

Full SAP Calculation Printout



Property Reference	St James' Road 83		Issued on Date	30/11/2023	
Assessment Reference	Rear Of 83 Baseline	Prop Type Ref			
Property	Rear Of, 83, St James' Road, Sutton, SM1 2TJ				
SAP Rating	72 C	DER	35.97	TER	14.61
Environmental	75 C	% DER < TER			-146.20
CO ₂ Emissions (t/year)	1.55	DFEE	107.25	TFEE	54.28
Compliance Check	See BREL	% DFEE < TFEE			-97.60
% DPER < TPER	-155.27	DPER	199.36	TPER	78.10
Assessor Details	Mr. Damian Selim			Assessor ID	L673-0001
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			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.8600	2.4000	124.4640
Dwelling volume			124.4640

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	20.0000 / (5) =	0.1607 (8)
Pressure test	No	
Pressure Test Method	Blower Door	
Measured/design AP50		15.0000 (17)
Infiltration rate		0.9107 (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) =	0.8424 (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	1.0740	1.0530	1.0319	0.9266	0.9056	0.8003	0.8003	0.7792	0.8424	0.9056	0.9477	0.9898 (22b)
Effective ac	1.0740	1.0530	1.0319	0.9293	0.9100	0.8202	0.8202	0.8036	0.8548	0.9100	0.9491	0.9899 (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
Window (Uw = 1.40)			6.3000	1.3258	8.3523		(27)
Solid Door			1.8900	3.0000	5.6700		(26)
Glazed Door (Uw = 1.40)			5.0400	1.3258	6.6818		(27)
Bath Velux			0.5700	1.3258	0.7557		(27a)
Ground Floor			51.8600	0.1800	9.3348	110.0000	5704.6000 (28a)
New Walls	50.0000	13.2300	36.7700	0.1800	6.6186	60.0000	2206.2000 (29a)
Existing Walls	50.0000		50.0000	0.3000	15.0000	17.0000	850.0000 (29a)
Roof	50.0000	0.5700	49.4300	0.1500	7.4145	9.0000	444.8700 (30)
Total net area of external elements Aum(A, m ²)			201.8600				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	59.8277		(33)
Internal Wall			67.0000			9.0000	603.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	9808.6700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							189.1375 (35)
Thermal bridges (Default value 0.200 * total exposed area)							40.3720 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	100.1997 (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
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(38)m	44.1143	43.2493	42.3844	38.1700	37.3776	33.6888	33.6888	33.0057	35.1096	37.3776	38.9806	40.6565 (38)
Heat transfer coeff	144.3140	143.4490	142.5840	138.3697	137.5772	133.8884	133.8884	133.2053	135.3093	137.5772	139.1803	140.8562 (39)
Average = Sum(39)m / 12 =												138.3499

HLP	Jan 2.7828	Feb 2.7661	Mar 2.7494	Apr 2.6681	May 2.6529	Jun 2.5817	Jul 2.5817	Aug 2.5686	Sep 2.6091	Oct 2.6529	Nov 2.6838	Dec 2.7161 (40)
HLP (average)												2.6678
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7449 (42)
Hot water usage for mixer showers	53.4764	52.6728	51.5017	49.2611	47.6075	45.7635	44.7154	45.8776	47.1516	49.1315	51.4203	53.2715 (42a)
Hot water usage for baths	23.1198	22.7765	22.2930	21.4014	20.7338	19.9936	19.5938	20.0739	20.5967	21.3888	22.2987	23.0417 (42b)
Hot water usage for other uses	32.4999	31.3181	30.1363	28.9545	27.7727	26.5909	26.5909	27.7727	28.9545	30.1363	31.3181	32.4999 (42c)
Average daily hot water use (litres/day)												100.2846 (43)
Daily hot water use	109.0962	106.7674	103.9310	99.6170	96.1141	92.3480	90.9000	93.7242	96.7028	100.6566	105.0371	108.8131 (44)
Energy conte	172.7817	152.0353	159.7380	136.3707	129.3880	113.5527	109.9357	116.0502	119.2442	136.5901	149.6446	170.3751 (45)
Energy content (annual)												Total = Sum(45)m = 1665.7062
Distribution loss (46)m = 0.15 x (45)m	25.9173	22.8053	23.9607	20.4556	19.4082	17.0329	16.4904	17.4075	17.8866	20.4885	22.4467	25.5563 (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												
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 (57)
Combi loss	50.9589	46.0274	50.9589	49.1262	48.9787	45.5415	46.3217	47.7608	47.6891	50.9589	49.3151	50.9589 (61)
Total heat required for water heating calculated for each month	223.7406	198.0627	210.6969	185.4968	178.3667	159.0941	156.2574	163.8110	166.9333	187.5490	198.9596	221.3340 (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	223.7406	198.0627	210.6969	185.4968	178.3667	159.0941	156.2574	163.8110	166.9333	187.5490	198.9596	221.3340 (64)
Total per year (kWh/year)												2250.3021 (64)
Electric shower(s)												2250 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month	70.1896	62.0586	65.8526	57.6248	55.2662	49.1416	48.1340	50.5269	51.5710	58.1559	62.0856	69.3894 (65)

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

Metabolic gains (Table 5), Watts	Jan 87.2470	Feb 87.2470	Mar 87.2470	Apr 87.2470	May 87.2470	Jun 87.2470	Jul 87.2470	Aug 87.2470	Sep 87.2470	Oct 87.2470	Nov 87.2470	Dec 87.2470 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.6982	84.9159	76.6982	79.2548	76.6982	79.2548	76.6982	76.6982	79.2548	76.6982	79.2548	76.6982 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	152.0628	153.6407	149.6644	141.1992	130.5134	120.4703	113.7609	112.1830	116.1593	124.6245	135.3103	145.3534 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247 (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)	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976 (71)
Water heating gains (Table 5)	94.3409	92.3491	88.5116	80.0344	74.2825	68.2523	64.6963	67.9125	71.6264	78.1666	86.2300	93.2654 (72)
Total internal gains	375.2760	383.0798	367.0483	352.6625	333.6682	317.1515	304.3295	305.9678	316.2146	331.6634	352.9692	367.4911 (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						
Northeast	1.8000	11.2829	0.6300	0.7000	0.7700	6.2068 (75)						
Southeast	2.7000	36.7938	0.6300	0.7000	0.7700	30.3606 (77)						
Northwest	1.8000	11.2829	0.6300	0.7000	0.7700	6.2068 (81)						
Northeast	2.5200	11.2829	0.6300	0.7000	0.7700	8.6895 (75)						
Northwest	2.5200	11.2829	0.6300	0.7000	0.7700	8.6895 (81)						
Northeast	0.5700	19.8164	0.6300	0.7000	1.0000	4.4831 (82)						
Solar gains	64.6363	121.8340	197.6838	296.5753	379.1022	396.9382	374.1316	309.4554	231.4598	143.0247	79.5608	53.9271 (83)
Total gains	439.9123	504.9138	564.7321	649.2379	712.7704	714.0897	678.4612	615.4231	547.6744	474.6881	432.5300	421.4182 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	Jan 18.8799	Feb 18.9937	Mar 19.1089	Apr 19.6910	May 19.8044	Jun 20.3500	Jul 20.3500	Aug 20.4544	Sep 20.1363	Oct 19.8044	Nov 19.5763	Dec 19.3433
tau	2.2587	2.2662	2.2739	2.3127	2.3203	2.3567	2.3567	2.3636	2.3424	2.3203	2.3051	2.2896
util living area	0.9824	0.9749	0.9614	0.9284	0.8670	0.7631	0.6511	0.7012	0.8575	0.9470	0.9753	0.9841 (86)
MIT	17.2999	17.5910	18.1323	18.9569	19.7354	20.3963	20.7149	20.6486	20.1064	19.1241	18.1230	17.3084 (87)

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Th 2	18.8626	18.8715	18.8805	18.9251	18.9336	18.9737	18.9737	18.9812	18.9582	18.9336	18.9164	18.8987 (88)
util rest of house	0.9767	0.9667	0.9478	0.9000	0.8047	0.6299	0.4232	0.4862	0.7618	0.9200	0.9657	0.9791 (89)
MIT 2	15.7349	16.0275	16.5668	17.3943	18.1276	18.7110	18.9143	18.8947	18.4957	17.5767	16.5831	15.7629 (90)
Living area fraction									fLA = Living area / (4) =			0.2700 (91)
MIT	16.1574	16.4496	16.9894	17.8161	18.5617	19.1659	19.4004	19.3682	18.9305	17.9944	16.9988	16.1801 (92)
Temperature adjustment												0.0000
adjusted MIT	16.1574	16.4496	16.9894	17.8161	18.5617	19.1659	19.4004	19.3682	18.9305	17.9944	16.9988	16.1801 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9650	0.9519	0.9291	0.8781	0.7896	0.6459	0.4819	0.5382	0.7600	0.9012	0.9515	0.9684 (94)	
Useful gains	424.5279	480.6523	524.7027	570.1199	562.8033	461.2283	326.9218	331.2147	416.2197	427.7687	411.5345	408.0840 (95)	
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.0000	10.6000	7.1000	4.2000 (96)	
Heat loss rate W	1711.1821	1656.7747	1495.6206	1233.7194	944.0087	611.3277	374.9428	395.3754	653.6135	1017.3048	1377.7193	1687.4732 (97)	
Space heating kWh	957.2707	790.3542	722.3629	477.7917	283.6168	0.0000	0.0000	0.0000	0.0000	438.6149	695.6530	951.8655 (98a)	
Space heating requirement - total per year (kWh/year)												5317.5298	
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	957.2707	790.3542	722.3629	477.7917	283.6168	0.0000	0.0000	0.0000	0.0000	438.6149	695.6530	951.8655 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												5317.5298	
Space heating per m2												(98c) / (4) =	102.5362 (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 %)													88.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	957.2707	790.3542	722.3629	477.7917	283.6168	0.0000	0.0000	0.0000	0.0000	438.6149	695.6530	951.8655 (98)	
Space heating efficiency (main heating system 1)	88.0000	88.0000	88.0000	88.0000	88.0000	0.0000	0.0000	0.0000	0.0000	88.0000	88.0000	88.0000 (210)	
Space heating fuel (main heating system)	1087.8076	898.1298	820.8670	542.9451	322.2918	0.0000	0.0000	0.0000	0.0000	498.4260	790.5148	1081.6654 (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	223.7406	198.0627	210.6969	185.4968	178.3667	159.0941	156.2574	163.8110	166.9333	187.5490	198.9596	221.3340 (64)	
Efficiency of water heater	87.8088	87.7978	87.7722	87.7180	87.6112	87.0000	87.0000	87.0000	87.0000	87.6981	87.7756	87.8096 (217)	
Fuel for water heating, kWh/month	254.8043	225.5897	240.0498	211.4695	203.5889	182.8668	179.6062	188.2885	191.8774	213.8575	226.6684	252.0613 (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	38.4366	30.8353	27.7637	20.3409	15.7119	12.8368	14.3329	18.6305	24.1991	31.7506	35.8622	39.5049 (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													6042.6475 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													87.0000
Water heating fuel used													2570.7283 (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)													310.2052 (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													9009.5810 (238)

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

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	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	6042.6475	0.2100	1268.9560 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2570.7283	0.2100	539.8529 (264)
Space and water heating			1808.8089 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	310.2052	0.1443	44.7722 (268)
Total CO2, kg/year			1865.5104 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			35.9700 (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	6042.6475	1.1300	6828.1917 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2570.7283	1.1300	2904.9229 (278)
Space and water heating			9733.1146 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	310.2052	1.5338	475.8031 (282)
Total Primary energy kWh/year			10339.0186 (286)
Dwelling Primary energy Rate (DPER)			199.3600 (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	51.8600 (1b)	2.4000 (2b)	124.4640 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.8600		124.4640 (4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 124.4640 (5)

2. Ventilation rate

		m ³ per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) = 0.1607 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000 (17)	
Infiltration rate	0.4107 (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) =	0.3799 (21)

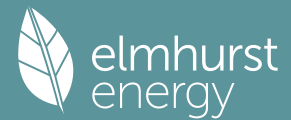
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4844	0.4749	0.4654	0.4179	0.4084	0.3609	0.3609	0.3514	0.3799	0.4084	0.4274	0.4464 (22b)
Effective ac	0.6173	0.6127	0.6083	0.5873	0.5834	0.5651	0.5651	0.5617	0.5722	0.5834	0.5913	0.5996 (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
TER Opaque door			1.8900	1.0000	1.8900		(26)
TER Opening Type (Uw = 1.20)			10.5300	1.1450	12.0573		(27)
Bath Velux			0.5300	1.5918	0.8436		(27a)
Ground Floor			51.8600	0.1300	6.7418		(28a)
New Walls	50.0000	12.4200	37.5800	0.1800	6.7644		(29a)
Existing Walls	50.0000		50.0000	0.1800	9.0000		(29a)
Roof	50.0000	0.5300	49.4700	0.1100	5.4417		(30)
Total net area of external elements Aum (A, m ²)			201.8600				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.7388		(33)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							189.1375 (35)
Thermal bridges (User defined value 0.050 * total exposed area)							10.0930 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	52.8318 (37)

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

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.3545	25.1674	24.9840	24.1227	23.9615	23.2113	23.2113	23.0724	23.5003	23.9615	24.2875	24.6283	(38)
Heat transfer coeff	78.1862	77.9992	77.8158	76.9544	76.7933	76.0431	76.0431	75.9042	76.3321	76.7933	77.1193	77.4601	(39)
Average = Sum(39)m / 12 =												76.9537	
HLP	1.5076	1.5040	1.5005	1.4839	1.4808	1.4663	1.4663	1.4636	1.4719	1.4808	1.4871	1.4936	(40)
HLP (average)												1.4839	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7449	(42)
Hot water usage for mixer showers														
53.4764	52.6728	51.5017	49.2611	47.6075	45.7635	44.7154	45.8776	47.1516	49.1315	51.4203	53.2715	53.2715	(42a)	
Hot water usage for baths														
23.1198	22.7765	22.2930	21.4014	20.7338	19.9936	19.5938	20.0739	20.5967	21.3888	22.2987	23.0417	23.0417	(42b)	
Hot water usage for other uses														
32.4999	31.3181	30.1363	28.9545	27.7727	26.5909	26.5909	27.7727	28.9545	30.1363	31.3181	32.4999	32.4999	(42c)	
Average daily hot water use (litres/day)													100.2846	(43)
Daily hot water use														
109.0962	106.7674	103.9310	99.6170	96.1141	92.3480	90.9000	93.7242	96.7028	100.6566	105.0371	108.8131	108.8131	(44)	
Energy conte	172.7817	152.0353	159.7380	136.3707	129.3880	113.5527	109.9357	116.0502	119.2442	136.5901	149.6446	170.3751	(45)	
Energy content (annual)													1665.7062	
Distribution loss (46)m = 0.15 x (45)m														
25.9173	22.8053	23.9607	20.4556	19.4082	17.0329	16.4904	17.4075	17.8866	20.4885	22.4467	25.5563	25.5563	(46)	
Water storage loss:														
Total storage loss														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)	
If cylinder contains dedicated solar storage														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)	
Primary loss														
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)	
Combi loss														
50.9589	46.0274	50.9589	49.1262	48.9787	45.5415	46.3217	47.7608	47.6891	50.9589	49.3151	50.9589	50.9589	(61)	
Total heat required for water heating calculated for each month														
223.7406	198.0627	210.6969	185.4968	178.3667	159.0941	156.2574	163.8110	166.9333	187.5490	198.9596	221.3340	221.3340	(62)	
WWHRS	-24.4472	-21.6213	-22.6406	-18.7473	-17.4718	-14.9507	-14.0139	-14.9024	-15.4686	-18.2358	-20.6589	-23.9945	(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														
199.2934	176.4414	188.0563	166.7496	160.8949	144.1434	142.2435	148.9086	151.4647	169.3132	178.3007	197.3395	197.3395	(64)	
12Total per year (kWh/year)													2023.1491	(64)
Electric shower(s)													2023	(64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000	(64a)
Heat gains from water heating, kWh/month														
70.1896	62.0586	65.8526	57.6248	55.2662	49.1416	48.1340	50.5269	51.5710	58.1559	62.0856	69.3894	69.3894	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	87.2470	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5														
76.7918	85.0195	76.7918	79.3516	76.7918	79.3516	76.7918	76.7918	79.3516	76.7918	79.3516	76.7918	76.7918	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5														
152.0628	153.6407	149.6644	141.1992	130.5134	120.4703	113.7609	112.1830	116.1593	124.6245	135.3103	145.3534	145.3534	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5														
31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	31.7247	(69)	
Pumps, fans														
3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)	
Losses e.g. evaporation (negative values) (Table 5)														
-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	-69.7976	(71)	
Water heating gains (Table 5)														
94.3409	92.3491	88.5116	80.0344	74.2825	68.2523	64.6963	67.9125	71.6264	78.1666	86.2300	93.2654	93.2654	(72)	
Total internal gains														
375.3696	383.1834	367.1419	352.7593	333.7619	317.2483	304.4232	306.0614	316.3113	331.7570	353.0659	367.5847	367.5847	(73)	

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W							
Northeast	4.0100	11.2829	0.6300	0.7000	0.7700	13.8273 (75)							
Southeast	2.5100	36.7938	0.6300	0.7000	0.7700	28.2241 (77)							
Northwest	4.0100	11.2829	0.6300	0.7000	0.7700	13.8273 (81)							
Northeast	0.5300	19.8164	0.6300	0.7000	1.0000	4.1685 (82)							
Solar gains	60.0473	113.1782	183.6244	275.4617	352.0974	368.6566	347.4775	287.4187	214.9913	132.8594	73.9111	50.0992	(83)
Total gains	435.4170	496.3616	550.7663	628.2210	685.8592	685.9049	651.9006	593.4801	531.3026	464.6164	426.9770	417.6839	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)														
tau	34.8480	34.9315	35.0139	35.4058	35.4801	35.8301	35.8301	35.8957	35.6944	35.4801	35.3301	35.1746		
alpha	3.3232	3.3288	3.3343	3.3604	3.3653	3.3887	3.3887	3.3930	3.3796	3.3653	3.3553	3.3450		
util living area														
0.9825	0.9720	0.9510	0.8943	0.7863	0.6267	0.4857	0.5440	0.7683	0.9254	0.9721	0.9847	0.9847	(86)	
MIT	18.9206	19.1669	19.5659	20.1208	20.5834	20.8643	20.9571	20.9371	20.7172	20.1218	19.4373	18.8857	(87)	
Th 2	19.6818	19.6845	19.6871	19.6996	19.7019	19.7129	19.7129	19.7149	19.7087	19.7019	19.6972	19.6923	(88)	

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util rest of house	0.9779	0.9647	0.9376	0.8648	0.7269	0.5277	0.3556	0.4104	0.6825	0.8980	0.9635	0.9807 (89)
MIT 2	17.3207	17.6333	18.1355	18.8205	19.3475	19.6306	19.6978	19.6901	19.5080	18.8408	17.9875	17.2829 (90)
Living area fraction									FLA = Living area / (4) =			0.2700 (91)
MIT	17.7526	18.0473	18.5216	19.1715	19.6812	19.9637	20.0377	20.0268	19.8344	19.1866	18.3789	17.7156 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7526	18.0473	18.5216	19.1715	19.6812	19.9637	20.0377	20.0268	19.8344	19.1866	18.3789	17.7156 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9680	0.9518	0.9218	0.8501	0.7258	0.5485	0.3899	0.4448	0.6921	0.8839	0.9510	0.9717 (94)
Useful gains	421.4970	472.4488	507.7087	534.0472	497.8047	376.2336	254.2059	264.0086	367.6886	410.6699	406.0657	405.8542 (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	1051.8072	1025.4791	935.4717	790.4391	612.8997	407.8706	261.4154	275.2857	437.7206	659.3968	869.8191	1046.9184 (97)
Space heating kWh	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518 (98a)
Space heating requirement - total per year (kWh/year)												2424.9825
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	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2424.9825
Space heating per m2										(98c) / (4) =		46.7602 (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)
Space heating requirement	468.9508	371.6363	318.2557	184.6021	85.6306	0.0000	0.0000	0.0000	0.0000	185.0528	333.9024	476.9518 (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)	507.5225	402.2038	344.4326	199.7859	92.6738	0.0000	0.0000	0.0000	0.0000	200.2736	361.3662	516.1816 (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	199.2934	176.4414	188.0563	166.7496	160.8949	144.1434	142.2435	148.9086	151.4647	169.3132	178.3007	197.3395 (64)
Efficiency of water heater (217)m	86.1484	85.9371	85.4989	84.5999	83.0921	80.3000	80.3000	80.3000	80.3000	84.5724	85.7048	80.3000 (216)
Fuel for water heating, kWh/month	231.3374	205.3147	219.9517	197.1037	193.6345	179.5061	177.1400	185.4403	188.6235	200.1991	208.0405	86.1982 (217)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	15.9558	12.8004	11.5253	8.4439	6.5223	5.3288	5.9499	7.7339	10.0456	13.1803	14.8871	16.3993 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-41.1016	-54.5439	-73.9093	-78.2739	-80.6653	-74.1101	-73.2654	-70.9697	-66.4049	-60.0630	-43.9964	-35.9576 (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	-34.8316	-71.5301	-139.0481	-204.4683	-266.2442	-265.9532	-262.7297	-224.2061	-166.7879	-100.6344	-45.9473	-27.6684 (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												2624.4400 (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												2415.2284 (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)												128.7727 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2563.3104 (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												2691.1305 (238)

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

Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
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Space heating - main system 1	2624.4400	0.2100	551.1324 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2415.2284	0.2100	507.1980 (264)
Space and water heating			1058.3303 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	128.7727	0.1443	18.5859 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-753.2611	0.1358	-102.3245
PV Unit electricity exported	-1810.0493	0.1265	-229.0436
Total			-331.3681 (269)
Total CO2, kg/year			757.4774 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			14.6100 (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	2624.4400	1.1300	2965.6172 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2415.2284	1.1300	2729.2080 (278)
Space and water heating			5694.8252 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.7727	1.5338	197.5158 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-753.2611	1.5021	-1131.4863
PV Unit electricity exported	-1810.0493	0.4645	-840.8008
Total			-1972.2871 (283)
Total Primary energy kWh/year			4050.1547 (286)
Target Primary Energy Rate (TPER)			78.1000 (287)