

Full SAP Calculation Printout



Plot Reference	UNIT 15			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 15		
Plot Address	UNIT 15, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	83 B	DER	16.01	TER	17.46
Environmental	88 B	% DER < TER			8.30
CO ₂ Emissions (t/year)	1.05	DFEE	50.21	TFEE	50.68
Compliance Check	See BREL	% DFEE < TFEE			0.93
% DPER < TPER	3.79	DPER	90.27	TPER	93.83
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			
Ground floor	72.7000 (1b)	2.9000 (2b)	210.8300 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.7000		210.8300 (4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	210.8300 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	3.0000	(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)

	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	0.1482	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			2.1000	1.0000	2.1000		(26)
l			45.3300	0.7940	35.9901		(27)
exposed wall	74.5300	45.3300	29.2000	0.1500	4.3800	60.0000	1751.9999 (29a)
corridor wall	15.9500	2.1000	13.8500	0.3100	4.2935	14.0000	193.9000 (29a)
stair wall	7.2500		7.2500	0.2000	1.4500	9.0000	65.2500 (29a)
flat roof	72.7000		72.7000	0.1000	7.2700	9.0000	654.3000 (30)
Total net area of external elements Aum(A, m ²)			170.4300				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	55.4836		(33)
Main dwelling							
pw			14.5000	0.0000	0.0000	110.0000	1595.0000 (32)
pf			72.7000			40.0000	2907.9999 (32d)
iw			176.9000			9.0000	1592.0999 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	8760.5497 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		120.5028 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	17.3600	0.0500	0.8680
E3 Sill	16.3600	0.0500	0.8180
E4 Jamb	64.0000	0.0500	3.2000
E7 Party floor between dwellings (in blocks of flats)	27.7000	0.0700	1.9390
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	5.5000	0.0200	0.1100
E24 Eaves (insulation at ceiling level - inverted)	4.9000	0.0800	0.3920
E15 Flat roof with parapet	25.8000	0.5600	14.4480
E16 Corner (normal)	14.5000	0.0900	1.3050
E17 Corner (inverted - internal area greater than external area)	11.6000	-0.0900	-1.0440
E18 Party wall between dwellings	11.6000	0.0600	0.6960
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			22.7320 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss		(33) + (36) + (36a) =	78.2156 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	16.9217	16.7195	16.5173	15.5063	15.3041	14.2931	14.2931	14.0909	14.6975	15.3041	15.7085	16.1129 (38)
Heat transfer coeff	95.1373	94.9351	94.7329	93.7219	93.5197	92.5087	92.5087	92.3065	92.9131	93.5197	93.9241	94.3285 (39)
Average = Sum(39)m / 12 =												93.6714
HLP	1.3086	1.3058	1.3031	1.2892	1.2864	1.2725	1.2725	1.2697	1.2780	1.2864	1.2919	1.2975 (40)
HLP (average)												1.2885
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.3098 (42)
Hot water usage for mixer showers	62.9483	62.0023	60.6238	57.9863	56.0399	53.8693	52.6355	54.0035	55.5032	57.8338	60.5279	62.7071 (42a)
Hot water usage for baths	27.1930	26.7892	26.2205	25.1719	24.3867	23.5160	23.0458	23.6105	24.2254	25.1570	26.2272	27.1011 (42b)
Hot water usage for other uses	38.2852	36.8930	35.5008	34.1086	32.7164	31.3242	31.3242	32.7164	34.1086	35.5008	36.8930	38.2852 (42c)
Average daily hot water use (litres/day)												118.0531 (43)
Daily hot water use	128.4265	125.6844	122.3450	117.2667	113.1430	108.7095	107.0055	110.3304	113.8372	118.4916	123.6481	128.0933 (44)
Energy conte	203.3961	178.9729	188.0398	160.5323	152.3122	133.6710	129.4138	136.6121	140.3726	160.7919	176.1594	200.5632 (45)
Energy content (annual)										Total = Sum(45)m =		1960.8375
Distribution loss (46)m = 0.15 x (45)m	30.5094	26.8459	28.2060	24.0798	22.8468	20.0507	19.4121	20.4918	21.0559	24.1188	26.4239	30.0845 (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	254.3550	225.0003	238.9987	209.8474	203.2711	182.9861	180.3727	187.5710	189.6877	211.7508	225.4745	251.5221 (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	254.3550	225.0003	238.9987	209.8474	203.2711	182.9861	180.3727	187.5710	189.6877	211.7508	225.4745	251.5221 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2560.8375 (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	80.3689	71.0154	75.2629	65.7058	63.3835	56.7744	55.7698	58.1633	59.0027	66.2030	70.9018	79.4270 (65)

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

Metabolic gains (Table 5), Watts												
(66)m	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	102.6499	113.6481	102.6499	106.0715	102.6499	106.0715	102.6499	102.6499	106.0715	102.6499	106.0715	102.6499 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	203.5149	205.6267	200.3049	188.9755	174.6741	161.2328	152.2532	150.1413	155.4631	166.7926	181.0940	194.5353 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492 (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)	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940 (71)
Water heating gains (Table 5)	108.0228	105.6776	101.1599	91.2580	85.1929	78.8533	74.9594	78.1764	81.9481	88.9826	98.4747	106.7567 (72)
Total internal gains	474.8353	485.6002	464.7624	446.9528	423.1646	403.8054	387.5102	388.6154	401.1305	419.0728	446.2879	464.5896 (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				11.5600	11.2829		0.5300		0.7000		0.7700		33.5341 (75)
East				3.5400	19.6403		0.5300		0.7000		0.7700		17.8755 (76)
Southeast				16.8700	36.7938		0.5300		0.7000		0.7700		159.5869 (77)
Southwest				13.3600	36.7938		0.5300		0.7000		0.7700		126.3830 (79)
Solar gains	337.3795	590.3405	847.0586	1111.7722	1299.3990	1313.0943	1256.4059	1113.3700	938.4989	663.2746	407.0093	286.8162	(83)

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Total gains 812.2148 1075.9406 1311.8210 1558.7249 1722.5636 1716.8997 1643.9161 1501.9854 1339.6294 1082.3474 853.2972 751.4058 (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	25.5787	25.6332	25.6879	25.9650	26.0211	26.3055	26.3055	26.3631	26.1910	26.0211	25.9091	25.7980
alpha	2.7052	2.7089	2.7125	2.7310	2.7347	2.7537	2.7537	2.7575	2.7461	2.7347	2.7273	2.7199
util living area	0.9132	0.8429	0.7472	0.6079	0.4631	0.3326	0.2436	0.2764	0.4434	0.6920	0.8634	0.9263 (86)
MIT	18.9835	19.5191	20.0620	20.5533	20.8273	20.9493	20.9841	20.9773	20.8867	20.4642	19.6392	18.8775 (87)
Th 2	19.8341	19.8363	19.8384	19.8493	19.8515	19.8625	19.8625	19.8647	19.8581	19.8515	19.8472	19.8428 (88)
util rest of house	0.8999	0.8218	0.7168	0.5674	0.4147	0.2772	0.1822	0.2106	0.3794	0.6460	0.8409	0.9148 (89)
MIT 2	17.5524	18.2044	18.8494	19.4139	19.7039	19.8287	19.8553	19.8537	19.7758	19.3410	18.3745	17.4272 (90)
Living area fraction	fLA = Living area / (4) = 0.4003 (91)											
MIT	18.1252	18.7306	19.3347	19.8700	20.1536	20.2772	20.3071	20.3034	20.2205	19.7906	18.8808	18.0077 (92)
Temperature adjustment	-0.1500											
adjusted MIT	17.9752	18.5806	19.1847	19.7200	20.0036	20.1272	20.1571	20.1534	20.0705	19.6406	18.7308	17.8577 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8728	0.7949	0.6979	0.5626	0.4213	0.2903	0.1983	0.2276	0.3917	0.6367	0.8146	0.8889 (94)
Useful gains	708.8701	855.3000	915.4608	876.9654	725.6862	498.4006	325.9223	341.7794	524.7618	689.1648	695.0701	667.9071 (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	1301.0236	1298.7721	1201.6629	1014.0676	776.5486	511.3181	329.0671	346.4672	554.7340	845.4711	1092.4093	1288.3148 (97)
Space heating kWh	440.5622	298.0132	212.9344	98.7135	37.8416	0.0000	0.0000	0.0000	0.0000	116.2919	286.0842	461.5834 (98a)
Space heating requirement - total per year (kWh/year)	1952.0245											
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	440.5622	298.0132	212.9344	98.7135	37.8416	0.0000	0.0000	0.0000	0.0000	116.2919	286.0842	461.5834 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1952.0245											
Space heating per m2	(98c) / (4) = 26.8504 (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	440.5622	298.0132	212.9344	98.7135	37.8416	0.0000	0.0000	0.0000	0.0000	116.2919	286.0842	461.5834 (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)	495.5705	335.2230	239.5213	111.0389	42.5665	0.0000	0.0000	0.0000	0.0000	130.8120	321.8045	519.2164 (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	254.3550	225.0003	238.9987	209.8474	203.2711	182.9861	180.3727	187.5710	189.6877	211.7508	225.4745	251.5221 (64)
Efficiency of water heater (217)m	85.5465	84.9845	84.1348	82.8645	81.5380	80.3000	80.3000	80.3000	80.3000	83.1516	84.8927	80.3000 (216)
Fuel for water heating, kWh/month	297.3294	264.7547	284.0663	253.2416	249.2963	227.8781	224.6236	233.5879	236.2238	254.6564	265.5994	293.6146 (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	18.6211	16.8190	18.6211	18.0204	18.6211	18.0204	18.6211	18.6211	18.0204	18.6211	18.0204	18.6211 (231)
Lighting	21.3286	17.1106	15.4062	11.2872	8.7186	7.1232	7.9534	10.3381	13.4282	17.6185	19.9001	21.9214 (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	2195.7531 (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	3084.8721 (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)	178.2483 (230a)											
central heating pump	41.0000 (230c)											

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Total electricity for the above, kWh/year	219.2483	(231)
Electricity for lighting (calculated in Appendix L)	172.1342	(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	5672.0077	(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	2195.7531	0.2100	461.1082 (261)
Total CO2 associated with community systems			0.0000 (273)
Water heating (other fuel)	3084.8721	0.2100	647.8231 (264)
Space and water heating			1108.9313 (265)
Pumps, fans and electric keep-hot	219.2483	0.1387	30.4124 (267)
Energy for lighting	172.1342	0.1443	24.8443 (268)
Total CO2, kg/year			1164.1880 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			16.0100 (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	2195.7531	1.1300	2481.2010 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	3084.8721	1.1300	3485.9054 (278)
Space and water heating			5967.1065 (279)
Pumps, fans and electric keep-hot	219.2483	1.5128	331.6789 (281)
Energy for lighting	172.1342	1.5338	264.0251 (282)
Total Primary energy kWh/year			6562.8105 (286)
Dwelling Primary energy Rate (DPER)			90.2700 (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	72.7000	2.9000	210.8300
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	72.7000		210.8300
Dwelling volume			210.8300

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) = 0.1423 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3923 (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) = 0.3040 (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	0.3876	0.3800	0.3724	0.3344	0.3268	0.2888	0.2888	0.2812	0.3040	0.3268	0.3420	0.3572 (22b)
Effective ac	0.5751	0.5722	0.5694	0.5559	0.5534	0.5417	0.5417	0.5395	0.5462	0.5534	0.5585	0.5638 (25)

3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K
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Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type			16.0700	1.1450	18.4008		(27)
exposed wall	74.5300	16.0700	58.4600	0.1800	10.5228		(29a)
corridor wall	15.9500	2.1000	13.8500	0.1800	2.4930		(29a)
stair wall	7.2500		7.2500	0.1800	1.3050		(29a)
flat roof	72.7000		72.7000	0.1100	7.9970		(30)
Total net area of external elements Aum(A, m2)			170.4300				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.8186		(33)
Main dwelling							
pw			14.5000	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							120.5028 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				17.3600	0.0500	0.8680	
E3 Sill				16.3600	0.0500	0.8180	
E4 Jamb				64.0000	0.0500	3.2000	
E7 Party floor between dwellings (in blocks of flats)				27.7000	0.0700	1.9390	
E23 Balcony within or between dwellings, balcony support penetrates wall insulation				5.5000	0.0200	0.1100	
E24 Eaves (insulation at ceiling level - inverted)				4.9000	0.2400	1.1760	
E15 Flat roof with parapet				25.8000	0.5600	14.4480	
E16 Corner (normal)				14.5000	0.0900	1.3050	
E17 Corner (inverted - internal area greater than external area)				11.6000	-0.0900	-1.0440	
E18 Party wall between dwellings				11.6000	0.0600	0.6960	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							23.5160 (36)
Point Thermal bridges							0.0000
Total fabric heat loss						(33) + (36) + (36a) =	66.3346 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	40.0141	39.8111	39.6122	38.6777	38.5028	37.6889	37.6889	37.5382	38.0024	38.5028	38.8565	39.2263	(38)
Heat transfer coeff	106.3487	106.1457	105.9467	105.0122	104.8374	104.0235	104.0235	103.8728	104.3370	104.8374	105.1911	105.5609	(39)
Average = Sum(39)m / 12 =												105.0114	
HLP	1.4628	1.4601	1.4573	1.4445	1.4421	1.4309	1.4309	1.4288	1.4352	1.4421	1.4469	1.4520	(40)
HLP (average)												1.4444	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													
Assumed occupancy													2.3098 (42)
Hot water usage for mixer showers													
62.9483	62.0023	60.6238	57.9863	56.0399	53.8693	52.6355	54.0035	55.5032	57.8338	60.5279	62.7071	(42a)	
Hot water usage for baths													
27.1930	26.7892	26.2205	25.1719	24.3867	23.5160	23.0458	23.6105	24.2254	25.1570	26.2272	27.1011	(42b)	
Hot water usage for other uses													
38.2852	36.8930	35.5008	34.1086	32.7164	31.3242	31.3242	32.7164	34.1086	35.5008	36.8930	38.2852	(42c)	
Average daily hot water use (litres/day)												118.0531	(43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	128.4265	125.6844	122.3450	117.2667	113.1430	108.7095	107.0055	110.3304	113.8372	118.4916	123.6481	128.0933	(44)
Energy conte	203.3961	178.9729	188.0398	160.5323	152.3122	133.6710	129.4138	136.6121	140.3726	160.7919	176.1594	200.5632	(45)
Energy content (annual)													
Distribution loss (46)m = 0.15 x (45)m													
30.5094	26.8459	28.2060	24.0798	22.8468	20.0507	19.4121	20.4918	21.0559	24.1188	26.4239	30.0845	(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	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													
254.3550	225.0003	238.9987	209.8474	203.2711	182.9861	180.3727	187.5710	189.6877	211.7508	225.4745	251.5221	(62)	
WWHRS	-28.7773	-25.4509	-26.6507	-22.0678	-20.5664	-17.5988	-16.4961	-17.5420	-18.2084	-21.4657	-24.3181	-28.2444	(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	225.5777	199.5495	212.3480	187.7795	182.7047	165.3873	163.8766	170.0291	171.4793	190.2851	201.1564	223.2777	(64)
12Total per year (kWh/year)												2293.4507	(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	80.3689	71.0154	75.2629	65.7058	63.3835	56.7744	55.7698	58.1633	59.0027	66.2030	70.9018	79.4270	(65)

5. Internal gains (see Table 5 and 5a)													
Metabolic gains (Table 5), Watts													
(66)m	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	115.4925	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
102.6708	113.6712	102.6708	106.0931	102.6708	106.0931	102.6708	102.6708	106.0931	102.6708	106.0931	102.6708	102.6708	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
203.5149	205.6267	200.3049	188.9755	174.6741	161.2328	152.2532	150.1413	155.4631	166.7926	181.0940	194.5353	(68)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	34.5492	(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)													
-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	-92.3940	(71)
Water heating gains (Table 5)													
108.0228	105.6776	101.1599	91.2580	85.1929	78.8533	74.9594	78.1764	81.9481	88.9826	98.4747	106.7567	(72)	
Total internal gains	474.8562	485.6233	464.7833	446.9744	423.1855	403.8270	387.5311	388.6363	401.1521	419.0937	446.3095	464.6105	(73)

6. Solar gains

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[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	4.1000	11.2829	0.6300	0.7000	0.7700	14.1377 (75)
East	1.2600	19.6403	0.6300	0.7000	0.7700	7.5629 (76)
Southeast	5.9800	36.7938	0.6300	0.7000	0.7700	67.2431 (77)
Southwest	4.7300	36.7938	0.6300	0.7000	0.7700	53.1873 (79)

Solar gains	142.1311	248.7100	356.8911	468.4580	547.5424	553.3230	529.4313	469.1416	395.4302	279.4445	171.4669	120.8283 (83)
Total gains	616.9872	734.3333	821.6745	915.4324	970.7279	957.1500	916.9624	857.7779	796.5823	698.5381	617.7764	585.4388 (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	22.8821	22.9259	22.9690	23.1734	23.2120	23.3936	23.3936	23.4276	23.3233	23.2120	23.1340	23.0529
alpha	2.5255	2.5284	2.5313	2.5449	2.5475	2.5596	2.5596	2.5618	2.5549	2.5475	2.5423	2.5369
util living area	0.9537	0.9290	0.8928	0.8234	0.7197	0.5803	0.4530	0.4941	0.6815	0.8544	0.9322	0.9589 (86)
MIT	18.2955	18.6600	19.1693	19.8168	20.3669	20.7465	20.9028	20.8759	20.5936	19.8696	18.9726	18.2314 (87)
Th 2	19.7155	19.7176	19.7197	19.7294	19.7312	19.7398	19.7398	19.7413	19.7365	19.7312	19.7275	19.7237 (88)
util rest of house	0.9454	0.9166	0.8736	0.7907	0.6654	0.4951	0.3394	0.3799	0.6034	0.8200	0.9182	0.9515 (89)
MIT 2	16.6293	17.0864	17.7214	18.5152	19.1549	19.5604	19.6945	19.6788	19.4201	18.6012	17.4935	16.5533 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	17.2963	17.7163	18.3010	19.0362	19.6400	20.0352	20.1781	20.1580	19.8898	19.1089	18.0856	17.2250 (92)
Temperature adjustment												
adjusted MIT	17.2963	17.7163	18.3010	19.0362	19.6400	20.0352	20.1781	20.1580	19.8898	19.1089	18.0856	17.2250 (93)

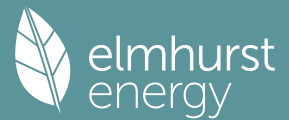
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9233	0.8908	0.8467	0.7697	0.6610	0.5165	0.3809	0.4199	0.6139	0.7994	0.8937	0.9308 (94)
Useful gains	569.6814	654.1356	695.7349	704.5966	641.6703	494.3360	349.2862	360.2209	489.0527	558.4016	552.1228	544.9238 (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	1382.1355	1360.3912	1250.2774	1064.4270	832.4128	565.3858	372.2110	390.3491	604.0924	892.0500	1155.5848	1374.9319 (97)
Space heating kWh	604.4659	474.6038	412.5796	259.0779	141.9124	0.0000	0.0000	0.0000	0.0000	248.2344	434.4927	617.5260 (98a)
Space heating requirement - total per year (kWh/year)	3192.8926											
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	604.4659	474.6038	412.5796	259.0779	141.9124	0.0000	0.0000	0.0000	0.0000	248.2344	434.4927	617.5260 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	3192.8926											
Space heating per m2	(98c) / (4) = 43.9187 (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	604.4659	474.6038	412.5796	259.0779	141.9124	0.0000	0.0000	0.0000	0.0000	248.2344	434.4927	617.5260 (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)	654.1838	513.6405	446.5147	280.3874	153.5848	0.0000	0.0000	0.0000	0.0000	268.6519	470.2302	668.3182 (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	225.5777	199.5495	212.3480	187.7795	182.7047	165.3873	163.8766	170.0291	171.4793	190.2851	201.1564	223.2777 (64)
Efficiency of water heater (217)m	86.3857	86.1684	85.7784	85.0714	83.8459	80.3000	80.3000	80.3000	80.3000	84.9520	85.9858	86.4416 (216)
Fuel for water heating, kWh/month	261.1286	231.5809	247.5541	220.7318	217.9053	205.9617	204.0805	211.7423	213.5483	223.9912	233.9415	258.2990 (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	21.3330	17.1141	15.4093	11.2895	8.7204	7.1246	7.9550	10.3402	13.4309	17.6221	19.9041	21.9259 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-12.0177	-18.3106	-28.4181	-34.5825	-39.6583	-37.8948	-37.4340	-34.1467	-28.8024	-22.0469	-13.6882	-10.2368 (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)	-3.1891	-6.9375	-14.2297	-22.0407	-29.8153	-30.2078	-29.8538	-24.9665	-17.8978	-10.1351	-4.3243	-2.5052 (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)												

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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												3455.5115	(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												2730.4652	(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)												172.1692	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-513.3399	(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												5930.8060	(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	3455.5115	0.2100	725.6574	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2730.4652	0.2100	573.3977	(264)
Space and water heating			1299.0551	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	172.1692	0.1443	24.8493	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-317.2370	0.1330	-42.1915	
PV Unit electricity exported	-196.1029	0.1250	-24.5140	
Total			-66.7055	(269)
Total CO2, kg/year			1269.1282	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.4600	(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	3455.5115	1.1300	3904.7280	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2730.4652	1.1300	3085.4257	(278)
Space and water heating			6990.1537	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	172.1692	1.5338	264.0789	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-317.2370	1.4914	-473.1407	
PV Unit electricity exported	-196.1029	0.4588	-89.9747	
Total			-563.1154	(283)
Total Primary energy kWh/year			6821.2180	(286)
Target Primary Energy Rate (TPER)			93.8300	(287)