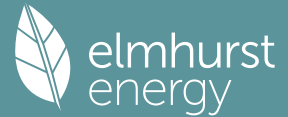
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1804.6685	0.2100	378.9804 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2772.6252	0.2100	582.2513 (264)
Space and water heating			961.2317 (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			776.3111 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0900 (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	1804.6685	1.1300	2039.2754 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2772.6252	1.1300	3133.0665 (278)
Space and water heating			5172.3419 (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			4058.3286 (286)
Target Primary Energy Rate (TPER)			57.9900 (287)

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Property Reference	OP-D320 Maisonette Top				Issued on Date	29/11/2024
Assessment Reference	Maisonette Top	Prop Type Ref	Maisonette Top			
Property	Maisonette Top					
SAP Rating	83 B	DER	4.27	TER	11.09	
Environmental	97 A	% DER < TER				61.50
CO ₂ Emissions (t/year)	0.28	DFEE	29.10	TFEE	30.02	
Compliance Check	See BREL	% DFEE < TFEE				3.06
% DPER < TPER	21.78	DPER	45.36	TPER	57.99	
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)	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

	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)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978		(30)
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 Floor			69.9800				(32d)

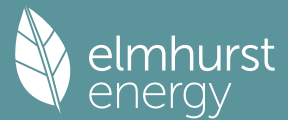
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K

List of Thermal Bridges

100.0000 (35)

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	14.1000	0.0500	0.7050
E10 Eaves (insulation at ceiling level)	19.5200	0.0600	1.1712
E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604
E16 Corner (normal)	9.4400	0.0900	0.8496
E7 Party floor between dwellings (in blocks of flats)	33.8600	0.0700	2.3702

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Thermal bridges (Sum(L x Psi) calculated using Appendix K)
 Point Thermal bridges (36a) = 6.5634 (36)
 Total fabric heat loss (33) + (36) + (36a) = 37.9825 (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	29.5859	29.4773	29.3708	28.8707	28.7771	28.3415	28.3415	28.2608	28.5093	28.7771	28.9664	29.1643 (38)
Heat transfer coeff	67.5684	67.4598	67.3533	66.8531	66.7596	66.3240	66.3240	66.2433	66.4918	66.7596	66.9489	67.1468 (39)
Average = Sum(39)m / 12 =												66.8527
HLP	0.9655	0.9640	0.9625	0.9553	0.9540	0.9478	0.9478	0.9466	0.9502	0.9540	0.9567	Dec 0.9595 (40)
HLP (average)												0.9553
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)
	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 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)
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(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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												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											
	Specific data											
	or Table 6b											
	Specific data											
	or Table 6c											
	Access											
	factor											
	Table 6d											
	Gains											
	W											
East	2.4400											14.6457 (76)
South	5.6200											80.2988 (78)
Solar gains	94.9444	160.1597	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	28.7692	28.8155	28.8611	29.0770	29.1178	29.3090	29.3090	29.3447	29.2350	29.1178	29.0354	28.9498
alpha	2.9179	2.9210	2.9241	2.9385	2.9412	2.9539	2.9539	2.9563	2.9490	2.9412	2.9357	2.9300
util living area	0.9445	0.9172	0.8838	0.8198	0.7252	0.5809	0.4440	0.4718	0.6474	0.8285	0.9170	0.9505 (86)

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MIT	18.9753	19.2859	19.6635	20.1443	20.5470	20.8338	20.9444	20.9318	20.7578	20.2408	19.5351	18.9143 (87)
Th 2	20.1121	20.1135	20.1147	20.1207	20.1219	20.1271	20.1271	20.1281	20.1251	20.1219	20.1196	20.1172 (88)
util rest of house	0.9372	0.9067	0.8687	0.7955	0.6860	0.5201	0.3652	0.3937	0.5907	0.8006	0.9048	0.9439 (89)
MIT 2	18.2627	18.5665	18.9348	19.3990	19.7718	20.0205	20.1006	20.0940	19.9605	19.4984	18.8195	18.2065 (90)
Living area fraction									fLA = Living area / (4) =			0.4073 (91)
MIT	18.5529	18.8594	19.2316	19.7025	20.0875	20.3517	20.4443	20.4352	20.2852	19.8007	19.1109	18.4948 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5529	18.8594	19.2316	19.7025	20.0875	20.3517	20.4443	20.4352	20.2852	19.8007	19.1109	18.4948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9211	0.8888	0.8510	0.7825	0.6843	0.5365	0.3946	0.4221	0.6017	0.7891	0.8877	0.9286	(94)
Useful gains	466.1288	519.1707	527.4718	510.7230	449.1757	343.0203	243.6431	253.1358	354.5336	429.9835	446.7864	448.9815	(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	963.0439	941.7011	857.5142	722.1810	559.9460	381.4778	254.9669	267.3057	411.2661	614.2377	804.1176	959.8476	(97)
Space heating kWh	369.7048	283.9405	245.5515	152.2498	82.4131	0.0000	0.0000	0.0000	0.0000	137.0851	257.2785	380.0844	(98a)
Space heating requirement - total per year (kWh/year)												1908.3076	
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	369.7048	283.9405	245.5515	152.2498	82.4131	0.0000	0.0000	0.0000	0.0000	137.0851	257.2785	380.0844	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1908.3076	
Space heating per m2										(98c) / (4) =		27.2693	(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	623.4452	490.7973	503.4490	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7869	0.8507	0.8357	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	490.5805	417.5210	420.7290	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	148.2890	190.3002	174.2566	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	37.0722	47.5751	43.5641	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												128.2114	(107)
Energy for space heating												27.2693	(99)
Energy for space cooling												1.8321	(108)
Total												29.1014	(109)
Fabric Energy Efficiency (DFEE)												29.1	(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)+(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)

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	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)
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	0.5818	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)
External Wall	78.5600	10.2000	68.3600	0.1800	12.3048			(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978			(30)
Total net area of external elements Aum(A, m2)			148.5400					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	31.3716		(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	14.1000	0.0500	0.7050	
E10 Eaves (insulation at ceiling level)	19.5200	0.0600	1.1712	
E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604	
E16 Corner (normal)	9.4400	0.0900	0.8496	
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)

6.5634 (36)

Point Thermal bridges

(33) + (36) + (36a) = 37.9350 (37)

Total fabric heat loss

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	69.1052	68.9351	68.7683	67.9849	67.8383	67.1560	67.1560	67.0297	67.4188	67.8383	68.1348	68.4448	(39)
Average = Sum(39)m / 12 =												67.9842	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	0.9875	0.9851	0.9827	0.9715	0.9694	0.9596	0.9596	0.9578	0.9634	0.9694	0.9736	0.9781	(40)
HLP (average)												0.9715	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

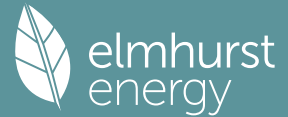
Assumed occupancy													2.2456 (42)
Hot water usage for mixer showers													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
26.7301	26.3331	25.7740	24.7433	23.9715	23.1157	22.6534	23.2085	23.8129	24.7287	25.7807	26.6397	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	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 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	0.0000	(46)
Water storage loss:													
Total storage loss													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
86.6378	75.7611	79.2540	67.7988	64.2229	56.3368	54.9360	58.2683	60.0956	68.7679	75.1292	85.5330	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)
Total per year (kWh/year)												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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												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													
(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	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	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	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)													

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	-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]												Gains W
					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d	
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	28.1294	28.1988	28.2672	28.5929	28.6547	28.9459	28.9459	29.0004	28.8330	28.6547	28.5300	28.4008
alpha	2.8753	2.8799	2.8845	2.9062	2.9103	2.9297	2.9297	2.9334	2.9222	2.9103	2.9020	2.8934
util living area	0.9453	0.9187	0.8860	0.8228	0.7294	0.5851	0.4481	0.4758	0.6516	0.8312	0.9182	0.9511 (86)
MIT	18.9136	19.2283	19.6142	20.1128	20.5270	20.8262	20.9413	20.9283	20.7469	20.2148	19.4950	18.8618 (87)
Th 2	20.0938	20.0958	20.0978	20.1072	20.1089	20.1171	20.1171	20.1186	20.1139	20.1089	20.1054	20.1017 (88)
util rest of house	0.9380	0.9082	0.8709	0.7984	0.6900	0.5237	0.3681	0.3965	0.5945	0.8033	0.9060	0.9445 (89)
MIT 2	18.1894	18.4979	18.8750	19.3592	19.7435	20.0058	20.0892	20.0829	19.9421	19.4644	18.7704	18.1442 (90)
Living area fraction	18.4843	18.7954	19.1760	19.6661	20.0626	20.3399	20.4362	20.4272	20.2699	19.7700	19.0655	18.4365 (92)
Temperature adjustment	18.4843	18.7954	19.1760	19.6661	20.0626	20.3399	20.4362	20.4272	20.2699	19.7700	19.0655	18.4365 (93)
adjusted MIT	18.4843	18.7954	19.1760	19.6661	20.0626	20.3399	20.4362	20.4272	20.2699	19.7700	19.0655	18.4365 (93)

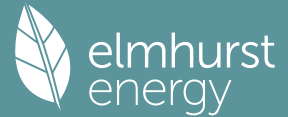
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9217	0.8900	0.8528	0.7850	0.6878	0.5399	0.3979	0.4252	0.6052	0.7913	0.8887	0.9290 (94)
Useful gains	466.4336	519.8436	528.5749	512.3089	451.4376	345.2010	245.6389	255.0197	356.6021	431.1837	447.2660	449.1812 (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	980.2114	957.8781	871.7081	731.9331	567.3029	385.4700	257.6246	269.9412	415.9678	622.0778	815.2662	974.4123 (97)
Space heating kWh	382.2507	294.3591	255.2911	158.1294	86.2038	0.0000	0.0000	0.0000	0.0000	142.0252	264.9602	390.7719 (98a)
Space heating requirement - total per year (kWh/year)												1973.9914 (88)
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 (98c)
Space heating kWh	382.2507	294.3591	255.2911	158.1294	86.2038	0.0000	0.0000	0.0000	0.0000	142.0252	264.9602	390.7719 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1973.9914 (99)
Space heating per m2												(98c) / (4) = 28.2079 (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	631.2668	496.9547	509.4256	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7810	0.8456	0.8306	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	492.9966	420.2284	423.1526	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	146.5493	188.2859	172.4535	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction												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	36.6373	47.0715	43.1134	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												126.8222 (107)
Energy for space heating												28.2079 (99)
Energy for space cooling												1.8123 (108)
Total												30.0202 (109)
Fabric Energy Efficiency (TFEE)												30.0 (109)

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Property Reference	OP-D320 Maisonette Top				Issued on Date	29/11/2024
Assessment Reference	Maisonette Top	Prop Type Ref	Maisonette Top			
Property	Maisonette Top					
SAP Rating	83 B	DER	4.27	TER	11.09	
Environmental	97 A	% DER < TER				61.50
CO ₂ Emissions (t/year)	0.28	DFEE	29.10	TFEE	30.02	
Compliance Check	See BREL	% DFEE < TFEE				3.06
% DPER < TPER	21.78	DPER	45.36	TPER	57.99	
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)	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

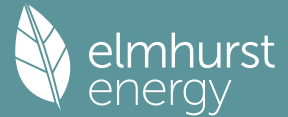
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)
External Wall	78.5600	10.2000	68.3600	0.1700	11.6212		(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978		(30)
Total net area of external elements Aum(A, m ²)			148.5400				(31)
Fabric heat loss, W/K = Sum (A x U)							(32)
Party Floor			69.9800		31.4191		(33)
							(32d)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							100.0000 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value		Total
E2 Other lintels (including other steel lintels)				6.5800	0.0500		0.3290
E3 Sill				5.5600	0.0500		0.2780
E4 Jamb				14.1000	0.0500		0.7050
E10 Eaves (insulation at ceiling level)				19.5200	0.0600		1.1712

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E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604
E16 Corner (normal)	9.4400	0.0900	0.8496
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)			6.5634 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	37.9825 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)			
Jan	Feb	Mar	Apr
May	Jun	Jul	Aug
Sep	Oct	Nov	Dec
(38)m	17.4476	17.2483	17.0491
Heat transfer coeff	16.0529	15.8537	14.8575
55.4301	55.2308	55.0316	54.0354
53.8362	52.8400	52.8400	52.6407
53.2384	53.8362	54.2346	54.6331 (39)
53.9856			
Average = Sum(39)m / 12 =			
HLP	Jan	Feb	Mar
HLP (average)	Apr	May	Jun
Days in mont	Jul	Aug	Sep
	Oct	Nov	Dec
	0.7921	0.7892	0.7864
	0.7722	0.7693	0.7551
	0.7551	0.7522	0.7608
	0.7693	0.7750	0.7807 (40)
			0.7714
			31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.2456 (42)
Hot water usage for mixer showers												84.7475 (42a)
Hot water usage for baths												28.0418 (42b)
Hot water usage for other uses												39.6080 (42c)
Average daily hot water use (litres/day)												140.5295 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	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 conte	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)
Energy content (annual)										Total = Sum(45)m =		2334.2026
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:												230.0000 (47)
Store volume												1.8000 (48)
a) If manufacturer declared loss factor is known (kWh/day):												0.7800 (49)
Temperature factor from Table 2b												1.4040 (55)
Enter (49) or (54) in (55)												
Total storage loss												
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)	
If cylinder contains dedicated solar storage												
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)	
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	22.5120	54.8576	53.0880	54.8576 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
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 (63a)	
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
Output from w/h	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)
Total per year (kWh/year)												3368.2242 (64)
Electric shower(s)												3368 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
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)

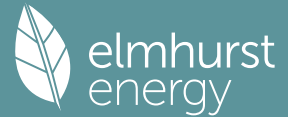
Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820	112.2820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
111.4354	123.3749	111.4354	115.1499	111.4354	115.1499	111.4354	111.4354	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 (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	Solar flux	g	FF	Access	Gains
		m2	Table 6a	Specific data	Specific data	factor	W
			W/m2	or Table 6b	or Table 6c	Table 6d	
East		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
Total gains	627.4654	703.9644	736.0876	760.4420	759.1422	702.8777	677.2574
							250.7605
							229.8683
							175.8401
							113.4429
							81.4294 (83)
							603.7234 (84)

7. Mean internal temperature (heating season)

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Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	35.0692	35.1957	35.3232	35.9744	36.1075	36.7882	36.7882	36.9275	36.5129	36.1075	35.8422	35.5808
alpha	3.3379	3.3464	3.3549	3.3983	3.4072	3.4525	3.4525	3.4618	3.4342	3.4072	3.3895	3.3721
util living area	0.8920	0.8505	0.8004	0.7112	0.5948	0.4604	0.3376	0.3585	0.5246	0.7123	0.8428	0.9008 (86)
Living	19.7826	20.0326	20.3039	20.6210	20.8351	20.9507	20.9870	20.9839	20.9191	20.6749	20.2156	19.7502
Non living	18.8429	19.1516	19.4847	19.8726	20.1186	20.2517	20.2842	20.2843	20.2172	19.9433	19.3915	18.8102
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	20.3772	20.0326	20.3039	20.6210	20.8351	20.9507	20.9870	20.9839	20.9191	20.6749	20.2156	19.9250 (87)
Th 2	20.2602	20.2627	20.2651	20.2775	20.2800	20.2924	20.2924	20.2949	20.2875	20.2800	20.2751	20.2701 (88)
util rest of house	0.8808	0.8360	0.7813	0.6847	0.5591	0.4146	0.2853	0.3060	0.4785	0.6814	0.8255	0.8903 (89)
MIT 2	19.6952	19.1516	19.4847	19.8726	20.1186	20.2517	20.2842	20.2843	20.2172	19.9433	19.3915	19.0733 (90)
Living area fraction	fLA = Living area / (4) =											0.4073 (91)
MIT	19.9730	19.5104	19.8184	20.1774	20.4104	20.5364	20.5704	20.5692	20.5030	20.2412	19.7272	19.4202 (92)
Temperature adjustment												0.0000
adjusted MIT	19.9730	19.5104	19.8184	20.1774	20.4104	20.5364	20.5704	20.5692	20.5030	20.2412	19.7272	19.4202 (93)

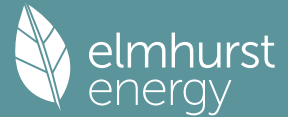
8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8760	0.8194	0.7687	0.6809	0.5658	0.4306	0.3060	0.3266	0.4927	0.6797	0.8109	0.8764 (94)
Useful gains	549.6772	576.8484	565.8409	517.7499	429.4852	302.6599	207.2515	216.2354	322.4796	441.8192	499.9823	529.1309 (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	868.7529	806.9426	732.9306	609.3795	468.9339	313.6791	209.7982	219.4685	340.8874	519.0476	684.8289	831.5250 (97)
Space heating kWh	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98a)
Space heating requirement - total per year (kWh/year)												1027.1822
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	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1027.1822
Space heating per m2												(98c) / (4) = 14.6782 (99)

9a. Energy requirements - Individual heating systems, including micro-CHP												

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												238.0569 (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	237.3923	154.6233	124.3148	65.9733	29.3498	0.0000	0.0000	0.0000	0.0000	57.4579	133.0896	224.9812 (98)
Space heating efficiency (main heating system 1)	238.0569	238.0569	238.0569	238.0569	238.0569	0.0000	0.0000	0.0000	0.0000	238.0569	238.0569	238.0569 (210)
Space heating fuel (main heating system)	99.7208	64.9523	52.2206	27.7132	12.3289	0.0000	0.0000	0.0000	0.0000	24.1362	55.9066	94.5073 (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 (217)m	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914	271.1914 (216)
Fuel for water heating, kWh/month	125.5234	111.3625	118.9033	105.6267	103.2006	82.5687	81.4375	84.5587	85.3827	106.7907	112.3892	124.2661 (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	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												431.4859 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												271.1914
Water heating fuel used												1242.0101 (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)												
Total electricity for the above, kWh/year												
Electricity for lighting (calculated in Appendix L)												
											194.1100 (230a)	
											194.1100 (231)	
											200.6623 (232)	

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Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2068.2683 (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	431.4859	0.1561	67.3561 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1242.0101	0.1415	175.7824 (264)
Space and water heating			243.1385 (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			299.0257 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2700 (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	431.4859	1.5779	680.8310 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1242.0101	1.5234	1892.0452 (278)
Space and water heating			2572.8762 (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			3174.3083 (286)
Dwelling Primary energy Rate (DPER)			45.3600 (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)

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External Wall	78.5600	10.2000	68.3600	0.1800	12.3048	(29a)
Roof - ceiling	69.9800		69.9800	0.1100	7.6978	(30)
Total net area of external elements Aum(A, m2)			148.5400			(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	31.3716		(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	14.1000	0.0500	0.7050			
E10 Eaves (insulation at ceiling level)	19.5200	0.0600	1.1712			
E12 Gable (insulation at ceiling level)	14.3400	0.0600	0.8604			
E16 Corner (normal)	9.4400	0.0900	0.8496			
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)			6.5634			(36)
Point Thermal bridges			0.0000			(36a) =
Total fabric heat loss			(33) + (36) + (36a) =	37.9350		(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	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)
Average = Sum(39)m / 12 =	69.1052	68.9351	68.7683	67.9849	67.8383	67.1560	67.1560	67.0297	67.4188	67.8383	68.1348	68.4448	(39)
												67.9842	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9875	0.9851	0.9827	0.9715	0.9694	0.9596	0.9596	0.9578	0.9634	0.9694	0.9736	0.9781	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	
												0.9715	
												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)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	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)														
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														
WWHRS	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)	
PV diverter	-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)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
Output from w/h														
	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)													2293	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Heat gains from water heating, kWh/month														
	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)	

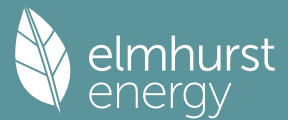
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	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)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), 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)	
Pumps, fans	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)	
Losses e.g. evaporation (negative values) (Table 5)	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
	-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

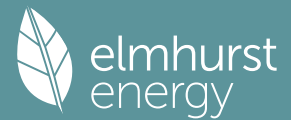
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
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East	2.4400		19.6403		0.6300		0.7000		0.7700		14.6457 (76)	
South	5.6200		46.7521		0.6300		0.7000		0.7700		80.2988 (78)	
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	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	28.1294	28.1988	28.2672	28.5929	28.6547	28.9459	28.9459	29.0004	28.8330	28.6547	28.5300	28.4008
alpha	2.8753	2.8799	2.8845	2.9062	2.9103	2.9297	2.9297	2.9334	2.9222	2.9103	2.9020	2.8934
util living area	0.9177	0.8867	0.8487	0.7790	0.6789	0.5345	0.4032	0.4270	0.5961	0.7812	0.8824	0.9247 (86)
MIT	19.1650	19.4523	19.8054	20.2508	20.6138	20.8636	20.9556	20.9462	20.8015	20.3528	19.7068	19.1176 (87)
Th 2	20.0938	20.0958	20.0978	20.1072	20.1089	20.1171	20.1171	20.1186	20.1139	20.1089	20.1054	20.1017 (88)
util rest of house	0.9075	0.8732	0.8303	0.7516	0.6377	0.4748	0.3291	0.3532	0.5390	0.7492	0.8663	0.9153 (89)
MIT 2	17.9627	18.3203	18.7589	19.3063	19.7318	20.0069	20.0905	20.0849	19.9443	19.4382	18.6502	17.9088 (90)
Living area fraction	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (92)
MIT	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (93)
Temperature adjustment												0.0000
adjusted MIT	18.4523	18.7813	19.1851	19.6909	20.0910	20.3558	20.4428	20.4357	20.2934	19.8107	19.0805	18.4011 (93)
8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8846	0.8499	0.8090	0.7376	0.6368	0.4916	0.3570	0.3804	0.5512	0.7373	0.8444	0.8931 (94)
Useful gains	539.6491	583.8258	582.4180	550.4873	475.2330	355.0707	249.0605	259.3751	371.1932	469.3602	507.5684	523.8402 (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	977.9991	956.9101	872.3321	733.6211	569.2289	386.5387	258.0692	270.5087	417.5525	624.8362	816.2925	971.9898 (97)
Space heating kWh	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (98a)
Space heating requirement - total per year (kWh/year)												1665.7091
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	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1665.7091
Space heating per m2										(98c) / (4) =		23.8026 (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	326.1324	250.7126	215.6961	131.8563	69.9329	0.0000	0.0000	0.0000	0.0000	115.6741	222.2814	333.4233 (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)	353.3395	271.6280	233.6903	142.8562	75.7670	0.0000	0.0000	0.0000	0.0000	125.3241	240.8249	361.2386 (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	84.8915	84.5780	84.0988	83.2826	82.1021	79.8000	79.8000	79.8000	79.8000	82.9795	84.2874	79.8000 (216)
Fuel for water heating, kWh/month	265.0216	235.3829	252.0577	225.4063	222.7000	207.6630	205.9342	213.5121	215.1663	229.3241	238.3179	84.9626 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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												1804.6685 (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												2772.6252 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
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	3120.6919 (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	1804.6685	0.2100	378.9804 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2772.6252	0.2100	582.2513 (264)
Space and water heating			961.2317 (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			776.3111 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.0900 (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	1804.6685	1.1300	2039.2754 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2772.6252	1.1300	3133.0665 (278)
Space and water heating			5172.3419 (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			4058.3286 (286)
Target Primary Energy Rate (TPER)			57.9900 (287)