

Full SAP Calculation Printout



Plot Reference	UNIT 03			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 03		
Plot Address	UNIT 03, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	85 B	DER	13.47	TER	16.24
Environmental	89 B	% DER < TER			17.06
CO ₂ Emissions (t/year)	0.91	DFEE	37.13	TFEE	43.40
Compliance Check	See BREL	% DFEE < TFEE			14.43
% DPER < TPER	12.71	DPER	76.59	TPER	87.74
Assessor Details	Mr. Ondrej Gajdos			Assessor ID	W452-0001
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)
Main dwelling			
Basement floor	39.1000 (1a)	x 2.9000 (2a)	= 113.3900 (1a) - (3a)
Ground floor	32.6000 (1b)	x 2.8000 (2b)	= 91.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 204.6700 (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											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											3.0000 (17)	
Infiltration rate											0.1500 (18)	
Number of sides sheltered											3 (19)	
Shelter factor											(20) = 1 - [0.075 x (19)] =	0.7750 (20)
Infiltration rate adjusted to include shelter factor											(21) = (18) x (20) =	0.1162 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
	0.1482	0.1453	0.1424	0.1279	0.1250	0.1104	0.1104	0.1075	0.1162	0.1250	0.1308	0.1366 (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	0.2432	0.2403	0.2374	0.2229	0.2200	0.2054	0.2054	0.2025	0.2112	0.2200	0.2258	0.2316 (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
Main dwelling							
dl			1.8900	1.0000	1.8900		(26)
1			30.1500	0.7940	23.9378		(27)
basement floor			39.1000	0.1000	3.9100	110.0000	4300.9998 (28)
exposed wall	85.1500	32.0400	53.1100	0.1500	7.9665	60.0000	3186.6001 (29a)
basement wall	48.1400		48.1400	0.1500	7.2210	9.0000	433.2600 (29a)
Total net area of external elements Aum(A, m ²)			172.3900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.9253		(33)
Main dwelling							
pw			35.1700	0.0000	0.0000	110.0000	3868.6998 (32)
pc			35.9000			30.0000	1077.0000 (32b)
iw			89.9600			9.0000	809.6400 (32c)
if			32.6000			18.0000	586.8000 (32d)
ic			32.6000			9.0000	293.4000 (32e)

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Heat capacity $C_m = \text{Sum}(A \times k)$
Thermal mass parameter (TMP = C_m / TFA) in $\text{kJ/m}^2\text{K}$
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 14556.3997 (34)
203.0181 (35)

	Length	Psi-value	Total
K1 Element	12.3500	0.0500	0.6175
E2 Other lintels (including other steel lintels)	11.4500	0.0500	0.5725
E3 Sill	35.2000	0.0500	1.7600
E4 Jamb	8.7000	0.1600	1.3920
E5 Ground floor (normal)	16.6000	0.0700	1.1620
E22 Basement floor	6.1000	0.0000	0.0000
E6 Intermediate floor within a dwelling	22.8000	0.0700	1.5960
E7 Party floor between dwellings (in blocks of flats)	8.6000	0.0900	0.7740
E16 Corner (normal)	5.7000	-0.0900	-0.5130
E17 Corner (inverted - internal area greater than external area)	14.2000	0.0600	0.8520
E18 Party wall between dwellings	5.7000	0.0600	0.3420
E25 Staggered party wall between dwellings			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			8.5550 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	53.4803 (37)

Ventilation heat loss calculated monthly (38)m = $0.33 \times (25)\text{m} \times (5)$	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.4273	16.2310	16.0347	15.0532	14.8569	13.8755	13.8755	13.6792	14.2681	14.8569	15.2495	15.6421	(38)
Heat transfer coeff	69.9076	69.7113	69.5150	68.5336	68.3373	67.3558	67.3558	67.1595	67.7484	68.3373	68.7299	69.1224	(39)
Average = Sum(39)m / 12 =												68.4845	
HLP	0.9750	0.9723	0.9695	0.9558	0.9531	0.9394	0.9394	0.9367	0.9449	0.9531	0.9586	0.9641	(40)
HLP (average)												0.9552	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.2867 (42)
Hot water usage for mixer showers	62.5597	61.6196	60.2496	57.6284	55.6940	53.5368	52.3106	53.6702	55.1606	57.4768	60.1543	62.3201	(42a)
Hot water usage for baths	27.0260	26.6246	26.0594	25.0172	24.2369	23.3716	22.9042	23.4654	24.0766	25.0024	26.0661	26.9346	(42b)
Hot water usage for other uses	38.0479	36.6643	35.2808	33.8972	32.5136	31.1301	31.1301	32.5136	33.8972	35.2808	36.6643	38.0479	(42c)
Average daily hot water use (litres/day)												117.3243	(43)
Daily hot water use	127.6336	124.9085	121.5897	116.5428	112.4445	108.0384	106.3449	109.6493	113.1344	117.7600	122.8847	127.3025	(44)
Energy conte	202.1404	177.8681	186.8789	159.5413	151.3719	132.8459	128.6149	135.7688	139.5060	159.7992	175.0718	199.3250	(45)
Energy content (annual)													
Distribution loss (46)m = $0.15 \times (45)\text{m}$	30.3211	26.6802	28.0318	23.9312	22.7058	19.9269	19.2922	20.3653	20.9259	23.9699	26.2608	29.8988	(46)
Water storage loss (or HIU 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	49.3151	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	253.0993	223.8954	237.8378	208.8563	202.3308	182.1609	179.5738	186.7277	188.8211	210.7582	224.3869	250.2839	(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	253.0993	223.8954	237.8378	208.8563	202.3308	182.1609	179.5738	186.7277	188.8211	210.7582	224.3869	250.2839	(64)
12Total per year (kWh/year)												2548.7322	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	79.9514	70.6480	74.8770	65.3762	63.0709	56.5000	55.5042	57.8828	58.7145	65.8730	70.5402	79.0153	(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	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	114.3340	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4983	112.3731	101.4983	104.8816	101.4983	104.8816	101.4983	101.4983	104.8816	101.4983	104.8816	101.4983	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	201.2318	203.3199	198.0578	186.8555	172.7145	159.4240	150.5451	148.4570	153.7190	164.9214	179.0624	192.3529	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	(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)	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	(71)
Water heating gains (Table 5)	107.4616	105.1309	100.6411	90.8003	84.7727	78.4722	74.6024	77.7995	81.5479	88.5389	97.9724	106.2033	(72)
Total internal gains	470.4918	481.1242	460.4974	442.8376	419.2857	400.0780	383.9460	385.0550	397.4488	415.2589	442.2166	460.3547	(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
Southwest	20.9600	36.7938	0.5300	0.7000	0.7700	198.2775 (79)
Northwest	9.1900	11.2829	0.5300	0.7000	0.7700	26.6591 (81)

Full SAP Calculation Printout



Solar gains	224.9366	392.0052	559.8793	733.1418	857.1645	866.7943	829.0952	734.1488	619.5008	439.5911	271.0347	191.4554 (83)
Total gains	695.4284	873.1294	1020.3767	1175.9794	1276.4502	1266.8723	1213.0412	1119.2038	1016.9495	854.8499	713.2513	651.8101 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	57.8398	58.0027	58.1665	58.9995	59.1689	60.0311	60.0311	60.2066	59.6832	59.1689	58.8310	58.4968
alpha	4.8560	4.8668	4.8778	4.9333	4.9446	5.0021	5.0021	5.0138	4.9789	4.9446	4.9221	4.8998
util living area	0.9657	0.9151	0.8248	0.6627	0.4898	0.3392	0.2442	0.2757	0.4544	0.7470	0.9269	0.9732 (86)
MIT	20.0954	20.4098	20.6961	20.9085	20.9811	20.9976	20.9996	20.9994	20.9902	20.8677	20.4613	20.0365 (87)
Th 2	20.1042	20.1065	20.1088	20.1203	20.1226	20.1341	20.1341	20.1364	20.1295	20.1226	20.1180	20.1134 (88)
util rest of house	0.9581	0.8991	0.7970	0.6236	0.4461	0.2938	0.1962	0.2241	0.3991	0.7025	0.9100	0.9671 (89)
MIT 2	19.0776	19.4622	19.7977	20.0366	20.1080	20.1328	20.1340	20.1362	20.1233	20.0044	19.5409	19.0115 (90)
Living area fraction	19.4935	19.8495	20.1648	20.3929	20.4648	20.4862	20.4877	20.4889	20.4776	20.3572	19.9170	19.4303 (91)
MIT	19.4935	19.8495	20.1648	20.3929	20.4648	20.4862	20.4877	20.4889	20.4776	20.3572	19.9170	19.4303 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.3435	19.6995	20.0148	20.2429	20.3148	20.3362	20.3377	20.3389	20.3276	20.2072	19.7670	19.2803 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9501	0.8907	0.7939	0.6292	0.4557	0.3044	0.2075	0.2362	0.4118	0.7070	0.9022	0.9599 (94)
Useful gains	660.7366	777.7137	810.0453	739.9728	581.7312	385.6580	251.6820	264.3895	418.8022	604.3732	643.5109	625.7010 (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	1051.6560	1031.6893	939.4804	777.3716	588.7106	386.3653	251.7586	264.5357	421.9096	656.5290	870.6023	1042.3895 (97)
Space heating kWh	290.8440	170.6716	96.2998	26.9271	5.1927	0.0000	0.0000	0.0000	0.0000	38.8039	163.5058	310.0163 (98a)
Space heating requirement - total per year (kWh/year)												1102.2612
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	290.8440	170.6716	96.2998	26.9271	5.1927	0.0000	0.0000	0.0000	0.0000	38.8039	163.5058	310.0163 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1102.2612
Space heating per m2										(98c) / (4) =		15.3732 (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 %)												88.9000 (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	290.8440	170.6716	96.2998	26.9271	5.1927	0.0000	0.0000	0.0000	0.0000	38.8039	163.5058	310.0163 (98)
Space heating efficiency (main heating system 1)	88.9000	88.9000	88.9000	88.9000	88.9000	0.0000	0.0000	0.0000	0.0000	88.9000	88.9000	88.9000 (210)
Space heating fuel (main heating system)	327.1586	191.9815	108.3237	30.2893	5.8410	0.0000	0.0000	0.0000	0.0000	43.6490	183.9210	348.7247 (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	253.0993	223.8954	237.8378	208.8563	202.3308	182.1609	179.5738	186.7277	188.8211	210.7582	224.3869	250.2839 (64)
Efficiency of water heater	84.6801	83.8068	82.6030	81.1970	80.4948	80.3000	80.3000	80.3000	80.3000	81.5263	83.7136	84.8412 (217)
Fuel for water heating, kWh/month	298.8888	267.1565	287.9288	257.2216	251.3587	226.8505	223.6287	232.5376	235.1446	258.5156	268.0411	295.0029 (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	18.1788	16.4195	18.1788	17.5924	18.1788	17.5924	18.1788	18.1788	17.5924	18.1788	17.5924	18.1788 (231)
Lighting	21.0893	16.9187	15.2334	11.1606	8.6208	7.0433	7.8642	10.2221	13.2776	17.4209	19.6768	21.6755 (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												1239.8889 (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												3102.2753 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.1000, SFP = 0.6930)												
mechanical ventilation fans (SFP = 0.6930)												173.0403 (230a)

Full SAP Calculation Printout



central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	214.0403 (231)
Electricity for lighting (calculated in Appendix L)	170.2031 (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	4726.4075 (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	1239.8889	0.2100	260.3767 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	3102.2753	0.2100	651.4778 (264)
Space and water heating			911.8545 (265)
Pumps, fans and electric keep-hot	214.0403	0.1387	29.6900 (267)
Energy for lighting	170.2031	0.1443	24.5656 (268)
Total CO2, kg/year			966.1101 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			13.4700 (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	1239.8889	1.1300	1401.0744 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3102.2753	1.1300	3505.5711 (278)
Space and water heating			4906.6455 (279)
Pumps, fans and electric keep-hot	214.0403	1.5128	323.8002 (281)
Energy for lighting	170.2031	1.5338	261.0632 (282)
Total Primary energy kWh/year			5491.5088 (286)
Dwelling Primary energy Rate (DPER)			76.5900 (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)
Main dwelling			
Basement floor	39.1000 (1a)	x 2.9000 (2a)	= 113.3900 (1a) - (3a)
Ground floor	32.6000 (1b)	x 2.8000 (2b)	= 91.2800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	71.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	204.6700 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) = 0.1466 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3966 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3073 (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	0.3919	0.3842	0.3765	0.3381	0.3304	0.2920	0.2920	0.2843	0.3073	0.3304	0.3458	0.3611 (22b)
Effective ac	0.5768	0.5738	0.5709	0.5571	0.5546	0.5426	0.5426	0.5404	0.5472	0.5546	0.5598	0.5652 (25)

3. Heat losses and heat loss parameter

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Element	Gross		Openings		NetArea		U-value		A x U		K-value		A x K	
Main dwelling	m2		m2		m2		W/m2K		W/K		kJ/m2K		kJ/K	
TER Opaque door					1.8900		1.0000		1.8900				(26)	
TER Opening Type					16.0300		1.1450		18.3550				(27)	
basement floor					39.1000		0.1300		5.0830				(28)	
exposed wall	85.1500		17.9200		67.2300		0.1800		12.1014				(29a)	
basement wall	48.1400				48.1400		0.1800		8.6652				(29a)	
Total net area of external elements Aum(A, m2)					172.3900								(31)	
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =				46.0946				(33)	
Main dwelling														
pw					35.1700		0.0000		0.0000				(32)	
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													203.0181 (35)	
List of Thermal Bridges														
K1 Element							Length		Psi-value		Total			
E2 Other lintels (including other steel lintels)							12.3500		0.0500		0.6175			
E3 Sill							11.4500		0.0500		0.5725			
E4 Jamb							35.2000		0.0500		1.7600			
E5 Ground floor (normal)							8.7000		0.1600		1.3920			
E22 Basement floor							16.6000		0.0700		1.1620			
E6 Intermediate floor within a dwelling							6.1000		0.0000		0.0000			
E7 Party floor between dwellings (in blocks of flats)							22.8000		0.0700		1.5960			
E16 Corner (normal)							8.6000		0.0900		0.7740			
E17 Corner (inverted - internal area greater than external area)							5.7000		-0.0900		-0.5130			
E18 Party wall between dwellings							14.2000		0.0600		0.8520			
E25 Staggered party wall between dwellings							5.7000		0.0600		0.3420			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													8.5550 (36)	
Point Thermal bridges													0.0000	
Total fabric heat loss									(33) + (36) + (36a) =				54.6496 (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		
	38.9564	38.7550	38.5576	37.6305	37.4571	36.6496	36.6496	36.5000	36.9606	37.4571	37.8080	38.1748	(38)	
Heat transfer coeff														
	93.6059	93.4046	93.2072	92.2801	92.1066	91.2991	91.2991	91.1496	91.6102	92.1066	92.4575	92.8244	(39)	
Average = Sum(39)m / 12 =													92.2792	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP	1.3055	1.3027	1.3000	1.2870	1.2846	1.2733	1.2733	1.2713	1.2777	1.2846	1.2895	1.2946	(40)	
HLP (average)													1.2870	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)														

Assumed occupancy													2.2867 (42)	
Hot water usage for mixer showers														
	62.5597	61.6196	60.2496	57.6284	55.6940	53.5368	52.3106	53.6702	55.1606	57.4768	60.1543	62.3201	(42a)	
Hot water usage for baths														
	27.0260	26.6246	26.0594	25.0172	24.2369	23.3716	22.9042	23.4654	24.0766	25.0024	26.0661	26.9346	(42b)	
Hot water usage for other uses														
	38.0479	36.6643	35.2808	33.8972	32.5136	31.1301	31.1301	32.5136	33.8972	35.2808	36.6643	38.0479	(42c)	
Average daily hot water use (litres/day)													117.3243 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	127.6336	124.9085	121.5897	116.5428	112.4445	108.0384	106.3449	109.6493	113.1344	117.7600	122.8847	127.3025	(44)	
Energy conte	202.1404	177.8681	186.8789	159.5413	151.3719	132.8459	128.6149	135.7688	139.5060	159.7992	175.0718	199.3250	(45)	
Energy content (annual)													1948.7322	
Distribution loss (46)m = 0.15 x (45)m														
	30.3211	26.6802	28.0318	23.9312	22.7058	19.9269	19.2922	20.3653	20.9259	23.9699	26.2608	29.8988	(46)	
Water storage loss (or HIU 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														
	253.0993	223.8954	237.8378	208.8563	202.3308	182.1609	179.5738	186.7277	188.8211	210.7582	224.3869	250.2839	(62)	
WWHRS	-28.5997	-25.2938	-26.4862	-21.9316	-20.4395	-17.4902	-16.3943	-17.4337	-18.0961	-21.3333	-24.1680	-28.0701	(63a)	
PV diverter	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	(63b)	
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)	
Output from w/h	224.4996	198.6016	211.3516	186.9247	181.8913	164.6707	163.1795	169.2940	170.7250	189.4249	200.2189	222.2138	(64)	
12Total per year (kWh/year)													2282.9957 (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	79.9514	70.6480	74.8770	65.3762	63.0709	56.5000	55.5042	57.8828	58.7145	65.8730	70.5402	79.0153	(65)	

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

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)	
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	101.4932	112.3674	101.4932	104.8763	101.4932	104.8763	101.4932	101.4932	104.8763	101.4932	104.8763	101.4932	(67)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	201.2318	203.3199	198.0578	186.8555	172.7145	159.4240	150.5451	148.4570	153.7190	164.9214	179.0624	192.3529	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	34.4334	(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)	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	-91.4672	(71)	
Water heating gains (Table 5)	107.4616	105.1309	100.6411	90.8003	84.7727	78.4722	74.6024	77.7995	81.5479	88.5389	97.9724	106.2033	(72)	
Total internal gains	470.4867	481.1184	460.4923	442.8323	419.2805	400.0727	383.9409	385.0498	397.4434	415.2537	442.2112	460.3496	(73)	

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6. Solar gains

[Jan]	Area m2				Solar flux Table 6a W/m2	Specific data or Table 6b	g or Table 6b	Specific data or Table 6c	FF or Table 6c	Access factor Table 6d	Gains W	
Southwest	11.1500				36.7938		0.6300		0.7000	0.7700	125.3781	(79)
Northwest	4.8800				11.2829		0.6300		0.7000	0.7700	16.8273	(81)
Solar gains	142.2054	247.8177	353.9213	463.4103	541.7718	547.8449	524.0232	464.0346	391.5979	277.8943	171.3472	121.0395 (83)
Total gains	612.6921	728.9362	814.4136	906.2426	961.0523	947.9176	907.9640	849.0844	789.0414	693.1480	613.5584	581.3891 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	43.1965	43.2896	43.3813	43.8171	43.8996	44.2879	44.2879	44.3605	44.1375	43.8996	43.7330	43.5602
alpha	3.8798	3.8860	3.8921	3.9211	3.9266	3.9525	3.9525	3.9574	3.9425	3.9266	3.9155	3.9040
util living area	0.9838	0.9682	0.9396	0.8706	0.7488	0.5780	0.4324	0.4780	0.7013	0.9026	0.9703	0.9866 (86)
MIT	19.3678	19.6430	20.0025	20.4410	20.7663	20.9377	20.9845	20.9770	20.8654	20.4329	19.8238	19.3208 (87)
Th 2	19.8365	19.8387	19.8409	19.8510	19.8529	19.8618	19.8618	19.8634	19.8584	19.8529	19.8491	19.8450 (88)
util rest of house	0.9795	0.9600	0.9239	0.8377	0.6892	0.4892	0.3253	0.3671	0.6161	0.8702	0.9612	0.9830 (89)
MIT 2	17.9738	18.3211	18.7689	19.3008	19.6589	19.8251	19.8564	19.8547	19.7675	19.3073	18.5605	17.9201 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.5434	18.8613	19.2730	19.7667	20.1114	20.2797	20.3174	20.3133	20.2162	19.7673	19.0767	18.4925 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.5434	18.8613	19.2730	19.7667	20.1114	20.2797	20.3174	20.3133	20.2162	19.7673	19.0767	18.4925 (93)

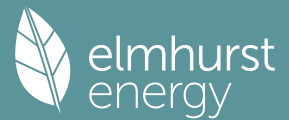
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9729	0.9511	0.9146	0.8350	0.7036	0.5230	0.3690	0.4121	0.6447	0.8673	0.9533	0.9772 (94)
Useful gains	596.1044	693.3211	744.8590	756.7256	676.2322	495.7591	335.0118	349.9207	508.6735	601.1582	584.8776	568.1190 (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	1333.2707	1304.0450	1190.5386	1002.7840	774.7465	518.5545	339.3929	356.6978	560.3019	844.3678	1107.3383	1326.6928 (97)
Space heating kWh	548.4517	410.4065	331.5856	177.1620	73.2946	0.0000	0.0000	0.0000	0.0000	180.9479	376.1717	564.3789 (98a)
Space heating requirement - total per year (kWh/year)	2662.3988											
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	548.4517	410.4065	331.5856	177.1620	73.2946	0.0000	0.0000	0.0000	0.0000	180.9479	376.1717	564.3789 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2662.3988											
Space heating per m2	(98c) / (4) = 37.1325 (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	548.4517	410.4065	331.5856	177.1620	73.2946	0.0000	0.0000	0.0000	0.0000	180.9479	376.1717	564.3789 (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)	593.5625	444.1628	358.8589	191.7338	79.3232	0.0000	0.0000	0.0000	0.0000	195.8311	407.1122	610.7996 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	224.4996	198.6016	211.3516	186.9247	181.8913	164.6707	163.1795	169.2940	170.7250	189.4249	200.2189	222.2138 (64)
Efficiency of water heater (217)m	86.2181	85.8999	85.3420	84.2666	82.5949	80.3000	80.3000	80.3000	80.3000	84.2834	85.7113	86.2893 (216)
Fuel for water heating, kWh/month	260.3857	231.2012	247.6524	221.8254	220.2210	205.0694	203.2124	210.8269	212.6090	224.7476	233.5968	257.5220 (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	21.0883	16.9178	15.2326	11.1601	8.6203	7.0429	7.8638	10.2216	13.2769	17.4200	19.6758	21.6744 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-9.3307	-14.3766	-22.5603	-27.7679	-32.1259	-30.8004	-30.4271	-27.6192	-23.0981	-17.4396	-10.6822	-7.9310 (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	-2.1194	-4.6341	-9.5517	-14.8669	-20.1848	-20.4779	-20.2378	-16.8905	-12.0652	-6.7920	-2.8805	-1.6632 (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)												

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(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												2881.3840	(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												2728.8696	(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)												170.1944	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-386.5231	(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												5479.9250	(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	2881.3840	0.2100	605.0906	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2728.8696	0.2100	573.0626	(264)
Space and water heating			1178.1533	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	170.1944	0.1443	24.5643	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-254.1591	0.1328	-33.7466	
PV Unit electricity exported	-132.3640	0.1249	-16.5282	
Total			-50.2748	(269)
Total CO2, kg/year			1164.3720	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			16.2400	(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	2881.3840	1.1300	3255.9639	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2728.8696	1.1300	3083.6227	(278)
Space and water heating			6339.5866	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	170.1944	1.5338	261.0499	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-254.1591	1.4906	-378.8545	
PV Unit electricity exported	-132.3640	0.4583	-60.6631	
Total			-439.5175	(283)
Total Primary energy kWh/year			6291.2198	(286)
Target Primary Energy Rate (TPER)			87.7400	(287)