Full SAP Calculation Printout

Property Reference	C2223457	Issued on Date	28/02/2023
Assessment Reference	As Designed	Prop Type Ref	
Property	1b, TEMPLEWOOD AVENUE, LONDON, NW3 7UY		

SAP Rating	84 B	DER	3.33	TER	12.12
Environmental	97 A	% DER < TER			72.52
CO_2 Emissions (t/year)	0.39	DFEE	45.42	TFEE	51.13
Compliance Check	See BREL	% DFEE < TFEE			11.16
% DPER < TPER	45.68	DPER	34.59	TPER	63.68

Assessor Details	Mr. Gary White	Assessor ID	4104-0001
Client			

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

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Ground floor		67.8700 (1b)	x	2.5400 (2b)	=	172.3898 (1b)	-
First floor		67.8700 (1c)	x	3.1400 (2c)	=	213.1118 (1c)	-
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.7400						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	385.5016	(5)

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

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.2000 (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) =	0.1700 (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	0.2167	0.2125	0.2083	0.1870	0.1827	0.1615	0.1615	0.1573	0.1700	0.1827	0.1913	0.1998	(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) =	81.0000 (23c)

Effective ac	0.3117	0.3075	0.3033	0.2820	0.2777	0.2565	0.2565	0.2522	0.2650	0.2777	0.2863	0.2947	(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	
window (Uw = 1.00)			32.4700	0.9615	31.2212			(27)
glazed door (Uw = 1.10)			3.0000	1.0536	3.1609			(27)

Heat Loss Floor			67.8700	0.1000	6.7870	110.0000	7465.7000 (28a)
External Wall	223.9056	35.4700	188.4356	0.1500	28.2653	190.0000	35802.7640 (29a)
External Roof - flat	67.8700		67.8700	0.1400	9.5018	100.0000	6787.0000 (30)
Total net area of external elements Aum(A, m2)			359.6456				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		78.9362		(33)
Internal Wall 1			224.1000			9.0000	2016.9000 (32c)
Internal Wall 2			6.1500			100.0000	615.0000 (32c)
Internal Floor 1			67.8700			100.0000	6787.0000 (32d)
Internal Ceiling 1			67.8700			100.0000	6787.0000 (32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	66261.3640 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		488.1491 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.3000	0.3000	4.8900
E3 Sill	7.5500	0.0400	0.3020
E4 Jamb	30.8000	0.0500	1.5400
E5 Ground floor (normal)	39.4200	0.1600	6.3072
E6 Intermediate floor within a dwelling	39.4200	0.0700	2.7594
E15 Flat roof with parapet	39.4200	0.3000	11.8260
E16 Corner (normal)	17.0400	0.0900	1.5336
E17 Corner (inverted – internal area greater than external area)	5.6800	-0.0900	-0.5112

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		28.6470 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	107.5832 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	39.6594	39.1188	38.5781	35.8748	35.3341	32.6308	32.6308	32.0901	33.7121	35.3341	36.4154	37.4968	(38)
Heat transfer coeff	147.2427	146.7020	146.1613	143.4580	142.9173	140.2140	140.2140	139.6733	141.2953	142.9173	143.9987	145.0800	(39)

Average = Sum(39)m / 12 = 143.3228

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0847	1.0808	1.0768	1.0569	1.0529	1.0330	1.0330	1.0290	1.0409	1.0529	1.0608	1.0688	(40)
HLP (average)												1.0559	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9085 (42)
Hot water usage for mixer showers	82.1090	80.8750	79.0769	75.6366	73.0977	70.2664	68.6571	70.4416	72.3977	75.4377	78.9519	81.7944 (42a)
Hot water usage for baths	31.5095	31.0415	30.3825	29.1675	28.2577	27.2488	26.7039	27.3583	28.0708	29.1503	30.3903	31.4030 (42b)
Hot water usage for other uses	44.4159	42.8008	41.1857	39.5705	37.9554	36.3403	36.3403	37.9554	39.5705	41.1857	42.8008	44.4159 (42c)
Average daily hot water use (litres/day)												145.2941 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	158.0343	154.7173	150.6451	144.3746	139.3108	133.8555	131.7013	135.7553	140.0390	145.7736	152.1430	157.6132	(44)
Energy conte	250.2878	220.3154	231.5359	197.6417	187.5391	164.5910	159.2813	168.0934	172.6821	197.8134	216.7556	246.7842	(45)
Energy content (annual)										Total = Sum(45)m =		2413.3209	
Distribution loss (46)m = 0.15 x (45)m	37.5432	33.0473	34.7304	29.6462	28.1309	24.6886	23.8922	25.2140	25.9023	29.6720	32.5133	37.0176	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.8000	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.9720	(55)
Total storage loss	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(56)
If cylinder contains dedicated solar storage	30.1320	27.2160	30.1320	29.1600	30.1320	29.1600	30.1320	30.1320	29.1600	30.1320	29.1600	30.1320	(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	303.6822	268.5426	284.9303	249.3137	240.9335	216.2630	212.6757	221.4878	224.3541	251.2078	268.4276	300.1786	(62)
WWHRS	-59.4965	-52.6192	-55.0998	-45.6248	-42.5207	-36.3853	-34.1054	-36.2676	-37.6456	-44.3800	-50.2772	-58.3947	(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	244.1857	215.9234	229.8305	203.6888	198.4129	179.8777	178.5703	185.2201	186.7085	206.8278	218.1505	241.7839	(64)
										Total per year (kWh/year) = Sum(64)m =		2489.1801	(64)
12Total per year (kWh/year)												2489	(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	125.9362	111.8366	119.7012	107.0534	105.0723	96.0641	95.6765	98.6066	98.7544	108.4885	113.4088	124.7713	(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	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5
153.5923 170.0487 153.5923 158.7121 153.5923 158.7121 153.5923 153.5923 158.7121 153.5923 158.7121 153.5923 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5
304.5140 307.6739 299.7110 282.7591 261.3602 241.2484 227.8124 224.6525 232.6154 249.5673 270.9661 291.0780 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5
37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 37.5425 (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)
-116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 -116.3398 (71)
Water heating gains (Table 5)
169.2691 166.4236 160.8887 148.6853 141.2262 133.4224 128.5975 132.5357 137.1589 145.8178 157.5123 167.7033 (72)
Total internal gains
694.0028 710.7735 680.8195 656.7839 622.8062 600.0103 576.6297 577.4080 595.1138 615.6049 653.8179 679.0011 (73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	12.6900	36.7938	0.5700	0.7000	0.7700	129.1049	(77)
Southwest	19.7800	36.7938	0.5700	0.7000	0.7700	201.2368	(79)
Southeast	3.0000	36.7938	0.5700	0.7000	0.7700	30.5213	(77)

Solar gains 360.8630 614.6832 841.0363 1042.0848 1167.2218 1158.7811 1117.1886 1023.8308 910.6645 679.3559 432.2307 308.8235 (83)
Total gains 1054.8658 1325.4567 1521.8559 1698.8687 1790.0280 1758.7913 1693.8183 1601.2388 1505.7782 1294.9608 1086.0486 987.8246 (84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	125.0041	125.4648	125.9289	128.3019	128.7873	131.2703	131.2703	131.7784	130.2657	128.7873	127.8202	126.8675	
alpha	9.3336	9.3643	9.3953	9.5535	9.5858	9.7514	9.7514	9.7852	9.6844	9.5858	9.5213	9.4578	
util living area													
	0.9998	0.9980	0.9870	0.9147	0.7310	0.5099	0.3642	0.4012	0.6440	0.9552	0.9986	0.9999	(86)
Living	20.4889	20.6131	20.7567	20.9053	20.9604	20.9678	20.9680	20.9681	20.9660	20.8824	20.6545	20.4731	
Non living	19.4208	19.5824	19.7648	19.9458	19.9942	20.0149	20.0149	20.0184	20.0075	19.9304	19.6501	19.4120	
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	20.7385	20.6131	20.7567	20.9053	20.9604	20.9678	20.9680	20.9681	20.9660	20.8824	20.6545	20.5468	(87)
Th 2	20.0133	20.0166	20.0198	20.0362	20.0395	20.0560	20.0560	20.0593	20.0494	20.0395	20.0329	20.0264	(88)
util rest of house													
	0.9996	0.9967	0.9788	0.8751	0.6613	0.4349	0.2861	0.3192	0.5574	0.9230	0.9975	0.9998	(89)
MIT 2	19.7771	19.5824	19.7648	19.9458	19.9942	20.0149	20.0149	20.0184	20.0075	19.9304	19.6501	19.5227	(90)
Living area fraction										fLA = Living area / (4) =		0.3323	(91)
MIT	20.0966	19.9249	20.0944	20.2647	20.3153	20.3316	20.3317	20.3340	20.3260	20.2468	19.9839	19.8630	(92)
Temperature adjustment												0.0000	
adjusted MIT	20.0966	19.9249	20.0944	20.2647	20.3153	20.3316	20.3317	20.3340	20.3260	20.2468	19.9839	19.8630	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9997	0.9966	0.9796	0.8855	0.6818	0.4568	0.3089	0.3431	0.5829	0.9313	0.9975	0.9998	(94)
Useful gains	1054.5063	1320.9195	1490.8366	1504.4287	1220.4288	803.4350	523.2284	549.4643	877.6965	1205.9877	1083.2893	987.6132	(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													
	2325.9367	2204.1866	1986.9779	1630.3522	1231.2763	803.6454	523.2322	549.4746	879.7105	1378.6891	1855.2618	2272.3949	(97)
Space heating kWh													
	945.9442	593.5555	369.1292	90.6649	8.0705	0.0000	0.0000	0.0000	0.0000	128.4898	555.8201	955.8776	(98a)
Space heating requirement - total per year (kWh/year)												3647.5519	
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													
	945.9442	593.5555	369.1292	90.6649	8.0705	0.0000	0.0000	0.0000	0.0000	128.4898	555.8201	955.8776	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3647.5519	
Space heating per m2											(98c) / (4) =	26.8716	(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 %) 245.2730 (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
945.9442 593.5555 369.1292 90.6649 8.0705 0.0000 0.0000 0.0000 0.0000 128.4898 555.8201 955.8776 (98)
Space heating efficiency (main heating system 1)
245.2730 245.2730 245.2730 245.2730 245.2730 0.0000 0.0000 0.0000 0.0000 245.2730 245.2730 245.2730 (210)
Space heating fuel (main heating system)
385.6700 241.9979 150.4973 36.9649 3.2904 0.0000 0.0000 0.0000 0.0000 52.3865 226.6129 389.7199 (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
244.1857 215.9234 229.8305 203.6888 198.4129 179.8777 178.5703 185.2201 186.7085 206.8278 218.1505 241.7839 (64)
Efficiency of water heater 277.4904 (216)
(217)m 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 277.4904 (217)
Fuel for water heating, kWh/month
87.9979 77.8129 82.8247 73.4039 71.5026 64.8230 64.3519 66.7483 67.2847 74.5351 78.6155 87.1323 (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 31.4561 28.4120 31.4561 30.4414 31.4561 30.4414 31.4561 31.4561 30.4414 31.4561 30.4414 31.4561 (231)
Lighting 33.4460 26.8316 24.1589 17.6998 13.6719 11.1700 12.4719 16.2115 21.0571 27.6281 31.2059 34.3756 (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 1487.1396 (211)
Space heating fuel - main system 2 0.0000 (213)
Space heating fuel - secondary 0.0000 (215)
Efficiency of water heater 277.4904
Water heating fuel used 897.0329 (219)
Space cooling fuel 0.0000 (221)

Electricity for pumps and fans:
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.7875)
mechanical ventilation fans (SFP = 0.7875) 370.3707 (230a)
Total electricity for the above, kWh/year 370.3707 (231)
Electricity for lighting (calculated in Appendix L) 269.9283 (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 3024.4715 (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	1487.1396	0.1582	235.1977	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	897.0329	0.1407	126.2177	(264)
Space and water heating			361.4154	(265)
Pumps, fans and electric keep-hot	370.3707	0.1387	51.3750	(267)
Energy for lighting	269.9283	0.1443	38.9590	(268)
Total CO2, kg/year			451.7493	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.3300	(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	1487.1396	1.5854	2357.7375	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	897.0329	1.5203	1363.7311	(278)
Space and water heating			3721.4686	(279)
Pumps, fans and electric keep-hot	370.3707	1.5128	560.2967	(281)
Energy for lighting	269.9283	1.5338	414.0251	(282)
Total Primary energy kWh/year			4695.7904	(286)
Dwelling Primary energy Rate (DPER)			34.5900	(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	67.8700 (1b)	x	2.5400 (2b)	=	172.3898 (1b)	-
First floor	67.8700 (1c)	x	3.1400 (2c)	=	213.1118 (1c)	-
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.7400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	385.5016	(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	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1038 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3538 (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) =	0.3007 (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	0.3834	0.3759	0.3684	0.3308	0.3232	0.2857	0.2857	0.2781	0.3007	0.3232	0.3383	0.3533	(22b)
Effective ac	0.5735	0.5706	0.5678	0.5547	0.5522	0.5408	0.5408	0.5387	0.5452	0.5522	0.5572	0.5624	(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 Opening Type (Uw = 1.20)			33.9400	1.1450	38.8626			(27)
Heat Loss Floor			67.8700	0.1300	8.8231			(28a)
External Wall	223.9056	33.9400	189.9656	0.1800	34.1938			(29a)
External Roof - flat	67.8700		67.8700	0.1100	7.4657			(30)
Total net area of external elements Aum(A, m2)			359.6456					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	89.3452			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 488.1491 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.3000	0.0500	0.8150
E3 Sill	7.5500	0.0500	0.3775
E4 Jamb	30.8000	0.0500	1.5400
E5 Ground floor (normal)	39.4200	0.1600	6.3072
E6 Intermediate floor within a dwelling	39.4200	0.0000	0.0000
E15 Flat roof with parapet	39.4200	0.5600	22.0752
E16 Corner (normal)	17.0400	0.0900	1.5336
E17 Corner (inverted – internal area greater than external area)	5.6800	-0.0900	-0.5112

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 32.1373 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 121.4825 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	72.9573	72.5942	72.2383	70.5669	70.2541	68.7983	68.7983	68.5287	69.3591	70.2541	70.8868	71.5482	(38)

Heat transfer coeff

	194.4398	194.0767	193.7208	192.0494	191.7366	190.2808	190.2808	190.0112	190.8416	191.7366	192.3693	193.0307 (39)
Average = Sum(39)m / 12 =												192.0479

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4324	1.4298	1.4271	1.4148	1.4125	1.4018	1.4018	1.3998	1.4059	1.4125	1.4172	1.4221	(40)
HLP (average)												1.4148	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.9085	(42)
Hot water usage for mixer showers													
	72.9857	71.8889	70.2906	67.2325	64.9758	62.4590	61.0285	62.6147	64.3535	67.0557	70.1795	72.7061	(42a)
Hot water usage for baths													
	31.5095	31.0415	30.3825	29.1675	28.2577	27.2488	26.7039	27.3583	28.0708	29.1503	30.3903	31.4030	(42b)
Hot water usage for other uses													
	44.4159	42.8008	41.1857	39.5705	37.9554	36.3403	36.3403	37.9554	39.5705	41.1857	42.8008	44.4159	(42c)
Average daily hot water use (litres/day)												136.8828	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	148.9111	145.7312	141.8588	135.9706	131.1888	126.0482	124.0727	127.9284	131.9948	137.3916	143.3706	148.5250	(44)
Energy conte	235.8388	207.5193	218.0317	186.1369	176.6054	154.9909	150.0552	158.4021	162.7628	186.4392	204.2577	232.5542	(45)
Energy content (annual)										Total = Sum(45)m =		2273.5942	
Distribution loss (46)m = 0.15 x (45)m													
	35.3758	31.1279	32.7048	27.9205	26.4908	23.2486	22.5083	23.7603	24.4144	27.9659	30.6387	34.8831	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage													
	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(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													
	282.4337	249.6050	264.6266	231.2287	223.2003	200.0827	196.6501	204.9970	207.8546	233.0341	249.3495	279.1491	(62)
WWHRS	-33.3660	-29.5092	-30.9003	-25.5867	-23.8459	-20.4051	-19.1265	-20.3391	-21.1119	-24.8886	-28.1958	-32.7481	(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													
	249.0677	220.0958	233.7263	205.6421	199.3544	179.6777	177.5236	184.6579	186.7428	208.1455	221.1538	246.4010	(64)
										Total per year (kWh/year) = Sum(64)m =		2512.1884	(64)
12Total per year (kWh/year)												2512	(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													
	115.6923	102.6687	109.7715	97.9640	95.9972	87.6079	87.1693	89.9446	90.1921	99.2669	103.9892	114.6002	(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	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	153.5923	170.0487	153.5923	158.7121	153.5923	158.7121	153.5923	153.5923	158.7121	153.5923	158.7121	153.5923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	304.5140	307.6739	299.7110	282.7591	261.3602	241.2484	227.8124	224.6525	232.6154	249.5673	270.9661	291.0780	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	(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)													
	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	(71)
Water heating gains (Table 5)													
	155.5004	152.7809	147.5423	136.0611	129.0285	121.6777	117.1630	120.8933	125.2668	133.4233	144.4294	154.0325	(72)
Total internal gains													
	683.2342	700.1308	670.4731	647.1597	613.6085	588.2656	565.1952	565.7656	583.2217	606.2104	643.7350	668.3303	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	15.0100	36.7938	0.6300	0.7000	0.7700	168.7825	(77)
Southwest	18.9300	36.7938	0.6300	0.7000	0.7700	212.8617	(79)

Solar gains	381.6442	650.0813	889.4696	1102.0959	1234.4393	1225.5125	1181.5248	1082.7907	963.1075	718.4783	457.1218	326.6079	(83)

Total gains	1064.8784	1350.2122	1559.9427	1749.2556	1848.0478	1813.7781	1746.7200	1648.5563	1546.3291	1324.6887	1100.8569	994.9382	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	94.6614	94.8385	95.0127	95.8396	95.9959	96.7304	96.7304	96.8676	96.4461	95.9959	95.6802	95.3524	
alpha	7.3108	7.3226	7.3342	7.3893	7.3997	7.4487	7.4487	7.4578	7.4297	7.3997	7.3787	7.3568	
util living area													
	0.9998	0.9988	0.9940	0.9666	0.8646	0.6597	0.4783	0.5280	0.7999	0.9832	0.9992	0.9999	(86)
MIT	20.0449	20.2225	20.4490	20.7225	20.9187	20.9906	20.9992	20.9984	20.9650	20.6967	20.3101	20.0151	(87)
Th 2	19.7385	19.7406	19.7426	19.7520	19.7537	19.7620	19.7620	19.7635	19.7588	19.7537	19.7502	19.7465	(88)
util rest of house													
	0.9997	0.9979	0.9896	0.9428	0.7889	0.5389	0.3444	0.3875	0.6830	0.9662	0.9984	0.9998	(89)
MIT 2	18.6506	18.8796	19.1686	19.5073	19.7052	19.7593	19.7619	19.7633	19.7454	19.4864	18.9997	18.6187	(90)
Living area fraction										fLA = Living area / (4) =		0.3323	(91)
MIT	19.1139	19.3259	19.5941	19.9111	20.1085	20.1685	20.1731	20.1737	20.1507	19.8886	19.4352	19.0827	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1139	19.3259	19.5941	19.9111	20.1085	20.1685	20.1731	20.1737	20.1507	19.8886	19.4352	19.0827	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9996	0.9975	0.9889	0.9466	0.8130	0.5797	0.3890	0.4345	0.7231	0.9687	0.9981	0.9997	(94)
Useful gains	1064.4133	1346.8520	1542.6582	1655.8313	1502.4180	1051.4564	679.5182	716.2387	1118.2086	1283.2646	1098.8128	994.6720	(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													
	2880.4200	2799.7251	2536.5991	2114.6839	1612.2143	1059.5808	679.8864	717.0545	1154.7238	1780.9652	2372.9058	2872.8240	(97)
Space heating kWh													
	1351.1090	976.3307	739.4920	330.3738	81.6884	0.0000	0.0000	0.0000	0.0000	370.2893	917.3469	1397.3451	(98a)
Space heating requirement - total per year (kWh/year)												6163.9753	
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													
	1351.1090	976.3307	739.4920	330.3738	81.6884	0.0000	0.0000	0.0000	0.0000	370.2893	917.3469	1397.3451	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6163.9753	
Space heating per m2											(98c) / (4) =	45.4102	(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													
	1351.1090	976.3307	739.4920	330.3738	81.6884	0.0000	0.0000	0.0000	0.0000	370.2893	917.3469	1397.3451	(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)													
	1463.8234	1057.7798	801.1831	357.9348	88.5032	0.0000	0.0000	0.0000	0.0000	401.1802	993.8753	1513.9167	(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													
	249.0677	220.0958	233.7263	205.6421	199.3544	179.6777	177.5236	184.6579	186.7428	208.1455	221.1538	246.4010	(64)
Efficiency of water heater												79.8000	(216)
(217)m	87.2681	86.9951	86.4582	85.1171	82.2222	79.8000	79.8000	79.8000	79.8000	85.3367	86.8963	87.3237	(217)
Fuel for water heating, kWh/month													
	285.4054	252.9980	270.3343	241.5990	242.4582	225.1600	222.4606	231.4008	234.0135	243.9108	254.5031	282.1697	(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	31.9135	25.6022	23.0519	16.8888	13.0454	10.6582	11.9005	15.4687	20.0923	26.3621	29.7760	32.8004	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-59.8657	-82.6096	-116.2303	-127.7804	-135.3115	-125.3159	-123.6323	-117.8216	-107.3473	-92.9349	-65.1197	-51.9584	(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	-39.5093	-82.3855	-162.4704	-242.2488	-318.6943	-319.7303	-316.0899	-268.4796	-197.8359	-117.3723	-52.5911	-31.3100	(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	6678.1965 (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	2986.4135 (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)	257.5598 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-3354.6448 (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	6653.5250 (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	6678.1965	0.2100	1402.4213	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2986.4135	0.2100	627.1468	(264)
Space and water heating			2029.5681	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	257.5598	0.1443	37.1738	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1205.9275	0.1351	-162.8875	
PV Unit electricity exported	-2148.7173	0.1261	-270.9606	
Total			-433.8481	(269)
Total CO2, kg/year			1644.8231	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.1200	(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	6678.1965	1.1300	7546.3620	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2986.4135	1.1300	3374.6472	(278)
Space and water heating			10921.0092	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	257.5598	1.5338	395.0539	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1205.9275	1.4992	-1807.9649	
PV Unit electricity exported	-2148.7173	0.4629	-994.6304	
Total			-2802.5953	(283)
Total Primary energy kWh/year			8643.5686	(286)
Target Primary Energy Rate (TPER)			63.6800	(287)

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

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1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Ground floor		67.8700 (1b)	x	2.5400 (2b)	=	172.3898 (1b)	-
First floor		67.8700 (1c)	x	3.1400 (2c)	=	213.1118 (1c)	-
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.7400						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	385.5016	(5)

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2. Ventilation rate
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		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	4 * 10 =	40.0000	(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) =	40.0000 / (5) =	0.1038	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.0000	(17)
Infiltration rate		0.3038	(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) =	0.2582	(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	0.3292	0.3227	0.3163	0.2840	0.2776	0.2453	0.2453	0.2388	0.2582	0.2776	0.2905	0.3034	(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	0.5542	0.5521	0.5500	0.5403	0.5385	0.5301	0.5301	0.5285	0.5333	0.5385	0.5422	0.5460	(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	
window (Uw = 1.00)			32.4700	0.9615	31.2212			(27)
glazed door (Uw = 1.10)			3.0000	1.0536	3.1609			(27)
Heat Loss Floor			67.8700	0.1000	6.7870	110.0000	7465.7000	(28a)
External Wall	223.9056	35.4700	188.4356	0.1500	28.2653	190.0000	35802.7640	(29a)
External Roof - flat	67.8700		67.8700	0.1400	9.5018	100.0000	6787.0000	(30)
Total net area of external elements Aum(A, m2)			359.6456					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	78.9362			(33)
Internal Wall 1			224.1000			9.0000	2016.9000	(32c)
Internal Wall 2			6.1500			100.0000	615.0000	(32c)
Internal Floor 1			67.8700			100.0000	6787.0000	(32d)
Internal Ceiling 1			67.8700			100.0000	6787.0000	(32e)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	66261.3640 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		488.1491 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.3000	0.3000	4.8900
E3 Sill	7.5500	0.0400	0.3020
E4 Jamb	30.8000	0.0500	1.5400
E5 Ground floor (normal)	39.4200	0.1600	6.3072
E6 Intermediate floor within a dwelling	39.4200	0.0700	2.7594
E15 Flat roof with parapet	39.4200	0.3000	11.8260
E16 Corner (normal)	17.0400	0.0900	1.5336
E17 Corner (inverted – internal area greater than external area)	5.6800	-0.0900	-0.5112

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		28.6470 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	107.5832 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	70.5011	70.2335	69.9711	68.7387	68.5081	67.4348	67.4348	67.2360	67.8482	68.5081	68.9746	69.4622	(38)
Heat transfer coeff	178.0844	177.8167	177.5543	176.3219	176.0913	175.0180	175.0180	174.8192	175.4314	176.0913	176.5578	177.0454	(39)
Average = Sum(39)m / 12 =												176.3208	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.3120	1.3100	1.3080	1.2990	1.2973	1.2894	1.2894	1.2879	1.2924	1.2973	1.3007	1.3043	(40)
HLP (average)												1.2990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.9085 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

	31.5095	31.0415	30.3825	29.1675	28.2577	27.2488	26.7039	27.3583	28.0708	29.1503	30.3903	31.4030 (42b)
Hot water usage for other uses												
	44.4159	42.8008	41.1857	39.5705	37.9554	36.3403	36.3403	37.9554	39.5705	41.1857	42.8008	44.4159 (42c)
Average daily hot water use (litres/day)												69.5923 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	75.9254	73.8423	71.5682	68.7380	66.2131	63.5891	63.0442	65.3137	67.6413	70.3359	73.1911	75.8189	(44)
Energy conte	120.2472	105.1504	109.9976	94.0989	89.1355	78.1902	76.2465	80.8720	83.4085	95.4452	104.2742	118.7140	(45)
Energy content (annual)										Total = Sum(45)m =		1155.7803	
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													
	102.2102	89.3779	93.4980	79.9841	75.7652	66.4617	64.8095	68.7412	70.8972	81.1284	88.6330	100.9069	(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													
	102.2102	89.3779	93.4980	79.9841	75.7652	66.4617	64.8095	68.7412	70.8972	81.1284	88.6330	100.9069	(64)
									Total per year (kWh/year) = Sum(64)m =			982.4133	(64)
12Total per year (kWh/year)												982	(64)
Electric shower(s)													
	58.4494	52.0789	56.8682	54.2686	55.2869	52.7384	54.4963	55.2869	54.2686	56.8682	55.7988	58.4494	(64a)
						Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =						664.8587	(64a)
Heat gains from water heating, kWh/month													
	40.1649	35.3642	37.5915	33.5632	32.7630	29.8000	29.8265	31.0070	31.2915	34.4991	36.1080	39.8391	(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	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	153.5923	170.0487	153.5923	158.7121	153.5923	158.7121	153.5923	153.5923	158.7121	153.5923	158.7121	153.5923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	304.5140	307.6739	299.7110	282.7591	261.3602	241.2484	227.8124	224.6525	232.6154	249.5673	270.9661	291.0780	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	(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)													
	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	(71)
Water heating gains (Table 5)													
	53.9851	52.6253	50.5263	46.6155	44.0363	41.3889	40.0893	41.6761	43.4604	46.3698	50.1500	53.5472	(72)
Total internal gains													
	578.7188	596.9753	570.4571	554.7141	525.6164	507.9768	488.1215	486.5484	501.4152	516.1569	546.4556	564.8449	(73)

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6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	12.6900	36.7938	0.5700	0.7000	0.7700	129.1049	(77)
Southwest	19.7800	36.7938	0.5700	0.7000	0.7700	201.2368	(79)
Southeast	3.0000	36.7938	0.5700	0.7000	0.7700	30.5213	(77)

Solar gains	360.8630	614.6832	841.0363	1042.0848	1167.2218	1158.7811	1117.1886	1023.8308	910.6645	679.3559	432.2307	308.8235	(83)
Total gains	939.5818	1211.6585	1411.4934	1596.7989	1692.8382	1666.7579	1605.3101	1510.3792	1412.0797	1195.5128	978.6863	873.6685	(84)

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7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	103.3551	103.5107	103.6637	104.3882	104.5249	105.1660	105.1660	105.2855	104.9181	104.5249	104.2488	103.9616	
alpha	7.8903	7.9007	7.9109	7.9592	7.9683	8.0111	8.0111	8.0190	7.9945	7.9683	7.9499	7.9308	
util living area													
	0.9999	0.9994	0.9961	0.9729	0.8732	0.6626	0.4790	0.5308	0.8096	0.9881	0.9996	1.0000	(86)
MIT	20.0987	20.2680	20.4821	20.7427	20.9293	20.9930	20.9995	20.9989	20.9701	20.7116	20.3454	20.0686	(87)
Th 2	19.8315	19.8330	19.8345	19.8416	19.8430	19.8492	19.8492	19.8503	19.8468	19.8430	19.8403	19.8375	(88)
util rest of house													
	0.9999	0.9989	0.9932	0.9531	0.8025	0.5491	0.3542	0.3992	0.6994	0.9758	0.9992	0.9999	(89)
MIT 2	19.0223	19.1927	19.4065	19.6610	19.8095	19.8476	19.8491	19.8502	19.8377	19.6384	19.2763	18.9973	(90)
Living area fraction									fLA = Living area / (4) =			0.3323	(91)
MIT	19.3800	19.5501	19.7640	20.0205	20.1816	20.2283	20.2314	20.2320	20.2140	19.9950	19.6316	19.3533	(92)

Temperature adjustment												0.0000	
adjusted MIT	19.3800	19.5501	19.7640	20.0205	20.1816	20.2283	20.2314	20.2320	20.2140	19.9950	19.6316	19.3533	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9998	0.9987	0.9929	0.9569	0.8255	0.5874	0.3958	0.4432	0.7375	0.9780	0.9991	0.9999	(94)
Useful gains	939.4279	1210.1250	1401.5344	1528.0541	1397.4992	979.0356	635.3368	669.3518	1041.3394	1169.1702	977.8525	873.5879	(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													
	2685.5143	2605.0237	2355.0731	1960.7824	1493.5403	985.0495	635.5662	669.9019	1072.5933	1654.3867	2212.5554	2682.8262	(97)
Space heating kWh													
	1299.0883	937.3719	709.4328	311.5644	71.4546	0.0000	0.0000	0.0000	0.0000	361.0011	888.9861	1346.0733	(98a)
Space heating requirement - total per year (kWh/year)												5924.9723	
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													
	1299.0883	937.3719	709.4328	311.5644	71.4546	0.0000	0.0000	0.0000	0.0000	361.0011	888.9861	1346.0733	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5924.9723	
Space heating per m2											(98c) / (4) =	43.6494	(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	1645.1690	1295.1331	1328.6260	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9391	0.9798	0.9667	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1545.0340	1268.9537	1284.4133	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1882.8487	1813.9631	1706.0681	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	243.2266	405.4870	313.7112	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction											fC = cooled area / (4) =	1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	60.8066	101.3717	78.4278	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												240.6062	(107)
Energy for space heating												43.6494	(99)
Energy for space cooling												1.7726	(108)
Total												45.4220	(109)
Fabric Energy Efficiency (DFEE)												45.4	(109)

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	67.8700	(1b)	x 2.5400	(2b) =	172.3898	(1b) -
First floor	67.8700	(1c)	x 3.1400	(2c) =	213.1118	(1c) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	135.7400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		385.5016	(5)

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2. Ventilation rate

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	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	4 * 10 =	40.0000 (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) =	40.0000 / (5) =	0.1038 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		5.0000 (17)
Infiltration rate		0.3538 (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) =	0.3007 (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													
	0.3834	0.3759	0.3684	0.3308	0.3232	0.2857	0.2857	0.2781	0.3007	0.3232	0.3383	0.3533	(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	0.5735	0.5706	0.5678	0.5547	0.5522	0.5408	0.5408	0.5387	0.5452	0.5522	0.5572	0.5624	(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 Opening Type (Uw = 1.20)			33.9400	1.1450	38.8626			(27)
Heat Loss Floor			67.8700	0.1300	8.8231			(28a)
External Wall	223.9056	33.9400	189.9656	0.1800	34.1938			(29a)
External Roof - flat	67.8700		67.8700	0.1100	7.4657			(30)
Total net area of external elements Aum(A, m2)			359.6456					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	89.3452			(33)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 488.1491 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	16.3000	0.0500	0.8150
E3 Sill	7.5500	0.0500	0.3775
E4 Jamb	30.8000	0.0500	1.5400
E5 Ground floor (normal)	39.4200	0.1600	6.3072
E6 Intermediate floor within a dwelling	39.4200	0.0000	0.0000
E15 Flat roof with parapet	39.4200	0.5600	22.0752
E16 Corner (normal)	17.0400	0.0900	1.5336
E17 Corner (inverted – internal area greater than external area)	5.6800	-0.0900	-0.5112

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		32.1373 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	121.4825 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	72.9573	72.5942	72.2383	70.5669	70.2541	68.7983	68.7983	68.5287	69.3591	70.2541	70.8868	71.5482	(38)
Heat transfer coeff													
	194.4398	194.0767	193.7208	192.0494	191.7366	190.2808	190.2808	190.0112	190.8416	191.7366	192.3693	193.0307	(39)
Average = Sum(39)m / 12 =												192.0479	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.4324	1.4298	1.4271	1.4148	1.4125	1.4018	1.4018	1.3998	1.4059	1.4125	1.4172	1.4221	(40)
HLP (average)												1.4148	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.9085 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	31.5095	31.0415	30.3825	29.1675	28.2577	27.2488	26.7039	27.3583	28.0708	29.1503	30.3903	31.4030	(42b)
Hot water usage for other uses													
	44.4159	42.8008	41.1857	39.5705	37.9554	36.3403	36.3403	37.9554	39.5705	41.1857	42.8008	44.4159	(42c)
Average daily hot water use (litres/day)												69.5923	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	75.9254	73.8423	71.5682	68.7380	66.2131	63.5891	63.0442	65.3137	67.6413	70.3359	73.1911	75.8189	(44)
Energy conte	120.2472	105.1504	109.9976	94.0989	89.1355	78.1902	76.2465	80.8720	83.4085	95.4452	104.2742	118.7140	(45)
Energy content (annual)										Total = Sum(45)m =		1155.7803	
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													
	102.2102	89.3779	93.4980	79.9841	75.7652	66.4617	64.8095	68.7412	70.8972	81.1284	88.6330	100.9069	(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													
	102.2102	89.3779	93.4980	79.9841	75.7652	66.4617	64.8095	68.7412	70.8972	81.1284	88.6330	100.9069	(64)
										Total per year (kWh/year) = Sum(64)m =		982.4133	(64)
12Total per year (kWh/year)												982	(64)
Electric shower(s)													
	58.4494	52.0789	56.8682	54.2686	55.2869	52.7384	54.4963	55.2869	54.2686	56.8682	55.7988	58.4494	(64a)
											Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	664.8587	(64a)
Heat gains from water heating, kWh/month													
	40.1649	35.3642	37.5915	33.5632	32.7630	29.8000	29.8265	31.0070	31.2915	34.4991	36.1080	39.8391	(65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	145.4248	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	153.5923	170.0487	153.5923	158.7121	153.5923	158.7121	153.5923	153.5923	158.7121	153.5923	158.7121	153.5923	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	304.5140	307.6739	299.7110	282.7591	261.3602	241.2484	227.8124	224.6525	232.6154	249.5673	270.9661	291.0780	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	37.5425	(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)													
	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	-116.3398	(71)
Water heating gains (Table 5)													
	53.9851	52.6253	50.5263	46.6155	44.0363	41.3889	40.0893	41.6761	43.4604	46.3698	50.1500	53.5472	(72)
Total internal gains													
	578.7188	596.9753	570.4571	554.7141	525.6164	507.9768	488.1215	486.5484	501.4152	516.1569	546.4556	564.8449	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W	
Southeast	15.0100	36.7938	0.6300	0.7000	0.7700	168.7825	(77)
Southwest	18.9300	36.7938	0.6300	0.7000	0.7700	212.8617	(79)

Solar gains	381.6442	650.0813	889.4696	1102.0959	1234.4393	1225.5125	1181.5248	1082.7907	963.1075	718.4783	457.1218	326.6079	(83)
Total gains	960.3630	1247.0566	1459.9267	1656.8100	1760.0557	1733.4893	1669.6463	1569.3391	1464.5227	1234.6353	1003.5774	891.4529	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	94.6614	94.8385	95.0127	95.8396	95.9959	96.7304	96.7304	96.8676	96.4461	95.9959	95.6802	95.3524	
alpha	7.3108	7.3226	7.3342	7.3893	7.3997	7.4487	7.4487	7.4578	7.4297	7.3997	7.3787	7.3568	
util living area													
	0.9999	0.9993	0.9960	0.9750	0.8866	0.6866	0.5000	0.5538	0.8296	0.9888	0.9995	0.9999	(86)
MIT	19.9992	20.1777	20.4068	20.6894	20.9024	20.9879	20.9989	20.9978	20.9553	20.6609	20.2677	19.9698	(87)
Th 2	19.7385	19.7406	19.7426	19.7520	19.7537	19.7620	19.7620	19.7635	19.7588	19.7537	19.7502	19.7465	(88)
util rest of house													
	0.9998	0.9988	0.9930	0.9559	0.8161	0.5630	0.3602	0.4069	0.7156	0.9768	0.9991	0.9999	(89)
MIT 2	18.8450	19.0250	19.2541	19.5326	19.7064	19.7592	19.7619	19.7633	19.7448	19.5130	19.1230	18.8223	(90)
Living area fraction										fLA = Living area / (4) =		0.3323	(91)
MIT	19.2286	19.4081	19.6372	19.9171	20.1039	20.1675	20.1730	20.1735	20.1471	19.8945	19.5034	19.2036	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2286	19.4081	19.6372	19.9171	20.1039	20.1675	20.1730	20.1735	20.1471	19.8945	19.5034	19.2036	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9998	0.9986	0.9927	0.9591	0.8386	0.6050	0.4069	0.4562	0.7551	0.9787	0.9990	0.9999	(94)
Useful gains	960.1653	1245.2687	1449.2543	1589.1122	1476.0316	1048.7145	679.3683	715.8835	1105.9110	1208.3396	1002.6013	891.3468	(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													
	2902.7111	2815.6759	2544.9403	2115.8202	1611.3309	1059.3974	679.8684	717.0157	1154.0311	1782.0886	2386.0394	2896.1591	(97)
Space heating kWh													
	1445.2541	1055.3137	815.1904	379.2298	100.6627	0.0000	0.0000	0.0000	0.0000	426.8693	996.0754	1491.5804	(98a)
Space heating requirement - total per year (kWh/year)												6710.1757	
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													
	1445.2541	1055.3137	815.1904	379.2298	100.6627	0.0000	0.0000	0.0000	0.0000	426.8693	996.0754	1491.5804	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6710.1757	

Space heating per m2 (98c) / (4) = 49.4340 (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	1788.6399	1408.0782	1444.0854	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9180	0.9689	0.9515	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	1641.9674	1364.2585	1374.0654	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1960.8464	1889.1613	1774.9823	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	229.5929	390.5276	298.2821	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	57.3982	97.6319	74.5705	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												229.6007	(107)
Energy for space heating												49.4340	(99)
Energy for space cooling												1.6915	(108)
Total												51.1255	(109)
Fabric Energy Efficiency (TFEE)												51.1	(109)

Predicted Energy Assessment

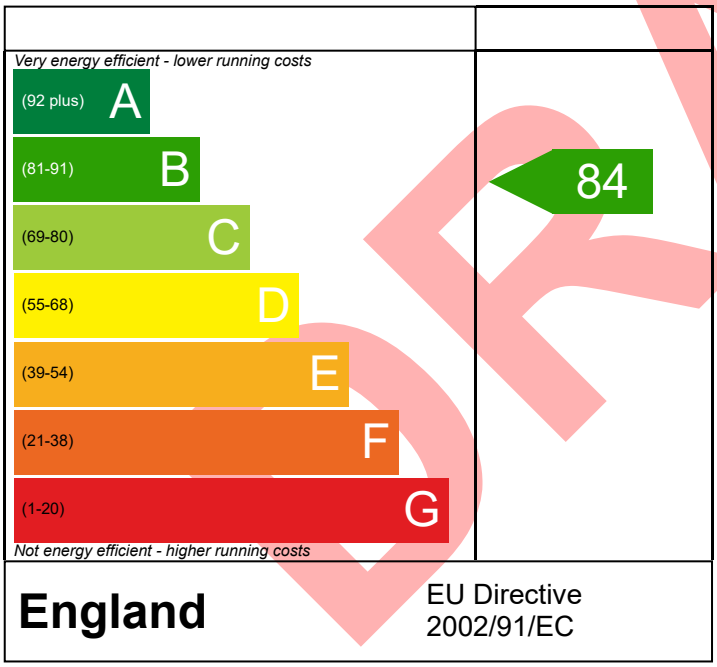
1b, TEMPLEWOOD AVENUE, LONDON, NW3 7UY

Dwelling type:	House, Detached
Date of assessment:	28/02/2023
Produced by:	Gary White
Total floor area:	135.74 m²
DRRN:	

This document is a Predicted Energy Assessment for properties marketed when they are incomplete. It includes a predicted energy rating which might not represent the final energy rating of the property on completion. Once the property is completed, this rating will be updated and an official Energy Performance Certificate will be created for the property. This will include more detailed information about the energy performance of the completed property.

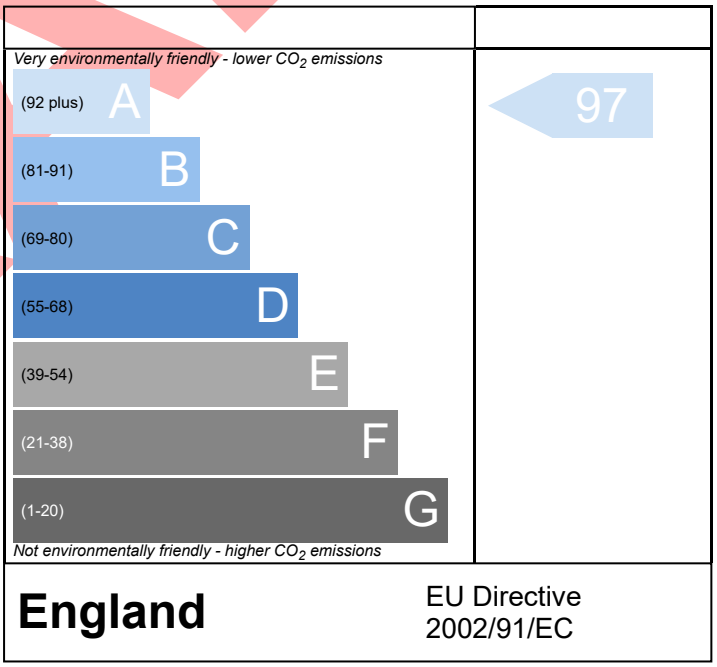
The energy performance has been assessed using the Government approved SAP 10 methodology and is rated in terms of the energy use per square meter of floor area; the energy efficiency is based on fuel costs and the environmental impact is based on carbon dioxide (CO2) emissions.

Energy Efficiency Rating



The energy efficiency rating is a measure of the overall efficiency of a home. The higher the rating the more energy efficient the home is and the lower the fuel bills are likely to be.

Environmental Impact (CO_2) Rating



The environmental impact rating is a measure of a home's impact on the environment in terms of carbon dioxide (CO_2) emissions. The higher the rating the less impact it has on the environment.

DRAFT

Summary for Input Data

elmhurst energy

Property Reference	C2223457	**Issued on Date**	28/02/2023
Assessment Reference	As Designed	**Prop Type Ref**	
Property	1b, TEMPLEWOOD AVENUE, LONDON, NW3 7UY		

SAP Rating	84 B	**DER**	3.33	**TER**	12.12
Environmental	97 A	**% DER < TER**			72.52
CO_2 Emissions (t/year)	0.39	**DFEE**	45.42	**TFEE**	51.13
Compliance Check	See BREL	**% DFEE < TFEE**			11.16
% DPER < TPER	45.68	**DPER**	34.59	**TPER**	63.68

Assessor Details	Mr. Gary White	**Assessor ID**	4104-0001
Client			

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

Orientation	Southeast
Property Tenture	ND
Transaction Type	6
Terrain Type	Suburban
1.0 Property Type	House, Detached
2.0 Number of Storeys	2
3.0 Date Built	2021
4.0 Sheltered Sides	2
5.0 Sunlight/Shade	Average or unknown
6.0 Thermal Mass Parameter	Precise calculation
7.0 Electricity Tariff	Standard
Smart electricity meter fitted	No
Smart gas meter fitted	No

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	39.42 m	67.87 m²	2.54 m
1st Storey:	39.42 m	67.87 m²	3.14 m

8.0 Living Area 45.11 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Wall	Solid Wall	Other	0.15	190.00	223.91	188.45	0.00	None	35.46	Calculate Wall Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall 1	Plasterboard on timber frame	9.00	224.10
Internal Wall 2	Dense block, dense plaster	100.00	6.15

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof - flat	External Flat Roof	Other	0.14	100.00	67.87	0.00	None	0.00	Calculate Wall Area	0.00

10.2 Internal Ceilings

Description	Storey	Construction	Area (m²)
Internal Ceiling 1	Lowest occupied	Other	67.87

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
Heat Loss Floor	Ground Floor - Solid	Lowest occupied	Other	0.10	None	0.00	110.00	67.87

11.2 Internal Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Floor 1		Other	100.00	67.87

12.0 Opening Types

Summary for Input Data

elmhurst energy

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
window	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	1.00
glazed door	Manufacturer	Window	Triple Low-E Soft 0.05			0.57		0.70	1.10

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
entrance door	glazed door	External Wall	South East	3.00	
windows	window	External Wall	South East	12.68	
window	window	External Wall	South West	19.78	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Calculate Bridges	

17.1 List of Bridges

Bridge Type	Source Type	Length	Psi	Adjusted Reference:	Imported
E2 Other lintels (including other steel lintels)	Independently assessed	16.30	0.30	0.30	No
E3 Sill	Independently assessed	7.55	0.04	0.04	No
E4 Jamb	Independently assessed	30.80	0.05	0.05	No
E5 Ground floor (normal)	Independently assessed	39.42	0.16	0.16	No
E6 Intermediate floor within a dwelling	Independently assessed	39.42	0.07	0.07	No
E15 Flat roof with parapet	Table K1 - Default	39.42	0.30	0.30	No
E16 Corner (normal)	Independently assessed	17.04	0.09	0.09	No
E17 Corner (inverted – internal area greater than external area)	Independently assessed	5.68	-0.09	-0.09	No

Y-value	0.08	W/m²K
18.0 Pressure Testing	Yes	
Designed AP_{50}	4.00	m³/(h.m²) @ 50 Pa
Test Method	Blower Door	

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	Yes	
Approved Installation	Yes	
Mechanical Ventilation data Type	Database	
Type	Balanced mechanical ventilation with heat recovery	
MV Reference Number	500167	
Configuration	3	
Manufacturer SFP	0.63	
Duct Type	Rigid	
MVHR Efficiency	90.00	
Wet Rooms	3	
SFP from Installer Commissioning Certificate	No	
MVHR System Location	Inside heated envelope (installed exclusively)	
Duct Installation Specification	Level 1	

20.0 Fans, Open Fireplaces, Flues

21.0 Fixed Cooling System	No	

22.0 Lighting

No Fixed Lighting	No	

Name	Efficacy	Power	Capacity	Count
Low energy Lighting	95.00	4	380	30

24.0 Main Heating 1	Database	
Description	ASHP	
Percentage of Heat	100.00	%
Database Ref. No.	103747	
Fuel Type	Electricity	
In Winter	0.00	

In Summer	0.00
Model Name	aroTHERM 5kW
Manufacturer	Vaillant Group UK Ltd
System Type	Heat Pump
Controls SAP Code	2207
PCDF Controls	0
Is MHS Pumped	Pump in heated space
Heating Pump Age	2013 or later
Heat Emitter	Underfloor
Underfloor Heating	Yes - Pipes in thin screed
Flow Temperature	Enter value
Flow Temperature Value	45.00

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1										
Heat source 2										
Heat source 3										
Heat source 4										
Heat source 5										

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	Yes
Waste Water Heat Recovery Instantaneous System 2	Yes
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From mains
Bath Count	1
Immersion Only Heating Hot Water	Yes

28.1 Showers

Description	Shower Type	Flow Rate [l/min]	Rated Power [kW]	Connected	Connected To

28.3 Waste Water Heat Recovery System

Instantaneous System 1

Database ID	80146
Brand Model	Recoup, Pipe HEX
Details	Year: 2019 + current Efficiency: 0 Utilisation factor: 0.972
Dedicated Storage Volume	0

Instantaneous System 2

Database ID	80140
Brand Model	RECOUP, Easyfit+
Details	Year: 2017 + current Efficiency: 0 Utilisation factor: 0.956
Dedicated Storage Volume	0

29.0 Hot Water Cylinder	Hot Water Cylinder
Cylinder Stat	Yes
Cylinder In Heated Space	Yes
Independent Time Control	Yes

Summary for Input Data

Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.80	kWh/day
Pipes insulation	Fully insulated primary pipework	
In Airing Cupboard	No	

31.0 Thermal Store None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	**Environmental Impact**
			B 85	A 97
	£3,500 - £5,500	£174	B 89	A 98
			0	0