

Full SAP Calculation Printout



Property Reference	OP-D320 A3BEEC				Issued on Date	29/11/2024
Assessment Reference	A3BEEC		Prop Type Ref	A3BEEC		
Property	A3BEEC					
SAP Rating	82 B	DER	4.21	TER	10.84	
Environmental	96 A	% DER < TER				61.16
CO ₂ Emissions (t/year)	0.37	DFEE	36.61	TFEE	37.54	
Compliance Check	See BREL	% DFEE < TFEE				2.49
% DPER < TPER	21.19	DPER	44.51	TPER	56.48	
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	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 231.6828 (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)

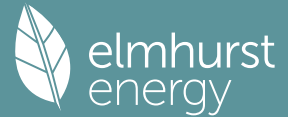
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		3.5000	(17)
Infiltration rate		0.1750	(18)
Number of sides sheltered		2	(19)
Shelter factor	(20) = 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) =												72.0000 (23c)
Effective ac	0.3297	0.3259	0.3222	0.3036	0.2999	0.2813	0.2813	0.2776	0.2888	0.2999	0.3073	0.3148 (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)			20.7500	1.2357	25.6416		(27)
Ground Floor			47.0900	0.1100	5.1799		(28a)
External Wall	114.1000	22.8900	91.2100	0.1700	15.5057		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Total net area of external elements Aum(A, m ²)			208.2800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.6471		(33)
Party Wall			25.8300	0.0000	0.0000		(32)
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)				16.0200	0.0500		0.8010
E3 Sill				13.1900	0.0500		0.6595

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E4 Jamb	35.4000	0.0500	1.7700
E5 Ground floor (normal)	23.1900	0.1600	3.7104
E6 Intermediate floor within a dwelling	23.1900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150
E16 Corner (normal)	9.8500	0.0900	0.8865
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.2500	0.0800	0.4200
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.8598 (36)

Point Thermal bridges 0.0000

Total fabric heat loss (33) + (36) + (36a) = 64.5069 (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	25.2040	24.9197	24.6353	23.2137	22.9294	21.5078	21.5078	21.2235	22.0765	22.9294	23.4981	24.0667 (38)
Average = Sum(39)m / 12 =	89.7109	89.4266	89.1423	87.7207	87.4364	86.0148	86.0148	85.7305	86.5834	87.4364	88.0050	88.5736 (39)
												87.6496

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9525	0.9495	0.9465	0.9314	0.9284	0.9133	0.9133	0.9103	0.9193	0.9284	0.9344	0.9405 (40)
HLP (average)												0.9307
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.6787 (42)
Hot water usage for mixer showers	95.0581	93.6296	91.5479	87.5650	84.6258	81.3479	79.4848	81.5507	83.8153	87.3347	91.4032	94.6939 (42a)
Hot water usage for baths	31.4239	30.9573	30.3001	29.0883	28.1810	27.1749	26.6314	27.2840	27.9946	29.0711	30.3078	31.3177 (42b)
Hot water usage for other uses	44.2767	42.6666	41.0565	39.4465	37.8364	36.2264	36.2264	37.8364	39.4465	41.0565	42.6666	44.2767 (42c)
Average daily hot water use (litres/day)												157.0268 (43)
Daily hot water use	170.7587	167.2534	162.9045	156.0998	150.6431	144.7491	142.3426	146.6711	151.2564	157.4624	164.3776	170.2883 (44)
Energy content (annual)	270.4401	238.1666	250.3782	213.6928	202.7946	177.9859	172.1510	181.6095	186.5142	213.6750	234.1860	266.6303 (45)
Distribution loss (46)m = 0.15 x (45)m	40.5660	35.7250	37.5567	32.0539	30.4192	26.6979	25.8226	27.2414	27.9771	32.0512	35.1279	39.9945 (46)
Water storage loss:												
Store volume												230.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)
Temperature factor from Table 2b												0.7800 (49)
Enter (49) or (54) in (55)												1.4040 (55)
Total storage loss	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (56)
If cylinder contains dedicated solar storage	43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240 (57)
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119 (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	368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119 (64)
12Total per year (kWh/year)												3642.2458 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	133.8074	118.8294	127.1368	113.5233	111.3153	77.1899	75.8501	78.9951	80.0256	114.9330	120.3373	132.5406 (65)

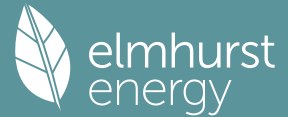
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts												
(66)m	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	128.5456	124.3990	128.5456	124.3990 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936 (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)	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490 (71)
Water heating gains (Table 5)	179.8487	176.8295	170.8828	157.6712	149.6173	107.2082	101.9491	106.1762	111.1466	154.4799	167.1351	178.1460 (72)
Total internal gains	613.9898	626.8577	601.1351	578.3443	548.8174	494.2706	473.9859	475.6545	491.2190	544.1314	578.2596	601.4082 (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
North	9.1500	10.6334	0.6300	0.7000	0.7700	29.7348 (74)
East	3.5400	19.6403	0.6300	0.7000	0.7700	21.2482 (76)
South	8.0600	46.7521	0.6300	0.7000	0.7700	115.1616 (78)

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Solar gains	166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721 (83)
Total gains	780.1344	913.8534	1006.3967	1104.8118	1163.0561	1115.4929	1068.1096	1002.1359	937.8970	864.5235	777.9410	743.1803 (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	29.1616	29.2543	29.3476	29.8232	29.9202	30.4147	30.4147	30.5155	30.2149	29.9202	29.7268	29.5360
alpha	2.9441	2.9503	2.9565	2.9882	2.9947	3.0276	3.0276	3.0344	3.0143	2.9947	2.9818	2.9691
util living area	0.9240	0.8854	0.8319	0.7341	0.6045	0.4622	0.3443	0.3791	0.5660	0.7683	0.8869	0.9320 (86)
Living	19.1933	19.5327	19.9393	20.4133	20.7417	20.9177	20.9747	20.9659	20.8433	20.4251	19.7521	19.1429
Non living	18.0176	18.4399	18.9417	19.5188	19.8949	20.0905	20.1411	20.1374	20.0175	19.5477	18.7290	17.9614
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	20.0758	19.5327	19.9393	20.4133	20.7417	20.9177	20.9747	20.9659	20.8433	20.4251	19.7521	19.4027 (87)
Th 2	20.1231	20.1256	20.1281	20.1409	20.1434	20.1562	20.1562	20.1588	20.1511	20.1434	20.1383	20.1332 (88)
util rest of house	0.9146	0.8721	0.8127	0.7052	0.5638	0.4090	0.2817	0.3145	0.5114	0.7362	0.8716	0.9235 (89)
MIT 2	19.2837	18.4399	18.9417	19.5188	19.8949	20.0905	20.1411	20.1374	20.0175	19.5477	18.7290	18.3527 (90)
Living area fraction	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	0.1890 (91)
MIT	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	18.5512 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	18.5512 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9062	0.8450	0.7875	0.6886	0.5594	0.4149	0.2925	0.3251	0.5130	0.7183	0.8454	0.9042 (94)
Useful gains	706.9594	772.1700	792.5531	760.8232	650.5622	462.7847	312.3877	325.8110	481.0960	621.0223	657.6688	672.0027 (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	1357.6297	1229.2946	1125.8872	946.3183	730.5294	485.7141	318.1399	333.8305	525.8691	796.8544	1040.4245	1271.1349 (97)
Space heating kWh	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98a)
Space heating requirement - total per year (kWh/year)												2084.4965
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	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2084.4965
Space heating per m2										(98c) / (4) =		22.1331 (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 %)												254.4503 (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	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98)
Space heating efficiency (main heating system 1)	254.4503	254.4503	254.4503	254.4503	254.4503	0.0000	0.0000	0.0000	0.0000	254.4503	254.4503	254.4503 (210)
Space heating fuel (main heating system)	190.2527	120.7260	97.4653	52.4882	23.3820	0.0000	0.0000	0.0000	0.0000	51.4124	108.3057	175.1833 (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	368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119 (64)
Efficiency of water heater (217)m	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619 (216)
Fuel for water heating, kWh/month	136.8734	121.3632	129.4282	114.6362	111.7695	90.0379	88.6721	92.1822	93.2029	115.8073	122.2414	135.4596 (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	29.2395	26.4099	29.2395	28.2963	29.2395	28.2963	29.2395	29.2395	28.2963	29.2395	28.2963	29.2395 (231)
Lighting	25.8477	20.7359	18.6704	13.6788	10.5659	8.6324	9.6385	12.5285	16.2733	21.3515	24.1164	26.5660 (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												819.2157 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.4619
Water heating fuel used												1351.6738 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)	
mechanical ventilation fans (SFP = 1.2180)	344.2714 (230a)
Total electricity for the above, kWh/year	344.2714 (231)
Electricity for lighting (calculated in Appendix L)	208.6054 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2723.7663 (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	819.2157	0.1559	127.7329 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1351.6738	0.1415	191.3080 (264)
Space and water heating			319.0409 (265)
Pumps, fans and electric keep-hot	344.2714	0.1387	47.7547 (267)
Energy for lighting	208.6054	0.1443	30.1082 (268)
Total CO2, kg/year			396.9038 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2100 (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	819.2157	1.5772	1292.0616 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1351.6738	1.5234	2059.1209 (278)
Space and water heating			3351.1825 (279)
Pumps, fans and electric keep-hot	344.2714	1.5128	520.8137 (281)
Energy for lighting	208.6054	1.5338	319.9659 (282)
Total Primary energy kWh/year			4191.9621 (286)
Dwelling Primary energy Rate (DPER)			44.5100 (287)

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

1. Overall dwelling characteristics

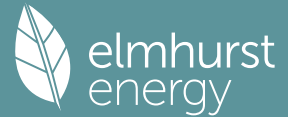
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.6828 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1295 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3795 (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) = 0.3226 (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	0.4113	0.4032	0.3951	0.3548	0.3468	0.3064	0.3064	0.2984	0.3226	0.3468	0.3629	0.3790 (22b)
Effective ac	0.5846	0.5813	0.5781	0.5629	0.5601	0.5470	0.5470	0.5445	0.5520	0.5601	0.5658	0.5718 (25)

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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	
TER Opaque door			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			20.7500	1.1450	23.7595			(27)
Ground Floor			47.0900	0.1300	6.1217			(28a)
External Wall	114.1000	22.8900	91.2100	0.1800	16.4178			(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799			(30)
Total net area of external elements Aum(A, m ²)			208.2800					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Party Wall			25.8300	0.0000	0.0000			(32)

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)	16.0200	0.0500	0.8010	
E3 Sill	13.1900	0.0500	0.6595	
E4 Jamb	35.4000	0.0500	1.7700	
E5 Ground floor (normal)	23.1900	0.1600	3.7104	
E6 Intermediate floor within a dwelling	23.1900	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764	
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	5.2500	0.0800	0.4200	
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				10.8598 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 64.4787 (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	44.6936	44.4425	44.1964	43.0404	42.8242	41.8174	41.8174	41.6309	42.2052	42.8242	43.2617	43.7191	(38)
Average = Sum(39)m / 12 =	109.1723	108.9212	108.6751	107.5192	107.3029	106.2961	106.2961	106.1097	106.6839	107.3029	107.7404	108.1978	(39)
												107.5181	
HLP	1.1592	1.1565	1.1539	1.1416	1.1393	1.1286	1.1286	1.1267	1.1328	1.1393	1.1440	1.1488	(40)
HLP (average)												1.1416	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

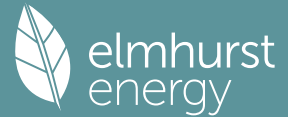
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6787 (42)
Hot water usage for mixer showers													
69.1332	68.0942	66.5803	63.6837	61.5460	59.1621	57.8071	59.3096	60.9566	63.5162	66.4750	68.8683	68.8683	(42a)
Hot water usage for baths													
29.8527	29.4094	28.7851	27.6339	26.7719	25.8161	25.2998	25.9198	26.5948	27.6176	28.7925	29.7518	29.7518	(42b)
Hot water usage for other uses													
42.0628	40.5333	39.0037	37.4741	35.9446	34.4150	34.4150	35.9446	37.4741	39.0037	40.5333	42.0628	42.0628	(42c)
Average daily hot water use (litres/day)													129.6556 (43)
Daily hot water use													
141.0487	138.0369	134.3691	128.7917	124.2625	119.3933	117.5220	121.1740	125.0256	130.1374	135.8007	140.6829	140.6829	(44)
Energy conte	223.3867	196.5627	206.5202	176.3094	167.2812	146.8080	142.1327	150.0387	154.1690	176.5953	193.4730	220.2755	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													2153.5525
33.5080	29.4844	30.9780	26.4464	25.0922	22.0212	21.3199	22.5058	23.1254	26.4893	29.0210	33.0413	33.0413	(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	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	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													
276.7363	244.7494	259.8699	227.9381	220.6308	198.4366	195.4823	203.3883	205.7977	229.9449	245.1017	273.6251	273.6251	(62)
WWHRS	-31.6048	-27.9515	-29.2692	-24.2361	-22.5872	-19.3280	-18.1169	-19.2655	-19.9975	-23.5748	-26.7074	-31.0195	(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													
245.1315	216.7979	230.6006	203.7020	198.0437	179.1086	177.3654	184.1228	185.8002	206.3701	218.3943	242.6056	242.6056	(64)
12Total per year (kWh/year)													2488.0427 (64)
Electric shower(s)													2488 (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	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
116.9558	103.9065	111.3477	99.9258	98.3007	90.1166	89.9388	92.5676	92.5641	101.3976	105.6327	115.9213	115.9213	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	128.5456	124.3990	128.5456	124.3990	128.5456	124.3990	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823	235.6823	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	(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)													

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	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	(71)
Water heating gains (Table 5)	157.1986	154.6228	149.6609	138.7858	132.1246	125.1619	120.8855	124.4188	128.5613	136.2871	146.7121	155.8082	(72)
Total internal gains	594.3398	607.6509	582.9131	562.4589	534.3247	512.2243	492.9223	493.8971	508.6337	528.9387	560.8366	582.0704	(73)

6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		FF Access factor Table 6d		Gains W	
North	9.1500				10.6334		0.6300		0.7000		0.7700		29.7348 (74)	
East	3.5400				19.6403		0.6300		0.7000		0.7700		21.2482 (76)	
South	8.0600				46.7521		0.6300		0.7000		0.7700		115.1616 (78)	
Solar gains	166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721	(83)	
Total gains	760.4844	894.6466	988.1748	1088.9265	1148.5634	1133.4466	1087.0460	1020.3786	955.3117	849.3308	760.5181	723.8425	(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	23.9631	24.0184	24.0728	24.3316	24.3806	24.6115	24.6115	24.6548	24.5221	24.3806	24.2816	24.1790
alpha	2.5975	2.6012	2.6049	2.6221	2.6254	2.6408	2.6408	2.6437	2.6348	2.6254	2.6188	2.6119
util living area	0.9372	0.9067	0.8642	0.7848	0.6716	0.5264	0.4025	0.4402	0.6252	0.8143	0.9087	0.9437 (86)
MIT	18.6032	18.9639	19.4391	20.0307	20.5075	20.8174	20.9343	20.9151	20.6976	20.0778	19.2500	18.5422 (87)
Th 2	19.9528	19.9549	19.9570	19.9670	19.9688	19.9775	19.9775	19.9791	19.9742	19.9688	19.9651	19.9611 (88)
util rest of house	0.9284	0.8941	0.8456	0.7552	0.6257	0.4596	0.3182	0.3546	0.5612	0.7821	0.8942	0.9357 (89)
MIT 2	17.1753	17.6266	18.2178	18.9428	19.4985	19.8357	19.9408	19.9288	19.7211	19.0177	17.9994	17.1038 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.4452	17.8793	18.4486	19.1484	19.6892	20.0212	20.1285	20.1152	19.9056	19.2181	18.2358	17.3756 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.4452	17.8793	18.4486	19.1484	19.6892	20.0212	20.1285	20.1152	19.9056	19.2181	18.2358	17.3756 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8994	0.8617	0.8127	0.7282	0.6120	0.4626	0.3311	0.3665	0.5566	0.7542	0.8627	0.9082 (94)
Useful gains	684.0082	770.9186	803.0748	792.9455	702.9585	524.3686	359.9666	374.0073	531.6829	640.5752	656.0754	657.4239 (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	1435.0882	1413.7258	1298.5207	1101.8988	857.2635	576.2569	375.0691	394.2169	619.3691	924.7445	1199.7727	1425.5741 (97)
Space heating kWh	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (98a)
Space heating requirement - total per year (kWh/year)	2871.0190											
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	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2871.0190											
Space heating per m2	(98c) / (4) = 30.4844 (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	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (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)	605.4210	468.0027	399.3627	241.0037	124.3802	0.0000	0.0000	0.0000	0.0000	229.0595	424.1193	619.1807 (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	245.1315	216.7979	230.6006	203.7020	198.0437	179.1086	177.3654	184.1228	185.8002	206.3701	218.3943	242.6056 (64)
Efficiency of water heater (217)m	85.8478	85.5748	85.1061	84.2576	82.8826	79.8000	79.8000	79.8000	79.8000	84.1141	85.3528	79.8000 (216)
Fuel for water heating, kWh/month	285.5421	253.3431	270.9565	241.7609	238.9449	224.4469	222.2624	230.7304	232.8324	245.3455	255.8725	282.3867 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	25.8477	20.7359	18.6704	13.6788	10.5659	8.6324	9.6385	12.5285	16.2733	21.3515	24.1164	26.5660 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-43.3053	-60.6742	-86.6790	-96.8341	-103.8769	-96.7354	-95.4956	-90.3831	-81.3274	-69.0349	-47.4565	-37.4808 (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)

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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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-25.6437	-53.8037	-106.6909	-159.9020	-211.1243	-212.0494	-209.5953	-177.6429	-130.4168	-76.8817	-34.2144	-20.2930	(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													3110.5297	(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													2984.4240	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													208.6054	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2327.5412	(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													4062.0179	(238)

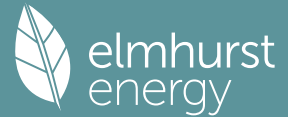
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	3110.5297	0.2100	653.2112 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2984.4240	0.2100	626.7290 (264)
Space and water heating			1279.9403 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	208.6054	0.1443	30.1082 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-909.2832	0.1347	-122.5047
PV Unit electricity exported	-1418.2580	0.1260	-178.6361
Total			-301.1408 (269)
Total CO2, kg/year			1020.8370 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.8400 (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	3110.5297	1.1300	3514.8986 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2984.4240	1.1300	3372.3992 (278)
Space and water heating			6887.2978 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	208.6054	1.5338	319.9659 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-909.2832	1.4979	-1362.0470
PV Unit electricity exported	-1418.2580	0.4623	-655.7206
Total			-2017.7677 (283)
Total Primary energy kWh/year			5319.5968 (286)
Target Primary Energy Rate (TPER)			56.4800 (287)

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Property Reference	OP-D320 A3BEEC				Issued on Date	29/11/2024		
Assessment Reference	A3BEEC			Prop Type Ref	A3BEEC			
Property	A3BEEC							
SAP Rating	82 B		DER	4.21		TER	10.84	
Environmental	96 A		% DER < TER				61.16	
CO ₂ Emissions (t/year)	0.37		DFEE	36.61		TFEE	37.54	
Compliance Check	See BREL		% DFEE < TFEE				2.49	
% DPER < TPER	21.19		DPER	44.51		TPER	56.48	
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	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 231.6828 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1295 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5000 (17)
Infiltration rate	0.3045 (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) = 0.2588 (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	0.3300	0.3235	0.3170	0.2847	0.2782	0.2459	0.2459	0.2394	0.2588	0.2782	0.2912	0.3041 (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	0.5544	0.5523	0.5503	0.5405	0.5387	0.5302	0.5302	0.5287	0.5335	0.5387	0.5424	0.5462 (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)			20.7500	1.2357	25.6416		(27)
Ground Floor			47.0900	0.1100	5.1799		(28a)
External Wall	114.1000	22.8900	91.2100	0.1700	15.5057		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Total net area of external elements Aum(A, m ²)			208.2800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	53.6471		(33)
Party Wall			25.8300	0.0000	0.0000		(32)

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

List of Thermal Bridges	Length	Psi-value	Total
K1 Element	16.0200	0.0500	0.8010
E2 Other lintels (including other steel lintels)	13.1900	0.0500	0.6595
E3 Sill	35.4000	0.0500	1.7700
E4 Jamb	23.1900	0.1600	3.7104
E5 Ground floor (normal)	23.1900	0.0000	0.0000
E6 Intermediate floor within a dwelling			

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E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150
E16 Corner (normal)	9.8500	0.0900	0.8865
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.2500	0.0800	0.4200
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.8598 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	64.5069 (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	42.3904	42.2287	42.0703	41.3261	41.1868	40.5387	40.5387	40.4186	40.7883	41.1868	41.4685	41.7630 (38)
Average = Sum(39)m / 12 =	106.8973	106.7356	106.5772	105.8330	105.6938	105.0456	105.0456	104.9256	105.2953	105.6938	105.9754	106.2699 (39)
												105.8323
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1350	1.1333	1.1316	1.1237	1.1223	1.1154	1.1154	1.1141	1.1180	1.1223	1.1252	1.1284 (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												2.6787 (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	29.8527	29.4094	28.7851	27.6339	26.7719	25.8161	25.2998	25.9198	26.5948	27.6176	28.7925	29.7518 (42b)
Hot water usage for other uses	42.0628	40.5333	39.0037	37.4741	35.9446	34.4150	34.4150	35.9446	37.4741	39.0037	40.5333	42.0628 (42c)
Average daily hot water use (litres/day)												65.9171 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	71.9156	69.9427	67.7888	65.1080	62.7165	60.2311	59.7149	61.8644	64.0690	66.6213	69.3257	71.8146 (44)
Energy content (annual)	113.8967	99.5974	104.1888	89.1297	84.4285	74.0612	72.2200	76.6011	79.0035	90.4045	98.7672	112.4444 (45)
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	96.8122	84.6578	88.5605	75.7602	71.7642	62.9520	61.3870	65.1109	67.1530	76.8438	83.9521	95.5777 (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	96.8122	84.6578	88.5605	75.7602	71.7642	62.9520	61.3870	65.1109	67.1530	76.8438	83.9521	95.5777 (64)
12Total per year (kWh/year)												930.5313 (64)
Electric shower(s)	55.3642	49.3299	53.8664	51.4040	52.3686	49.9546	51.6197	52.3686	51.4040	53.8664	52.8535	55.3642 (64a)
Heat gains from water heating, kWh/month	38.0441	33.4969	35.6067	31.7911	31.0332	28.2267	28.2517	29.3699	29.6392	32.6775	34.2014	37.7355 (65)
												629.7640 (64a)

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	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	128.5456	124.3990	128.5456	124.3990 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823 (68)
Pumps, fans	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490 (71)
Total internal gains	51.1345	49.8466	47.8585	44.1542	41.7113	39.2037	37.9727	39.4756	41.1656	43.9214	47.5019	50.7197 (72)
	485.2757	499.8748	478.1107	464.8273	440.9114	426.2661	410.0095	408.9539	421.2380	433.5729	458.6265	473.9819 (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			
North				9.1500	10.6334		0.6300		0.7000		0.7700	29.7348 (74)			
East				3.5400	19.6403		0.6300		0.7000		0.7700	21.2482 (76)			
South				8.0600	46.7521		0.6300		0.7000		0.7700	115.1616 (78)			
Solar gains				166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721 (83)
Total gains				651.4203	786.8705	883.3724	991.2949	1055.1501	1047.4884	1004.1332	935.4354	867.9160	753.9651	658.3079	615.7540 (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	24.4731	24.5102	24.5466	24.7192	24.7518	24.9045	24.9045	24.9330	24.8455	24.7518	24.6860	24.6176
alpha	2.6315	2.6340	2.6364	2.6479	2.6501	2.6603	2.6603	2.6622	2.6564	2.6501	2.6457	2.6412
util living area	0.9541	0.9264	0.8872	0.8111	0.6998	0.5538	0.4268	0.4689	0.6592	0.8453	0.9307	0.9598 (86)
MIT	18.4672	18.8451	19.3403	19.9587	20.4654	20.7979	20.9263	20.9035	20.6620	19.9901	19.1209	18.3944 (87)
Th 2	19.9723	19.9737	19.9751	19.9815	19.9827	19.9883	19.9883	19.9893	19.9861	19.9827	19.9803	19.9777 (88)
util rest of house	0.9474	0.9161	0.8711	0.7837	0.6553	0.4864	0.3396	0.3805	0.5962	0.8166	0.9191	0.9539 (89)
MIT 2	17.6692	18.0397	18.5224	19.1164	19.5805	19.8644	19.9557	19.9439	19.7621	19.1607	18.3206	17.6013 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.8200	18.1919	18.6770	19.2756	19.7478	20.0408	20.1391	20.1253	19.9322	19.3174	18.4719	17.7512 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.8200	18.1919	18.6770	19.2756	19.7478	20.0408	20.1391	20.1253	19.9322	19.3174	18.4719	17.7512 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9286	0.8932	0.8462	0.7619	0.6440	0.4901	0.3532	0.3930	0.5925	0.7942	0.8970	0.9364 (94)
Useful gains	604.8994	702.8141	747.5190	755.2481	679.5552	513.3819	354.6661	367.6336	514.2783	598.8251	590.5107	576.6041 (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	1445.2543	1418.7232	1297.7898	1098.0840	850.5988	571.5363	371.7690	390.8783	614.1037	921.3798	1205.1411	1440.0825 (97)
Space heating kWh	625.2240	481.0910	409.4015	246.8418	127.2565	0.0000	0.0000	0.0000	0.0000	239.9807	442.5339	642.4279 (98a)
Space heating requirement - total per year (kWh/year)	3214.7573											
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	625.2240	481.0910	409.4015	246.8418	127.2565	0.0000	0.0000	0.0000	0.0000	239.9807	442.5339	642.4279 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3214.7573											
Space heating per m2	(98c) / (4) = 34.1342 (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	987.4287	777.3375	797.4344	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7866	0.8446	0.8176	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	776.7005	656.5011	651.9741	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1175.0638	1126.7984	1048.9467	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	286.8216	349.9012	295.3477	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	fc = cooled area / (4) =											
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 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	71.7054	87.4753	73.8369	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												233.0176 (107)
Energy for space cooling												34.1342 (99)
Total												2.4742 (108)
Fabric Energy Efficiency (DFEE)												36.6084 (109)
												36.6 (109)

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

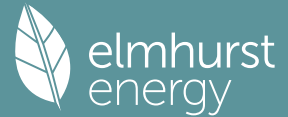
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.6828 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1295 (8)

Full SAP Calculation Printout



Pressure test												Yes
Pressure Test Method												Blower Door
Measured/design AP50												5.0000 (17)
Infiltration rate												0.3795 (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) = 0.3226 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	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)
Adj infilt rate	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)
	0.4113	0.4032	0.3951	0.3548	0.3468	0.3064	0.3064	0.2984	0.3226	0.3468	0.3629	0.3790 (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	0.5846	0.5813	0.5781	0.5629	0.5601	0.5470	0.5470	0.5445	0.5520	0.5601	0.5658	0.5718 (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)			20.7500	1.1450	23.7595		(27)
Ground Floor			47.0900	0.1300	6.1217		(28a)
External Wall	114.1000	22.8900	91.2100	0.1800	16.4178		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Total net area of external elements Aum(A, m2)			208.2800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 53.6189		(33)
Party Wall			25.8300	0.0000	0.0000		(32)

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)	16.0200	0.0500	0.8010
E3 Sill	13.1900	0.0500	0.6595
E4 Jamb	35.4000	0.0500	1.7700
E5 Ground floor (normal)	23.1900	0.1600	3.7104
E6 Intermediate floor within a dwelling	23.1900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150
E16 Corner (normal)	9.8500	0.0900	0.8865
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.2500	0.0800	0.4200
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300

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

10.8598 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 64.4787 (37)

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

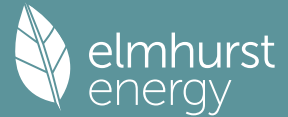
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.6936	44.4425	44.1964	43.0404	42.8242	41.8174	41.8174	41.6309	42.2052	42.8242	43.2617	43.7191 (38)
Average = Sum(39)m / 12 =	109.1723	108.9212	108.6751	107.5192	107.3029	106.2961	106.2961	106.1097	106.6839	107.3029	107.7404	108.1978 (39)
												107.5181

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1592	1.1565	1.1539	1.1416	1.1393	1.1286	1.1286	1.1267	1.1328	1.1393	1.1440	1.1488 (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												2.6787 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	29.8527	29.4094	28.7851	27.6339	26.7719	25.8161	25.2998	25.9198	26.5948	27.6176	28.7925	29.7518 (42b)
Hot water usage for other uses	42.0628	40.5333	39.0037	37.4741	35.9446	34.4150	34.4150	35.9446	37.4741	39.0037	40.5333	42.0628 (42c)
Average daily hot water use (litres/day)												65.9171 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	71.9156	69.9427	67.7888	65.1080	62.7165	60.2311	59.7149	61.8644	64.0690	66.6213	69.3257	71.8146 (44)
Energy content (annual)	113.8967	99.5974	104.1888	89.1297	84.4285	74.0612	72.2200	76.6011	79.0035	90.4045	98.7672	112.4444 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1094.7427
Water 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 (46)
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	96.8122	84.6578	88.5605	75.7602	71.7642	62.9520	61.3870	65.1109	67.1530	76.8438	83.9521	95.5777 (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 (64a)
Output from w/h	96.8122	84.6578	88.5605	75.7602	71.7642	62.9520	61.3870	65.1109	67.1530	76.8438	83.9521	95.5777 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 930.5313 (64)
Electric shower(s)	55.3642	49.3299	53.8664	51.4040	52.3686	49.9546	51.6197	52.3686	51.4040	53.8664	52.8535	55.3642 (64a)
Heat gains from water heating, kWh/month	38.0441	33.4969	35.6067	31.7911	31.0332	28.2267	28.2517	29.3699	29.6392	32.6775	34.2014	37.7355 (65)

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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	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	128.5456	124.3990	128.5456	124.3990 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936 (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)	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490 (71)
Water heating gains (Table 5)	51.1345	49.8466	47.8585	44.1542	41.7113	39.2037	37.9727	39.4756	41.1656	43.9214	47.5019	50.7197 (72)
Total internal gains	485.2757	499.8748	478.1107	464.8273	440.9114	426.2661	410.0095	408.9539	421.2380	433.5729	458.6265	473.9819 (73)

6. Solar gains

[Jan]	Area m ²		Solar flux Table 6a W/m ²		Specific data or Table 6b g		Specific data or Table 6c FF		Access factor Table 6d		Gains W	
North	9.1500		10.6334		0.6300		0.7000		0.7700		29.7348 (74)	
East	3.5400		19.6403		0.6300		0.7000		0.7700		21.2482 (76)	
South	8.0600		46.7521		0.6300		0.7000		0.7700		115.1616 (78)	
Solar gains	166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721 (83)
Total gains	651.4203	786.8705	883.3724	991.2949	1055.1501	1047.4884	1004.1332	935.4354	867.9160	753.9651	658.3079	615.7540 (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	23.9631	24.0184	24.0728	24.3316	24.3806	24.6115	24.6115	24.6548	24.5221	24.3806	24.2816	24.1790
alpha	2.5975	2.6012	2.6049	2.6221	2.6254	2.6408	2.6408	2.6437	2.6348	2.6254	2.6188	2.6119
util living area	0.9545	0.9274	0.8889	0.8137	0.7037	0.5575	0.4305	0.4725	0.6629	0.8473	0.9314	0.9601 (86)
MIT	18.4070	18.7880	19.2906	19.9265	20.4449	20.7900	20.9227	20.8993	20.6498	19.9631	19.0809	18.3432 (87)
Th 2	19.9528	19.9549	19.9570	19.9670	19.9688	19.9775	19.9775	19.9791	19.9742	19.9688	19.9651	19.9611 (88)
util rest of house	0.9478	0.9171	0.8728	0.7863	0.6589	0.4894	0.3420	0.3829	0.5994	0.8186	0.9199	0.9542 (89)
MIT 2	17.5971	17.9714	18.4620	19.0757	19.5515	19.8489	19.9434	19.9319	19.7423	19.1254	18.2715	17.5399 (90)
Living area fraction	17.7502	18.1257	18.6186	19.2365	19.7204	20.0268	20.1285	20.1147	19.9138	19.2837	18.4245	17.6917 (92)
MIT	17.7502	18.1257	18.6186	19.2365	19.7204	20.0268	20.1285	20.1147	19.9138	19.2837	18.4245	17.6917 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7502	18.1257	18.6186	19.2365	19.7204	20.0268	20.1285	20.1147	19.9138	19.2837	18.4245	17.6917 (93)

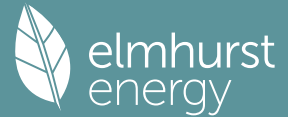
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9288	0.8939	0.8475	0.7639	0.6470	0.4929	0.3557	0.3954	0.5953	0.7958	0.8975	0.9365 (94)
Useful gains	605.0407	703.3467	748.6716	757.2619	682.7050	516.3177	357.1277	369.9113	516.6728	599.9815	590.8366	576.6722 (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	1468.3886	1440.5601	1316.9922	1111.3715	860.6099	576.8440	375.0675	394.1707	620.2415	931.7871	1220.1057	1459.7756 (97)
Space heating kWh	642.3308	495.4074	422.8306	254.9589	132.3613	0.0000	0.0000	0.0000	0.0000	246.8634	453.0738	657.0290 (98a)
Space heating requirement - total per year (kWh/year)												3304.8551
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	642.3308	495.4074	422.8306	254.9589	132.3613	0.0000	0.0000	0.0000	0.0000	246.8634	453.0738	657.0290 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3304.8551
Space heating per m ²												35.0908 (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	999.1833	786.5911	806.4334	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.7812	0.8399	0.8128	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	780.5766	660.6330	655.4716	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1175.0638	1126.7984	1048.9467	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	284.0308	346.8271	292.7455	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			
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 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	71.0077	86.7068	73.1864	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												230.9008 (107)
Energy for space heating												35.0908 (99)
Energy for space cooling												2.4517 (108)
Total												37.5425 (109)
Fabric Energy Efficiency (TFEE)												37.5 (109)

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Property Reference	OP-D320 A3BEEC				Issued on Date	29/11/2024		
Assessment Reference	A3BEEC			Prop Type Ref	A3BEEC			
Property	A3BEEC							
SAP Rating	82 B		DER	4.21		TER	10.84	
Environmental	96 A		% DER < TER				61.16	
CO ₂ Emissions (t/year)	0.37		DFEE	36.61		TFEE	37.54	
Compliance Check	See BREL		% DFEE < TFEE				2.49	
% DPER < TPER	21.19		DPER	44.51		TPER	56.48	
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	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 231.6828 (5)

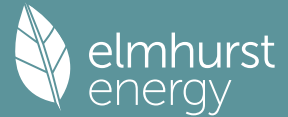
2. Ventilation rate

	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)											
Wind speed	Jan 5.1000	Feb 5.0000	Mar 4.9000	Apr 4.4000	May 4.3000	Jun 3.8000	Jul 3.8000	Aug 3.7000	Sep 4.0000	Oct 4.3000	Nov 4.5000	Dec 4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj 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) =												72.0000 (23c)
Effective ac	0.3297	0.3259	0.3222	0.3036	0.2999	0.2813	0.2813	0.2776	0.2888	0.2999	0.3073	0.3148 (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)			20.7500	1.2357	25.6416		(27)
Ground Floor			47.0900	0.1100	5.1799		(28a)
External Wall	114.1000	22.8900	91.2100	0.1700	15.5057		(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799		(30)
Total net area of external elements Aum(A, m ²)			208.2800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		53.6471		(33)
Party Wall			25.8300	0.0000	0.0000		(32)
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)				16.0200	0.0500		0.8010
E3 Sill				13.1900	0.0500		0.6595

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E4 Jamb	35.4000	0.0500	1.7700
E5 Ground floor (normal)	23.1900	0.1600	3.7104
E6 Intermediate floor within a dwelling	23.1900	0.0000	0.0000
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150
E16 Corner (normal)	9.8500	0.0900	0.8865
E18 Party wall between dwellings	9.8500	0.0600	0.5910
P1 Party wall - Ground floor	5.2500	0.0800	0.4200
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.8598 (36)

Point Thermal bridges 0.0000

Total fabric heat loss (33) + (36) + (36a) = 64.5069 (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	25.2040	24.9197	24.6353	23.2137	22.9294	21.5078	21.5078	21.2235	22.0765	22.9294	23.4981	24.0667 (38)
Average = Sum(39)m / 12 =	89.7109	89.4266	89.1423	87.7207	87.4364	86.0148	86.0148	85.7305	86.5834	87.4364	88.0050	88.5736 (39)
												87.6496

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9525	0.9495	0.9465	0.9314	0.9284	0.9133	0.9133	0.9103	0.9193	0.9284	0.9344	0.9405 (40)
HLP (average)												0.9307
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6787 (42)
Hot water usage for mixer showers													
95.0581	93.6296	91.5479	87.5650	84.6258	81.3479	79.4848	81.5507	83.8153	87.3347	91.4032	94.6939	(42a)	
Hot water usage for baths													
31.4239	30.9573	30.3001	29.0883	28.1810	27.1749	26.6314	27.2840	27.9946	29.0711	30.3078	31.3177	(42b)	
Hot water usage for other uses													
44.2767	42.6666	41.0565	39.4465	37.8364	36.2264	36.2264	37.8364	39.4465	41.0565	42.6666	44.2767	(42c)	
Average daily hot water use (litres/day)												157.0268 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
170.7587	167.2534	162.9045	156.0998	150.6431	144.7491	142.3426	146.6711	151.2564	157.4624	164.3776	170.2883	(44)	
Energy content (annual)													
270.4401	238.1666	250.3782	213.6928	202.7946	177.9859	172.1510	181.6095	186.5142	213.6750	234.1860	266.6033	(45)	
Energy content (annual)													
Total = Sum(45)m =												2608.2242	
Distribution loss (46)m = 0.15 x (45)m													
40.5660	35.7250	37.5567	32.0539	30.4192	26.6979	25.8226	27.2414	27.9771	32.0512	35.1279	39.9945	(46)	
Water storage loss:													
Store volume												230.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.8000 (48)	
Temperature factor from Table 2b												0.7800 (49)	
Enter (49) or (54) in (55)												1.4040 (55)	
Total storage loss													
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240	(56)	
If cylinder contains dedicated solar storage													
43.5240	39.3120	43.5240	42.1200	43.5240	42.1200	43.5240	43.5240	42.1200	43.5240	42.1200	43.5240	(57)	
Primary loss	54.8576	49.5488	54.8576	53.0880	54.8576	22.5120	23.2624	23.2624	22.5120	54.8576	53.0880	54.8576 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119	(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													
368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119	(64)	
12Total per year (kWh/year)												3642.2458 (64)	
Electric shower(s)												3642 (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													
133.8074	118.8294	127.1368	113.5233	111.3153	77.1899	75.8501	78.9951	80.0256	114.9330	120.3373	132.5406	(65)	

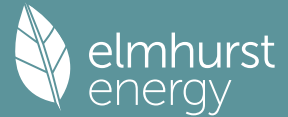
5. Internal gains (see Table 5 and 5a)

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	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	128.5456	124.3990	128.5456	124.3990 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823 (68)
Pumps, fans	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936 (69)
Losses e.g. evaporation (negative values) (Table 5)	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)
Water heating gains (Table 5)	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490 (71)
Total internal gains	179.8487	176.8295	170.8828	157.6712	149.6173	107.2082	101.9491	106.1762	111.1466	154.4799	167.1351	178.1460 (72)
	613.9898	626.8577	601.1351	578.3443	548.8174	494.2706	473.9859	475.6545	491.2190	544.1314	578.2596	601.4082 (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
North	9.1500	10.6334	0.6300	0.7000	0.7700	29.7348 (74)
East	3.5400	19.6403	0.6300	0.7000	0.7700	21.2482 (76)
South	8.0600	46.7521	0.6300	0.7000	0.7700	115.1616 (78)

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Solar gains	166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721 (83)
Total gains	780.1344	913.8534	1006.3967	1104.8118	1163.0561	1115.4929	1068.1096	1002.1359	937.8970	864.5235	777.9410	743.1803 (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	29.1616	29.2543	29.3476	29.8232	29.9202	30.4147	30.4147	30.5155	30.2149	29.9202	29.7268	29.5360
alpha	2.9441	2.9503	2.9565	2.9882	2.9947	3.0276	3.0276	3.0344	3.0143	2.9947	2.9818	2.9691
util living area	0.9240	0.8854	0.8319	0.7341	0.6045	0.4622	0.3443	0.3791	0.5660	0.7683	0.8869	0.9320 (86)
Living	19.1933	19.5327	19.9393	20.4133	20.7417	20.9177	20.9747	20.9659	20.8433	20.4251	19.7521	19.1429
Non living	18.0176	18.4399	18.9417	19.5188	19.8949	20.0905	20.1411	20.1374	20.0175	19.5477	18.7290	17.9614
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	20.0758	19.5327	19.9393	20.4133	20.7417	20.9177	20.9747	20.9659	20.8433	20.4251	19.7521	19.4027 (87)
Th 2	20.1231	20.1256	20.1281	20.1409	20.1434	20.1562	20.1562	20.1588	20.1511	20.1434	20.1383	20.1332 (88)
util rest of house	0.9146	0.8721	0.8127	0.7052	0.5638	0.4090	0.2817	0.3145	0.5114	0.7362	0.8716	0.9235 (89)
MIT 2	19.2837	18.4399	18.9417	19.5188	19.8949	20.0905	20.1411	20.1374	20.0175	19.5477	18.7290	18.3527 (90)
Living area fraction	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	0.1890 (91)
MIT	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	18.5512 (92)
Temperature adjustment												0.0000
adjusted MIT	19.4334	18.6464	19.1302	19.6879	20.0550	20.2469	20.2987	20.2940	20.1736	19.7135	18.9223	18.5512 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9062	0.8450	0.7875	0.6886	0.5594	0.4149	0.2925	0.3251	0.5130	0.7183	0.8454	0.9042 (94)
Useful gains	706.9594	772.1700	792.5531	760.8232	650.5622	462.7847	312.3877	325.8110	481.0960	621.0223	657.6688	672.0027 (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	1357.6297	1229.2946	1125.8872	946.3183	730.5294	485.7141	318.1399	333.8305	525.8691	796.8544	1040.4245	1271.1349 (97)
Space heating kWh	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98a)
Space heating requirement - total per year (kWh/year)												2084.4965
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	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2084.4965
Space heating per m2										(98c) / (4) =		22.1331 (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 %)												254.4503 (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	484.0986	307.1877	248.0006	133.5565	59.4955	0.0000	0.0000	0.0000	0.0000	130.8191	275.5841	445.7543 (98)
Space heating efficiency (main heating system 1)	254.4503	254.4503	254.4503	254.4503	254.4503	0.0000	0.0000	0.0000	0.0000	254.4503	254.4503	254.4503 (210)
Space heating fuel (main heating system)	190.2527	120.7260	97.4653	52.4882	23.3820	0.0000	0.0000	0.0000	0.0000	51.4124	108.3057	175.1833 (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	368.8217	327.0274	348.7598	308.9008	301.1762	242.6179	238.9374	248.3959	251.1462	312.0566	329.3940	365.0119 (64)
Efficiency of water heater (217)m	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619	269.4619 (216)
Fuel for water heating, kWh/month	136.8734	121.3632	129.4282	114.6362	111.7695	90.0379	88.6721	92.1822	93.2029	115.8073	122.2414	135.4596 (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	29.2395	26.4099	29.2395	28.2963	29.2395	28.2963	29.2395	29.2395	28.2963	29.2395	28.2963	29.2395 (231)
Lighting	25.8477	20.7359	18.6704	13.6788	10.5659	8.6324	9.6385	12.5285	16.2733	21.3515	24.1164	26.5660 (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												819.2157 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												269.4619
Water heating fuel used												1351.6738 (219)

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Space cooling fuel	0.0000 (221)
Electricity for pumps and fans: (BalancedWithHeatRecovery, Database: in-use factor = 1.4000, SFP = 1.2180)	
mechanical ventilation fans (SFP = 1.2180)	344.2714 (230a)
Total electricity for the above, kWh/year	344.2714 (231)
Electricity for lighting (calculated in Appendix L)	208.6054 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	2723.7663 (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	819.2157	0.1559	127.7329 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1351.6738	0.1415	191.3080 (264)
Space and water heating			319.0409 (265)
Pumps, fans and electric keep-hot	344.2714	0.1387	47.7547 (267)
Energy for lighting	208.6054	0.1443	30.1082 (268)
Total CO2, kg/year			396.9038 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2100 (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	819.2157	1.5772	1292.0616 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1351.6738	1.5234	2059.1209 (278)
Space and water heating			3351.1825 (279)
Pumps, fans and electric keep-hot	344.2714	1.5128	520.8137 (281)
Energy for lighting	208.6054	1.5338	319.9659 (282)
Total Primary energy kWh/year			4191.9621 (286)
Dwelling Primary energy Rate (DPER)			44.5100 (287)

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

1. Overall dwelling characteristics

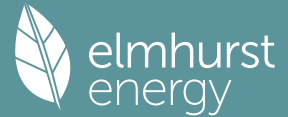
	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	47.0900 (1b)	x 2.3100 (2b)	= 108.7779 (1b) - (3b)
First floor	47.0900 (1c)	x 2.6100 (2c)	= 122.9049 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	94.1800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	231.6828 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1295 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3795 (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) = 0.3226 (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	0.4113	0.4032	0.3951	0.3548	0.3468	0.3064	0.3064	0.2984	0.3226	0.3468	0.3629	0.3790 (22b)
Effective ac	0.5846	0.5813	0.5781	0.5629	0.5601	0.5470	0.5470	0.5445	0.5520	0.5601	0.5658	0.5718 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
TER Opaque door			2.1400	1.0000	2.1400			(26)
TER Opening Type (Uw = 1.20)			20.7500	1.1450	23.7595			(27)
Ground Floor			47.0900	0.1300	6.1217			(28a)
External Wall	114.1000	22.8900	91.2100	0.1800	16.4178			(29a)
Roof - ceiling	47.0900		47.0900	0.1100	5.1799			(30)
Total net area of external elements Aum(A, m2)			208.2800					(31)
Fabric heat loss, W/K = Sum (A x U)								(33)
Party Wall			25.8300	0.0000	0.0000			(32)

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)	16.0200	0.0500	0.8010	
E3 Sill	13.1900	0.0500	0.6595	
E4 Jamb	35.4000	0.0500	1.7700	
E5 Ground floor (normal)	23.1900	0.1600	3.7104	
E6 Intermediate floor within a dwelling	23.1900	0.0000	0.0000	
E10 Eaves (insulation at ceiling level)	17.9400	0.0600	1.0764	
E12 Gable (insulation at ceiling level)	5.2500	0.0600	0.3150	
E16 Corner (normal)	9.8500	0.0900	0.8865	
E18 Party wall between dwellings	9.8500	0.0600	0.5910	
P1 Party wall - Ground floor	5.2500	0.0800	0.4200	
P2 Party wall - Intermediate floor within a dwelling	5.2500	0.0000	0.0000	
P4 Party wall - Roof (insulation at ceiling level)	5.2500	0.1200	0.6300	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				10.8598 (36)
Point Thermal bridges				0.0000
Total fabric heat loss				(33) + (36) + (36a) = 64.4787 (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	44.6936	44.4425	44.1964	43.0404	42.8242	41.8174	41.8174	41.6309	42.2052	42.8242	43.2617	43.7191	(38)
Average = Sum(39)m / 12 =	109.1723	108.9212	108.6751	107.5192	107.3029	106.2961	106.2961	106.1097	106.6839	107.3029	107.7404	108.1978	(39)
												107.5181	
HLP	1.1592	1.1565	1.1539	1.1416	1.1393	1.1286	1.1286	1.1267	1.1328	1.1393	1.1440	1.1488	(40)
HLP (average)												1.1416	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

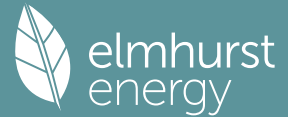
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6787 (42)
Hot water usage for mixer showers													
69.1332	68.0942	66.5803	63.6837	61.5460	59.1621	57.8071	59.3096	60.9566	63.5162	66.4750	68.8683	68.8683	(42a)
Hot water usage for baths													
29.8527	29.4094	28.7851	27.6339	26.7719	25.8161	25.2998	25.9198	26.5948	27.6176	28.7925	29.7518	29.7518	(42b)
Hot water usage for other uses													
42.0628	40.5333	39.0037	37.4741	35.9446	34.4150	34.4150	35.9446	37.4741	39.0037	40.5333	42.0628	42.0628	(42c)
Average daily hot water use (litres/day)													129.6556 (43)
Daily hot water use													
141.0487	138.0369	134.3691	128.7917	124.2625	119.3933	117.5220	121.1740	125.0256	130.1374	135.8007	140.6829	140.6829	(44)
Energy conte	223.3867	196.5627	206.5202	176.3094	167.2812	146.8080	142.1327	150.0387	154.1690	176.5953	193.4730	220.2755	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													2153.5525
33.5080	29.4844	30.9780	26.4464	25.0922	22.0212	21.3199	22.5058	23.1254	26.4893	29.0210	33.0413	33.0413	(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	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	30.0872	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	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													
276.7363	244.7494	259.8699	227.9381	220.6308	198.4366	195.4823	203.3883	205.7977	229.9449	245.1017	273.6251	273.6251	(62)
WWHRS	-31.6048	-27.9515	-29.2692	-24.2361	-22.5872	-19.3280	-18.1169	-19.2655	-19.9975	-23.5748	-26.7074	-31.0195	(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													
245.1315	216.7979	230.6006	203.7020	198.0437	179.1086	177.3654	184.1228	185.8002	206.3701	218.3943	242.6056	242.6056	(64)
12Total per year (kWh/year)													2488.0427 (64)
Electric shower(s)													2488 (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	0.0000	(64a)
													0.0000 (64a)
Heat gains from water heating, kWh/month													
116.9558	103.9065	111.3477	99.9258	98.3007	90.1166	89.9388	92.5676	92.5641	101.3976	105.6327	115.9213	115.9213	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	133.9362	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
124.3990	137.7275	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	128.5456	124.3990	128.5456	124.3990	124.3990	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
246.5613	249.1198	242.6724	228.9466	211.6202	195.3359	184.4570	181.8984	188.3458	202.0716	219.3980	235.6823	235.6823	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	36.3936	(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)													

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	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	-107.1490	(71)
Water heating gains (Table 5)	157.1986	154.6228	149.6609	138.7858	132.1246	125.1619	120.8855	124.4188	128.5613	136.2871	146.7121	155.8082	(72)
Total internal gains	594.3398	607.6509	582.9131	562.4589	534.3247	512.2243	492.9223	493.8971	508.6337	528.9387	560.8366	582.0704	(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	
North	9.1500				10.6334		0.6300		0.7000		0.7700		29.7348 (74)	
East	3.5400				19.6403		0.6300		0.7000		0.7700		21.2482 (76)	
South	8.0600				46.7521		0.6300		0.7000		0.7700		115.1616 (78)	
Solar gains	166.1446	286.9957	405.2617	526.4675	614.2387	621.2223	594.1237	526.4815	446.6781	320.3921	199.6815	141.7721	(83)	
Total gains	760.4844	894.6466	988.1748	1088.9265	1148.5634	1133.4466	1087.0460	1020.3786	955.3117	849.3308	760.5181	723.8425	(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	23.9631	24.0184	24.0728	24.3316	24.3806	24.6115	24.6115	24.6548	24.5221	24.3806	24.2816	24.1790
alpha	2.5975	2.6012	2.6049	2.6221	2.6254	2.6408	2.6408	2.6437	2.6348	2.6254	2.6188	2.6119
util living area	0.9372	0.9067	0.8642	0.7848	0.6716	0.5264	0.4025	0.4402	0.6252	0.8143	0.9087	0.9437 (86)
MIT	18.6032	18.9639	19.4391	20.0307	20.5075	20.8174	20.9343	20.9151	20.6976	20.0778	19.2500	18.5422 (87)
Th 2	19.9528	19.9549	19.9570	19.9670	19.9688	19.9775	19.9775	19.9791	19.9742	19.9688	19.9651	19.9611 (88)
util rest of house	0.9284	0.8941	0.8456	0.7552	0.6257	0.4596	0.3182	0.3546	0.5612	0.7821	0.8942	0.9357 (89)
MIT 2	17.1753	17.6266	18.2178	18.9428	19.4985	19.8357	19.9408	19.9288	19.7211	19.0177	17.9994	17.1038 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.4452	17.8793	18.4486	19.1484	19.6892	20.0212	20.1285	20.1152	19.9056	19.2181	18.2358	17.3756 (92)
Temperature adjustment	0.0000											
adjusted MIT	17.4452	17.8793	18.4486	19.1484	19.6892	20.0212	20.1285	20.1152	19.9056	19.2181	18.2358	17.3756 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8994	0.8617	0.8127	0.7282	0.6120	0.4626	0.3311	0.3665	0.5566	0.7542	0.8627	0.9082 (94)
Useful gains	684.0082	770.9186	803.0748	792.9455	702.9585	524.3686	359.9666	374.0073	531.6829	640.5752	656.0754	657.4239 (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	1435.0882	1413.7258	1298.5207	1101.8988	857.2635	576.2569	375.0691	394.2169	619.3691	924.7445	1199.7727	1425.5741 (97)
Space heating kWh	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (98a)
Space heating requirement - total per year (kWh/year)	2871.0190											
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	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2871.0190											
Space heating per m2	(98c) / (4) = 30.4844 (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	558.8036	431.9665	368.6118	222.4464	114.8029	0.0000	0.0000	0.0000	0.0000	211.4219	391.4621	571.5038 (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)	605.4210	468.0027	399.3627	241.0037	124.3802	0.0000	0.0000	0.0000	0.0000	229.0595	424.1193	619.1807 (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	245.1315	216.7979	230.6006	203.7020	198.0437	179.1086	177.3654	184.1228	185.8002	206.3701	218.3943	242.6056 (64)
Efficiency of water heater (217)m	85.8478	85.5748	85.1061	84.2576	82.8826	79.8000	79.8000	79.8000	79.8000	84.1141	85.3528	79.8000 (216)
Fuel for water heating, kWh/month	285.5421	253.3431	270.9565	241.7609	238.9449	224.4469	222.2624	230.7304	232.8324	245.3455	255.8725	282.3867 (219)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	25.8477	20.7359	18.6704	13.6788	10.5659	8.6324	9.6385	12.5285	16.2733	21.3515	24.1164	26.5660 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-43.3053	-60.6742	-86.6790	-96.8341	-103.8769	-96.7354	-95.4956	-90.3831	-81.3274	-69.0349	-47.4565	-37.4808 (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)

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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	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)														
(233b)m	-25.6437	-53.8037	-106.6909	-159.9020	-211.1243	-212.0494	-209.5953	-177.6429	-130.4168	-76.8817	-34.2144	-20.2930	(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													3110.5297	(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													2984.4240	(219)
Space cooling fuel													0.0000	(221)
Electricity for pumps and fans:														
Total electricity for the above, kWh/year													86.0000	(231)
Electricity for lighting (calculated in Appendix L)													208.6054	(232)
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation													-2327.5412	(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													4062.0179	(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	3110.5297	0.2100	653.2112	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2984.4240	0.2100	626.7290	(264)
Space and water heating			1279.9403	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	208.6054	0.1443	30.1082	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2832	0.1347	-122.5047	
PV Unit electricity exported	-1418.2580	0.1260	-178.6361	
Total			-301.1408	(269)
Total CO2, kg/year			1020.8370	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.8400	(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	3110.5297	1.1300	3514.8986	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2984.4240	1.1300	3372.3992	(278)
Space and water heating			6887.2978	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	208.6054	1.5338	319.9659	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-909.2832	1.4979	-1362.0470	
PV Unit electricity exported	-1418.2580	0.4623	-655.7206	
Total			-2017.7677	(283)
Total Primary energy kWh/year			5319.5968	(286)
Target Primary Energy Rate (TPER)			56.4800	(287)