

Full SAP Calculation Printout



Property Reference	Flat 3		Issued on Date	26/07/2023	
Assessment Reference	Flat 3 - Baseline	Prop Type Ref			
Property	Flat 3, Pier View Hotel, 34 Oldminster Road, Sharpness, Berkeley, G13 9NA				
SAP Rating	78 C	DER	24.61	TER	11.42
Environmental	78 C	% DER < TER			-115.50
CO ₂ Emissions (t/year)	1.96	DFEE	77.66	TFEE	35.92
Compliance Check	See BREL				
% DPER < TPER	-126.08	DPER	135.33	TPER	59.86
Assessor Details				Assessor ID	AW87-0001
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	45.8900 (1b)	x 2.8000 (2b)	= 128.4920 (1b)
First floor	45.8900 (1c)	x 2.3200 (2c)	= 106.4648 (1c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.7800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 234.9568 (5)

2. Ventilation rate

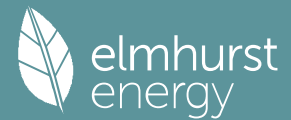
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1277 (8)
Pressure test	No
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.8777 (18)
Number of sides sheltered	1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.8119 (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 infil rate	1.0351	1.0148	0.9945	0.8930	0.8727	0.7713	0.7713	0.7510	0.8119	0.8727	0.9133	0.9539 (22b)
Effective ac	1.0351	1.0148	0.9945	0.8988	0.8808	0.7974	0.7974	0.7820	0.8296	0.8808	0.9171	0.9550 (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
Door			1.8300	1.4000	2.5620		(26)
New Windows (Uw = 1.40)			14.2700	1.3258	18.9186		(27)
External Wall	112.9600	14.2700	98.6900	0.3000	29.6070	110.0000	10855.9000 (29a)
Corridor Wall	28.2500	1.8300	26.4200	0.3000	7.9260	9.0000	237.7800 (29a)
Stud Wall	1.0600		1.0600	0.3000	0.3180	9.0000	9.5400 (29a)
Warm Pitched Roof	15.5000		15.5000	0.1700	2.6350	9.0000	139.5000 (30)
Cold Pitched Roof	33.5000		33.5000	0.1500	5.0250	9.0000	301.5000 (30)

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Total net area of external elements A _{um} (A, m ²)	191.2700												(31)
Fabric heat loss, W/K = Sum (A x U)	(26)...	(30) + (32) =	66.9916										(33)
Party Wall	17.1400	0.0000	0.0000						180.0000	3085.2000			(32)
Party Floor	45.8900								40.0000	1835.6000			(32d)
Internal Wall Lower Floor	43.2700								9.0000	389.4300			(32c)
Internal Wall Upper Floor	56.8400								9.0000	511.5600			(32c)

Heat capacity C _m = Sum(A x k)	(28)...	(30) + (32) + (32a)...	(32e) =	17366.0100									(34)
Thermal mass parameter (TMP = C _m / TFA) in kJ/m ² K				189.2134									(35)
Thermal bridges (Default value 0.200 * total exposed area)				38.2540									(36)
Point Thermal bridges				0.0000									(36a)
Total fabric heat loss	(33) + (36) + (36a) =			105.2456									(37)

Ventilation heat loss calculated monthly (38) _m = 0.33 x (25) _m x (5)													
(38) _m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	80.2586	78.6849	77.1124	69.6862	68.2968	61.8289	61.8289	60.6311	64.3202	68.2968	71.1076	74.0461	
Average = Sum(39) _m / 12 =	185.5042	183.9305	182.3579	174.9318	173.5424	167.0744	167.0744	165.8767	169.5658	173.5424	176.3531	179.2916	(39)
												174.9204	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	2.0212	2.0040	1.9869	1.9060	1.8909	1.8204	1.8204	1.8073	1.8475	1.8909	1.9215	1.9535	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.6493	(42)
Hot water usage for mixer showers	121.2468	119.4247	116.7695	111.6893	107.9403	103.7594	101.3830	104.0181	106.9066	111.3956	116.5849	120.7822		(42a)
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000		(42b)
Hot water usage for other uses	41.7616	40.2430	38.7244	37.2058	35.6872	34.1686	34.1686	35.6872	37.2058	38.7244	40.2430	41.7616		(42c)
Average daily hot water use (litres/day)													149.7505	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	163.0084	159.6676	155.4939	148.8951	143.6275	137.9280	135.5515	139.7052	144.1123	150.1200	156.8278	162.5438	(44)	
Energy content (annual)	258.1654	227.3646	238.9883	203.8300	193.3502	169.5985	163.9378	172.9842	177.7049	203.7114	223.4300	254.5043	(45)	
Distribution loss (46) _m = 0.15 x (45) _m	38.7248	34.1047	35.8482	30.5745	29.0025	25.4398	24.5907	25.9476	26.6557	30.5567	33.5145	38.1756	(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	0.5761	0.5529	0.6411	0.6274	0.6563	0.6337	0.6359	0.6279	0.5980	0.6121	0.5814	0.5750	(61)	
Total heat required for water heating calculated for each month	258.7415	227.9175	239.6294	204.4574	194.0065	170.2322	164.5737	173.6121	178.3029	204.3235	224.0115	255.0793	(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	258.7415	227.9175	239.6294	204.4574	194.0065	170.2322	164.5737	173.6121	178.3029	204.3235	224.0115	255.0793	(64)	
													2494.8875	(64)
12Total per year (kWh/year)													2495	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
													0.0000	(64a)
Heat gains from water heating, kWh/month	85.9840	75.7370	79.6239	67.9303	64.4530	56.5499	54.6683	57.6742	59.2364	67.8871	74.4358	84.7664	(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	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	128.2439	141.9844	128.2439	132.5187	128.2439	132.5187	128.2439	128.2439	132.5187	128.2439	132.5187	128.2439	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	242.3146	244.8291	238.4927	225.0033	207.9754	191.9715	181.2799	178.7655	185.1018	198.5912	215.6192	231.6230	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	(71)
Water heating gains (Table 5)	115.5699	112.7038	107.0213	94.3477	86.6304	78.5416	73.4789	77.5191	82.2728	91.2460	103.3831	113.9334	(72)
Total internal gains	551.8681	565.2569	539.4976	517.6093	488.5893	465.7714	445.7424	447.2682	462.6330	483.8208	517.2607	539.5400	(73)

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6. Solar gains

[Jan]			Area m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	Specific data or Table 6c	FF Access factor Table 6d			Gains W		
South			6.7000	46.7521	0.6300	0.7000	0.7700			95.7299 (78)		
West			7.5700	19.6403	0.6300	0.7000	0.7700			45.4376 (80)		
Solar gains	141.1674	245.6664	346.0928	439.2059	496.8497	494.1924	476.1548	433.8144	378.8698	274.5730	170.1278	120.0851 (83)
Total gains	693.0355	810.9232	885.5904	956.8152	985.4390	959.9638	921.8972	881.0826	841.5027	758.3938	687.3885	659.6250 (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	26.0042	26.2267	26.4529	27.5758	27.7966	28.8727	28.8727	29.0812	28.4485	27.7966	27.3536	26.9053
alpha	2.7336	2.7484	2.7635	2.8384	2.8531	2.9248	2.9248	2.9387	2.8966	2.8531	2.8236	2.7937
util living area	0.9870	0.9792	0.9671	0.9396	0.8880	0.7839	0.6559	0.6902	0.8505	0.9493	0.9800	0.9887 (86)
MIT	18.0828	18.3724	18.8255	19.4958	20.0845	20.6021	20.8361	20.8050	20.4324	19.6559	18.8105	18.1112 (87)
Th 2	19.3192	19.3306	19.3421	19.3967	19.4071	19.4558	19.4558	19.4649	19.4369	19.4071	19.3862	19.3645 (88)
util rest of house	0.9832	0.9730	0.9566	0.9180	0.8408	0.6796	0.4782	0.5222	0.7697	0.9269	0.9730	0.9854 (89)
MIT 2	16.7756	17.0692	17.5239	18.2135	18.7766	19.2562	19.4102	19.4041	19.1155	18.3844	17.5413	16.8320 (90)
Living area fraction	FLA = Living area / (4) =											0.2604 (91)
MIT	17.1160	17.4086	17.8629	18.5474	19.1172	19.6067	19.7815	19.7689	19.4585	18.7155	17.8718	17.1651 (92)
Temperature adjustment												0.0000
adjusted MIT	17.1160	17.4086	17.8629	18.5474	19.1172	19.6067	19.7815	19.7689	19.4585	18.7155	17.8718	17.1651 (93)

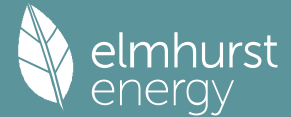
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9754	0.9624	0.9430	0.9025	0.8298	0.6919	0.5215	0.5612	0.7712	0.9131	0.9631	0.9786 (94)
Useful gains	675.9737	780.4216	835.1305	863.4823	817.7118	664.1972	480.7339	494.4956	648.9266	692.4695	662.0020	645.5073 (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	2377.4223	2300.7053	2072.1065	1687.6350	1287.1941	836.4884	531.5531	558.8215	908.6121	1408.3814	1899.6424	2324.5336 (97)
Space heating kWh	1265.8778	1021.6307	920.3101	593.3899	349.2948	0.0000	0.0000	0.0000	0.0000	532.6385	891.1011	1249.1956 (98a)
Space heating requirement - total per year (kWh/year)												6823.4385
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	1265.8778	1021.6307	920.3101	593.3899	349.2948	0.0000	0.0000	0.0000	0.0000	532.6385	891.1011	1249.1956 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6823.4385
Space heating per m ²												(98c) / (4) = 74.3456 (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 %)												89.1000 (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	1265.8778	1021.6307	920.3101	593.3899	349.2948	0.0000	0.0000	0.0000	0.0000	532.6385	891.1011	1249.1956 (98)
Space heating efficiency (main heating system 1)	89.1000	89.1000	89.1000	89.1000	89.1000	0.0000	0.0000	0.0000	0.0000	89.1000	89.1000	89.1000 (210)
Space heating fuel (main heating system)	1420.7382	1146.6113	1032.8958	665.9820	392.0256	0.0000	0.0000	0.0000	0.0000	597.7985	1000.1135	1402.0152 (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	258.7415	227.9175	239.6294	204.4574	194.0065	170.2322	164.5737	173.6121	178.3029	204.3235	224.0115	255.0793 (64)
Efficiency of water heater (217)m	88.3766	88.3229	88.2209	88.0121	87.5913	85.0000	85.0000	85.0000	85.0000	87.9242	88.2449	85.0000 (216)
Fuel for water heating, kWh/month	292.7716	258.0503	271.6243	232.3060	221.4906	200.2732	193.6162	204.2495	209.7682	232.3860	253.8520	288.6259 (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)

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Lighting	32.8139	26.3245	23.7023	17.3653	13.4135	10.9589	12.2362	15.9051	20.6592	27.1060	30.6161	33.7259 (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												7658.1802 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												85.0000
Water heating fuel used												2859.0137 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
central heating pump												41.0000 (230c)
main heating flue fan												45.0000 (230e)
Total electricity for the above, kWh/year												86.0000 (231)
Electricity for lighting (calculated in Appendix L)												264.8272 (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												10868.0211 (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	7658.1802	0.2100	1608.2178 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2859.0137	0.2100	600.3929 (264)
Space and water heating			2208.6107 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	264.8272	0.1443	38.2227 (268)
Total CO2, kg/year			2258.7627 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			24.6100 (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	7658.1802	1.1300	8653.7436 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2859.0137	1.1300	3230.6855 (278)
Space and water heating			11884.4291 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	264.8272	1.5338	406.2007 (282)
Total Primary energy kWh/year			12420.7307 (286)
Dwelling Primary energy Rate (DPER)			135.3300 (287)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	45.8900 (1b)	x 2.8000 (2b)	= 128.4920 (1b) -
First floor	45.8900 (1c)	x 2.3200 (2c)	= 106.4648 (1c) -
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	91.7800		(4)

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Distribution loss (46)m = 0.15 x (45)m	30.8692	27.1477	28.5063	24.3196	23.0581	20.2204	19.5747	20.6787	21.2628	24.3728	26.7196	30.4391 (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	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	256.7538	227.0122	241.0007	211.4458	204.6795	184.1179	181.4566	188.8169	191.0673	213.4441	227.4460	253.8862 (62)
WWHS	-40.3120	-35.6522	-37.3330	-30.9132	-28.8100	-24.6529	-23.1082	-24.5732	-25.5068	-30.0697	-34.0654	-39.5655 (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)
FGHS	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	216.4418	191.3600	203.6678	180.5326	175.8695	159.4650	158.3484	164.2437	165.5605	183.3743	193.3807	214.3207 (64)
												2206.5650 (64)
12Total per year (kWh/year)												2207 (64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month	81.1665	71.6843	75.9286	66.2372	63.8518	57.1507	56.1302	58.5775	59.4614	66.7660	71.5573	80.2130 (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	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654	132.4654 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	128.2439	141.9844	128.2439	132.5187	128.2439	132.5187	128.2439	128.2439	132.5187	128.2439	132.5187	128.2439 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	242.3146	244.8291	238.4927	225.0033	207.9754	191.9715	181.2799	178.7655	185.1018	198.5912	215.6192	231.6230 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465	36.2465 (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. evaporati on (negative values) (Table 5)	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723	-105.9723 (71)
Water heating gains (Table 5)	109.0948	106.6731	102.0546	91.9962	85.8224	79.3760	75.4438	78.7332	82.5853	89.7393	99.3852	107.8132 (72)
Total internal gains	545.3929	559.2261	534.5309	515.2578	487.7813	466.6058	447.7073	448.4823	462.9455	482.3141	513.2627	533.4198 (73)

6. Solar gains

[Jan]		Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	Access factor Table 6d	Gains W					
South		6.7000	46.7521	0.6300	0.7000	0.7700	95.7299 (78)					
West		7.5700	19.6403	0.6300	0.7000	0.7700	45.4376 (80)					
Solar gains	141.1674	245.6664	346.0928	439.2059	496.8497	494.1924	476.1548	433.8144	378.8698	274.5730	170.1278	120.0851 (83)
Total gains	686.5604	804.8925	880.6236	954.4637	984.6310	960.7982	923.8621	882.2967	841.8152	756.8871	683.3905	653.5049 (84)

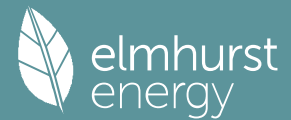
7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni,m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	47.1574	47.2955	47.4316	48.0817	48.2053	48.7893	48.7893	48.8990	48.5627	48.2053	47.9559	47.6979
alpha	4.1438	4.1530	4.1621	4.2054	4.2137	4.2526	4.2526	4.2599	4.2375	4.2137	4.1971	4.1799
util living area	0.9862	0.9729	0.9493	0.8911	0.7848	0.6158	0.4606	0.4992	0.7182	0.9120	0.9740	0.9886 (86)
MIT	19.4969	19.7470	20.0677	20.4677	20.7685	20.9395	20.9860	20.9803	20.8813	20.4864	19.9277	19.4608 (87)
Th 2	19.9890	19.9916	19.9942	20.0065	20.0087	20.0194	20.0194	20.0214	20.0153	20.0087	20.0041	19.9993 (88)
util rest of house	0.9828	0.9665	0.9371	0.8648	0.7345	0.5361	0.3627	0.3997	0.6438	0.8850	0.9668	0.9858 (89)
MIT 2	18.2494	18.5666	18.9694	19.4636	19.8051	19.9803	20.0138	20.0128	19.9294	19.4978	18.8070	18.2105 (90)
Living area fraction									fLA = Living area / (4) =			0.2604 (91)
MIT	18.5742	18.8740	19.2554	19.7251	20.0560	20.2301	20.2669	20.2648	20.1773	19.7552	19.0988	18.5361 (92)
Temperature adjustment												0.0000
adjusted MIT	18.5742	18.8740	19.2554	19.7251	20.0560	20.2301	20.2669	20.2648	20.1773	19.7552	19.0988	18.5361 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9763	0.9572	0.9259	0.8562	0.7371	0.5540	0.3879	0.4252	0.6570	0.8767	0.9580	0.9800 (94)

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Useful gains	670.2742	770.4292	815.3880	817.2125	725.7601	532.2868	358.4028	375.1151	553.0761	663.5591	654.6581	640.4575 (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	1460.1618	1425.2775	1297.2489	1086.0458	836.1808	556.6569	362.5584	381.2594	603.6743	916.1577	1206.9656	1449.8707 (97)
Space heating kWh	587.6764	440.0580	358.5046	193.5600	82.1530	0.0000	0.0000	0.0000	0.0000	187.9334	397.6614	602.2034 (98a)
Space heating requirement - total per year (kWh/year)												2849.7501
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	587.6764	440.0580	358.5046	193.5600	82.1530	0.0000	0.0000	0.0000	0.0000	187.9334	397.6614	602.2034 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2849.7501
Space heating per m2												(98c) / (4) = 31.0498 (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 %)	92.4000 (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	587.6764	440.0580	358.5046	193.5600	82.1530	0.0000	0.0000	0.0000	0.0000	187.9334	397.6614	602.2034	(98)
Space heating efficiency (main heating system 1)	92.4000	92.4000	92.4000	92.4000	92.4000	0.0000	0.0000	0.0000	0.0000	92.4000	92.4000	92.4000	(210)
Space heating fuel (main heating system)	636.0134	476.2533	387.9919	209.4805	88.9101	0.0000	0.0000	0.0000	0.0000	203.3911	430.3695	651.7353	(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	216.4418	191.3600	203.6678	180.5326	175.8695	159.4650	158.3484	164.2437	165.5605	183.3743	193.3807	214.3207	(64)
Efficiency of water heater	86.4091	86.1052	85.5795	84.5311	82.8519	80.3000	80.3000	80.3000	80.3000	84.4341	85.8903	80.3000	(216)
Fuel for water heating, kWh/month	250.4851	222.2397	237.9867	213.5696	212.2698	198.5865	197.1960	204.5376	206.1774	217.1803	225.1484	247.8577	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041	(231)
Lighting	26.6466	21.3769	19.2475	14.1015	10.8924	8.8992	9.9364	12.9158	16.7763	22.0114	24.8618	27.3871	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-30.7726	-44.5439	-65.7104	-75.8728	-83.5060	-78.5323	-77.5497	-72.3741	-63.5293	-51.8121	-34.2347	-26.4695	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-14.0220	-29.8299	-59.9178	-90.9229	-121.1434	-122.0784	-120.6611	-101.7564	-74.0362	-42.9867	-18.8250	-11.0649	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1													3084.1451 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													80.3000
Water heating fuel used													2633.2348 (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)													215.0530 (232)
Energy saving/generation technologies (Appendices M, N and O)													
PV generation													-1512.1521 (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													4506.2808 (238)

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

Energy Emission factor Emissions

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	kWh/year	kg CO2/kWh	kg CO2/year
Space heating - main system 1	3084.1451	0.2100	647.6705 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2633.2348	0.2100	552.9793 (264)
Space and water heating			1200.6498 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	215.0530	0.1443	31.0388 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-704.9074	0.1340	-94.4880
PV Unit electricity exported	-807.2448	0.1256	-101.3822
Total			-195.8702 (269)
Total CO2, kg/year			1047.7477 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.4200 (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	3084.1451	1.1300	3485.0840 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2633.2348	1.1300	2975.5554 (278)
Space and water heating			6460.6394 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	215.0530	1.5338	329.8554 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-704.9074	1.4954	-1054.0976
PV Unit electricity exported	-807.2448	0.4610	-372.1303
Total			-1426.2279 (283)
Total Primary energy kWh/year			5494.3677 (286)
Target Primary Energy Rate (TPER)			59.8600 (287)