

Full SAP Calculation Printout



Plot Reference	UNIT 11			Issued on Date	08/07/2026
Assessment Reference	001	Plot Type Ref	UNIT 11		
Plot Address	UNIT 11, Stoney Wood Quarter, 34 The Fairway, LONDON, NW7 3HS			SAP Version	10.2
SAP Rating	85 B	DER	14.22	TER	15.00
Environmental	90 B	% DER < TER			5.20
CO ₂ Emissions (t/year)	0.69	DFEE	29.01	TFEE	31.27
Compliance Check	See BREL	% DFEE < TFEE			7.24
% DPER < TPER	-0.12	DPER	80.78	TPER	80.68
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	51.6000 (1b)	2.7500 (2b)	141.9000 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	141.9000 (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			11.6500	0.7940	9.2496		(27)
exposed wall	41.2500	11.6500	29.6000	0.1500	4.4400	60.0000	1776.0000 (29a)
corridor wall	18.7000	2.1000	16.6000	0.3100	5.1460	14.0000	232.4000 (29a)
terraces	4.0000		4.0000	0.1000	0.4000	9.0000	36.0000 (30)
Total net area of external elements Aum(A, m ²)			63.9500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		21.3356		(33)
Main dwelling							
pw			21.4500	0.0000	0.0000	110.0000	2359.5001 (32)
pf			51.6000			40.0000	2063.9999 (32d)
pc			47.6000			30.0000	1428.0000 (32b)
iw			144.1000			9.0000	1296.9001 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	9192.8000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		178.1550 (35)

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List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	7.4000	0.0500	0.3700
E3 Sill	6.4000	0.0500	0.3200
E4 Jamb	16.9000	0.0500	0.8450
E7 Party floor between dwellings (in blocks of flats)	33.6000	0.0700	2.3520
E9 Balcony between dwellings, wall insulation continuous	3.0000	0.0200	0.0600
E23 Balcony within or between dwellings, balcony support penetrates wall insulation	3.4000	0.0200	0.0680
E24 Eaves (insulation at ceiling level - inverted)	5.3000	0.2400	1.2720
E14 Flat roof	4.7000	0.1600	0.7520
E16 Corner (normal)	11.0000	0.0900	0.9900
E17 Corner (inverted - internal area greater than external area)	5.5000	-0.0900	-0.4950
E18 Party wall between dwellings	2.7500	0.0600	0.1650
E25 Staggered party wall between dwellings	2.7500	0.0600	0.1650
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.8640 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			28.1996 (37) (33) + (36) + (36a) =

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	11.3892	11.2531	11.1170	10.4366	10.3005	9.6200	9.6200	9.4839	9.8922	10.3005	10.5727	10.8448	(38)
Heat transfer coeff	39.5888	39.4527	39.3166	38.6362	38.5001	37.8196	37.8196	37.6835	38.0918	38.5001	38.7723	39.0445	(39)
Average = Sum(39)m / 12 =												38.6022	
HLP	0.7672	0.7646	0.7620	0.7488	0.7461	0.7329	0.7329	0.7303	0.7382	0.7461	0.7514	0.7567	(40)
HLP (average)												0.7481	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.7373 (42)
Hot water usage for mixer showers	53.3478	52.5461	51.3778	49.1426	47.4930	45.6535	44.6079	45.7673	47.0382	49.0133	51.2966	53.1434	(42a)
Hot water usage for baths	23.0645	22.7220	22.2396	21.3502	20.6842	19.9458	19.5469	20.0259	20.5474	21.3376	22.2453	22.9866	(42b)
Hot water usage for other uses	32.4214	31.2424	30.0635	28.8845	27.7055	26.5266	26.5266	27.7055	28.8845	30.0635	31.2424	32.4214	(42c)
Average daily hot water use (litres/day)												100.0433	(43)
Daily hot water use	108.8337	106.5105	103.6809	99.3773	95.8828	92.1258	90.6814	93.4987	96.4701	100.4144	104.7844	108.5513	(44)
Energy conte	172.3660	151.6695	159.3537	136.0426	129.0767	113.2795	109.6712	115.7709	118.9573	136.2614	149.2845	169.9652	(45)
Energy content (annual)										Total = Sum(45)m =		1661.6986	
Distribution loss (46)m = 0.15 x (45)m	25.8549	22.7504	23.9031	20.4064	19.3615	16.9919	16.4507	17.3656	17.8436	20.4392	22.3927	25.4948	(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	49.0080	48.8608	45.4319	46.2102	47.6459	47.5743	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	223.3249	197.6969	210.3126	185.0506	177.9376	158.7114	155.8815	163.4169	166.5317	187.2203	198.5996	220.9241	(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	223.3249	197.6969	210.3126	185.0506	177.9376	158.7114	155.8815	163.4169	166.5317	187.2203	198.5996	220.9241	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2245.6079	(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	70.0514	61.9370	65.7248	57.4862	55.1332	49.0234	48.0182	50.4053	51.4469	58.0466	61.9659	69.2531	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	76.3447	84.5245	76.3447	78.8895	76.3447	78.8895	76.3447	76.3447	78.8895	76.3447	78.8895	76.3447	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	(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)	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	(71)
Water heating gains (Table 5)	94.1551	92.1681	88.3398	79.8419	74.1038	68.0881	64.5406	67.7491	71.4540	78.0197	86.0637	93.0822	(72)
Total internal gains	373.9470	381.7107	365.7440	351.3632	332.4420	315.9725	303.2006	304.8381	315.0466	330.4950	351.7222	366.1944	(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	1.0800	11.2829	0.5300	0.7000	0.7700	3.1329 (75)
East	1.4400	19.6403	0.5300	0.7000	0.7700	7.2714 (76)
Southeast	9.1300	36.7938	0.5300	0.7000	0.7700	86.3680 (77)

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Solar gains	96.7723	167.7182	236.2067	302.4439	346.5941	347.2420	333.4871	300.2591	259.2013	187.2671	116.4576	82.4512 (83)
Total gains	470.7194	549.4290	601.9506	653.8072	679.0361	663.2145	636.6877	605.0972	574.2479	517.7622	468.1798	448.6456 (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	64.5019	64.7244	64.9485	66.0923	66.3260	67.5193	67.5193	67.7631	67.0369	66.3260	65.8604	65.4012
alpha	5.3001	5.3150	5.3299	5.4062	5.4217	5.5013	5.5013	5.5175	5.4691	5.4217	5.3907	5.3601
util living area	0.9461	0.8959	0.8183	0.6774	0.5194	0.3641	0.2612	0.2863	0.4542	0.7195	0.8964	0.9547 (86)
MIT	20.3624	20.5773	20.7706	20.9270	20.9841	20.9982	20.9998	20.9996	20.9941	20.9172	20.6461	20.3256 (87)
Th 2	20.2818	20.2841	20.2864	20.2980	20.3003	20.3118	20.3118	20.3141	20.3072	20.3003	20.2956	20.2910 (88)
util rest of house	0.9368	0.8804	0.7948	0.6453	0.4825	0.3253	0.2204	0.2437	0.4098	0.6823	0.8784	0.9467 (89)
MIT 2	19.5549	19.8166	20.0449	20.2277	20.2870	20.3107	20.3117	20.3140	20.3030	20.2233	19.9135	19.5173 (90)
Living area fraction										FLA = Living area / (4) =		0.3333 (91)
MIT	19.8240	20.0701	20.2868	20.4608	20.5193	20.5398	20.5411	20.5425	20.5334	20.4546	20.1577	19.7867 (92)
Temperature adjustment												-0.1500
adjusted MIT	19.6740	19.9201	20.1368	20.3108	20.3693	20.3898	20.3911	20.3925	20.3834	20.3046	20.0077	19.6367 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9276	0.8717	0.7896	0.6460	0.4862	0.3297	0.2251	0.2486	0.4148	0.6826	0.8702	0.9380 (94)
Useful gains	436.6446	478.9181	475.2710	422.3270	330.1231	218.6394	143.3466	150.4000	238.1766	353.4031	407.4206	420.8235 (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	608.6398	592.5854	536.1531	440.8694	333.7703	218.9698	143.3770	150.4523	239.3453	373.6285	500.4616	602.7174 (97)
Space heating kWh	127.9644	76.3844	45.2963	13.3505	2.7136	0.0000	0.0000	0.0000	0.0000	15.0477	66.9896	135.3291 (98a)
Space heating requirement - total per year (kWh/year)												483.0755
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	127.9644	76.3844	45.2963	13.3505	2.7136	0.0000	0.0000	0.0000	0.0000	15.0477	66.9896	135.3291 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												483.0755
Space heating per m2										(98c) / (4) =		9.3619 (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	127.9644	76.3844	45.2963	13.3505	2.7136	0.0000	0.0000	0.0000	0.0000	15.0477	66.9896	135.3291 (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)	143.9420	85.9217	50.9520	15.0175	3.0524	0.0000	0.0000	0.0000	0.0000	16.9265	75.3538	152.2262 (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	223.3249	197.6969	210.3126	185.0506	177.9376	158.7114	155.8815	163.4169	166.5317	187.2203	198.5996	220.9241 (64)
Efficiency of water heater	83.2330	82.5249	81.7006	80.8261	80.4169	80.3000	80.3000	80.3000	80.3000	80.8821	82.3083	80.3000 (216)
Fuel for water heating, kWh/month	268.3128	239.5604	257.4187	228.9489	221.2690	197.6481	194.1239	203.5079	207.3869	231.4731	241.2873	265.0133 (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	13.6715	12.3484	13.6715	13.2305	13.6715	13.2305	13.6715	13.6715	13.2305	13.6715	13.2305	13.6715 (231)
Lighting	15.8629	12.7258	11.4582	8.3948	6.4844	5.2978	5.9152	7.6889	9.9871	13.1036	14.8005	16.3038 (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												543.3921 (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												2755.9503 (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)												119.9708 (230a)

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central heating pump	41.0000 (230c)
Total electricity for the above, kWh/year	160.9708 (231)
Electricity for lighting (calculated in Appendix L)	128.0228 (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	3588.3360 (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	543.3921	0.2100	114.1123 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2755.9503	0.2100	578.7496 (264)
Space and water heating			692.8619 (265)
Pumps, fans and electric keep-hot	160.9708	0.1387	22.3286 (267)
Energy for lighting	128.0228	0.1443	18.4777 (268)
Total CO2, kg/year			733.6682 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			14.2200 (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	543.3921	1.1300	614.0330 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2755.9503	1.1300	3114.2238 (278)
Space and water heating			3728.2569 (279)
Pumps, fans and electric keep-hot	160.9708	1.5128	243.5166 (281)
Energy for lighting	128.0228	1.5338	196.3657 (282)
Total Primary energy kWh/year			4168.1391 (286)
Dwelling Primary energy Rate (DPER)			80.7800 (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	51.6000 (1b)	x 2.7500 (2b)	= 141.9000 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.6000		(5)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 141.9000 (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	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) = 0.1409 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3909 (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) = 0.3030 (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	0.3863	0.3787	0.3712	0.3333	0.3257	0.2878	0.2878	0.2803	0.3030	0.3257	0.3409	0.3560 (22b)
Effective ac	0.5746	0.5717	0.5689	0.5555	0.5530	0.5414	0.5414	0.5393	0.5459	0.5530	0.5581	0.5634 (25)

3. Heat losses and heat loss parameter

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Element													
Main dwelling													
TER Opaque door													(26)
TER Opening Type													(27)
exposed wall	41.2500		10.8000										(29a)
corridor wall	18.7000		2.1000										(29a)
terraces	4.0000												(30)
Total net area of external elements Aum(A, m2)													(31)
Fabric heat loss, W/K = Sum (A x U)													(33)
Main dwelling													
pw													(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K													178.1550 (35)
List of Thermal Bridges													
K1 Element													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E7 Party floor between dwellings (in blocks of flats)													
E9 Balcony between dwellings, wall insulation continuous													
E23 Balcony within or between dwellings, balcony support penetrates wall insulation													
E24 Eaves (insulation at ceiling level - inverted)													
E14 Flat roof													
E16 Corner (normal)													
E17 Corner (inverted - internal area greater than external area)													
E18 Party wall between dwellings													
E25 Staggered party wall between dwellings													
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													6.4880 (36)
Point Thermal bridges													0.0000
Total fabric heat loss													(33) + (36) + (36a) = 29.8634 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	26.9075	26.7718	26.6388	26.0142	25.8973	25.3533	25.3533	25.2525	25.5628	25.8973	26.1337	26.3809	(38)
Heat transfer coeff	56.7709	56.6352	56.5022	55.8776	55.7607	55.2167	55.2167	55.1159	55.4262	55.7607	55.9971	56.2443	(39)
Average = Sum(39)m / 12 =													55.8770
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.1002	1.0976	1.0950	1.0829	1.0806	1.0701	1.0701	1.0681	1.0742	1.0806	1.0852	1.0900	1.0829
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)													

Assumed occupancy													1.7373 (42)
Hot water usage for mixer showers													
53.3478	52.5461	51.3778	49.1426	47.4930	45.6535	44.6079	45.7673	47.0382	49.0133	51.2966	53.1434		(42a)
Hot water usage for baths													
23.0645	22.7220	22.2396	21.3502	20.6842	19.9458	19.5469	20.0259	20.5474	21.3376	22.2453	22.9866		(42b)
Hot water usage for other uses													
32.4214	31.2424	30.0635	28.8845	27.7055	26.5266	26.5266	27.7055	28.8845	30.0635	31.2424	32.4214		(42c)
Average daily hot water use (litres/day)													100.0433 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
108.8337	106.5105	103.6809	99.3773	95.8828	92.1258	90.6814	93.4987	96.4701	100.4144	104.7844	108.5513		(44)
Energy conte	172.3660	151.6695	159.3537	136.0426	129.0767	113.2795	109.6712	115.7709	118.9573	136.2614	149.2845	169.9652	(45)
Energy content (annual)										Total = Sum(45)m =		1661.6986	
Distribution loss (46)m = 0.15 x (45)m													
25.8549	22.7504	23.9031	20.4064	19.3615	16.9919	16.4507	17.3656	17.8436	20.4392	22.3927	25.4948		(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	49.0080	48.8608	45.4319	46.2102	47.6459	47.5743	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
223.3249	197.6969	210.3126	185.0506	177.9376	158.7114	155.8815	163.4169	166.5317	187.2203	198.5996	220.9241		(62)
WWHRS	-24.3884	-21.5693	-22.5861	-18.7022	-17.4298	-14.9148	-13.9802	-14.8666	-15.4314	-18.1919	-20.6092	-23.9368	(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	198.9365	176.1276	187.7265	166.3484	160.5078	143.7966	141.9012	148.5503	151.1002	169.0284	177.9903	196.9873	(64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				2019.0012	(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	70.0514	61.9370	65.7248	57.4862	55.1332	49.0234	48.0182	50.4053	51.4469	58.0466	61.9659	69.2531	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	86.8635	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
76.5856	84.7912	76.5856	79.1384	76.5856	79.1384	76.5856	76.5856	76.5856	79.1384	76.5856	79.1384	76.5856	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
151.3882	152.9591	149.0004	140.5728	129.9344	119.9359	113.2562	111.6853	115.6440	124.0716	134.7100	144.7085		(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	31.6863	(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)													
-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	-69.4908	(71)
Water heating gains (Table 5)													
94.1551	92.1681	88.3398	79.8419	74.1038	68.0881	64.5406	67.7491	71.4540	78.0197	86.0637	93.0822		(72)
Total internal gains	374.1879	381.9775	365.9849	351.6122	332.6829	316.2214	303.4415	305.0790	315.2955	330.7359	351.9712	366.4353	(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	
Northeast	1.0000				11.2829		0.6300		0.7000	0.7700	3.4482	(75)
East	1.3300				19.6403		0.6300		0.7000	0.7700	7.9831	(76)
Southeast	8.4700				36.7938		0.6300		0.7000	0.7700	95.2424	(77)
Solar gains	106.6737	184.8686	260.3385	333.3137	381.9490	382.6552	367.5006	330.8973	285.6719	206.4102	128.3711	90.8885 (83)
Total gains	480.8616	566.8460	626.3234	684.9259	714.6319	698.8766	670.9421	635.9763	600.9674	537.1461	480.3423	457.3239 (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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
alpha	44.9800	45.0878	45.1939	45.6991	45.7949	46.2461	46.2461	46.3306	46.0713	45.7949	45.6015	45.4011
util living area	3.9987	4.0059	4.0129	4.0466	4.0530	4.0831	4.0831	4.0887	4.0714	4.0530	4.0401	4.0267
util living area	0.9662	0.9379	0.8916	0.7966	0.6580	0.4897	0.3584	0.3930	0.5955	0.8316	0.9403	0.9715 (86)
MIT	19.6850	19.9652	20.2896	20.6436	20.8679	20.9695	20.9933	20.9902	20.9328	20.6359	20.1082	19.6349 (87)
Th 2	20.0007	20.0028	20.0049	20.0148	20.0167	20.0253	20.0253	20.0269	20.0220	20.0167	20.0129	20.0090 (88)
util rest of house	0.9591	0.9256	0.8709	0.7608	0.6044	0.4208	0.2807	0.3124	0.5240	0.7929	0.9263	0.9654 (89)
MIT 2	18.4993	18.8479	19.2445	19.6644	19.9052	20.0061	20.0226	20.0227	19.9752	19.6689	19.0386	18.4426 (90)
Living area fraction	fLA = Living area / (4) =											
MIT	18.8945	19.2204	19.5929	19.9908	20.2261	20.3273	20.3462	20.3452	20.2944	19.9912	19.3951	18.8401 (92)
Temperature adjustment	0.0000											
adjusted MIT	18.8945	19.2204	19.5929	19.9908	20.2261	20.3273	20.3462	20.3452	20.2944	19.9912	19.3951	18.8401 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9490	0.9140	0.8611	0.7599	0.6163	0.4426	0.3065	0.3391	0.5447	0.7918	0.9157	0.9561 (94)
Ext temp.	456.3357	518.0936	539.3057	520.4426	440.4561	309.3209	205.6753	215.6568	327.3324	425.2962	439.8287	437.2340 (95)
Heat loss rate W	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)
Space heating kWh	828.5426	811.0363	739.7758	619.7271	475.4206	316.2399	206.8505	217.4422	343.3327	523.6598	688.4925	823.4211 (97)
Space heating requirement - total per year (kWh/year)	276.9219	196.8575	149.1497	71.4849	26.0136	0.0000	0.0000	0.0000	0.0000	73.1825	179.0379	287.3232 (98a)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Space heating kWh	276.9219	196.8575	149.1497	71.4849	26.0136	0.0000	0.0000	0.0000	0.0000	73.1825	179.0379	287.3232 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1259.9712
Space heating per m2												(98c) / (4) = 24.4180 (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	276.9219	196.8575	149.1497	71.4849	26.0136	0.0000	0.0000	0.0000	0.0000	73.1825	179.0379	287.3232 (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)	299.6990	213.0492	161.4175	77.3646	28.1532	0.0000	0.0000	0.0000	0.0000	79.2019	193.7640	310.9558 (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	198.9365	176.1276	187.7265	166.3484	160.5078	143.7966	141.9012	148.5503	151.1002	169.0284	177.9903	196.9873 (64)	
Efficiency of water heater	85.0902	84.6205	83.8931	82.7047	81.3982	80.3000	80.3000	80.3000	80.3000	82.7177	84.3940	80.3000 (216)	
Fuel for water heating, kWh/month	233.7948	208.1383	223.7686	201.1352	197.1883	179.0742	176.7139	184.9941	188.1697	204.3436	210.9040	85.1891 (217)	
Space cooling fuel requirement	233.7948	208.1383	223.7686	201.1352	197.1883	179.0742	176.7139	184.9941	188.1697	204.3436	210.9040	231.2354 (219)	
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 (221)	
Lighting	15.9130	12.7660	11.4943	8.4213	6.5048	5.3145	5.9339	7.7131	10.0186	13.1449	14.8472	16.3552 (232)	
Electricity generated by PVs (Appendix M) (negative quantity)	-9.8504	-14.9527	-23.1257	-28.0490	-32.0951	-30.6566	-30.2971	-27.6773	-23.3969	-17.9762	-11.2048	-8.3975 (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)	-2.7417	-5.9543	-12.1892	-18.8385	-25.4332	-25.7364	-25.4213	-21.2720	-15.2738	-8.6724	-3.7107	-2.1536 (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)	

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

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	1363.6052	1.1300	1540.8739 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2439.4601	1.1300	2756.5899 (278)
Space and water heating			4297.4638 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	128.4268	1.5338	196.9853 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-257.6794	1.4917	-384.3697
PV Unit electricity exported	-167.3972	0.4591	-76.8518
Total			-461.2214 (283)
Total Primary energy kWh/year			4163.3285 (286)
Target Primary Energy Rate (TPER)			80.6800 (287)