Full SAP Calculation Printout

Property Reference	8517-3	**Issued on Date**	11/12/2024
Assessment Reference	Baseline	**Prop Type Ref**	
Property	Flat 3, 78, Great North Road, London, N2 0NL		

SAP Rating	49 E	**DER**	14.87	**TER**	13.83
Environmental	89 B	**% DER < TER**			-7.52
CO_2 Emissions (t/year)	0.73	**DFEE**	62.85	**TFEE**	40.07
Compliance Check	See BREL	**% DFEE < TFEE**			-56.86
% DPER < TPER	-114.37	**DPER**	155.74	**TPER**	72.65

Assessor Details	Mr. Harry Davey	**Assessor ID**	R434-0001
Client			

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.7600	(1b)	x 2.5000	(2b) =	129.4000	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		129.4000	(5)

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2. Ventilation rate

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	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)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1546 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3746 (18)
Number of sides sheltered		4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2622 (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	0.3343	0.3277	0.3212	0.2884	0.2819	0.2491	0.2491	0.2425	0.2622	0.2819	0.2950	0.3081	(22b)
Effective ac	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5475	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			15.5800	1.3258	20.6553			(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000	(29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400	(30)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		47.0795			(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			51.7600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		9.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)		26.4520 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	73.5315 (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	23.7370	23.6444	23.5536	23.1270	23.0472	22.6757	22.6757	22.6069	22.8188	23.0472	23.2086	23.3774	(38)
Heat transfer coeff													

	97.2685	97.1759	97.0851	96.6585	96.5787	96.2072	96.2072	96.1384	96.3503	96.5787	96.7401	96.9089 (39)
Average = Sum(39)m / 12 =												96.6581

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8792	1.8774	1.8757	1.8674	1.8659	1.8587	1.8587	1.8574	1.8615	1.8659	1.8690	1.8723	(40)
HLP (average)												1.8674	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.7420 (42)
Hot water usage for mixer showers												
	94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247 (42a)
Hot water usage for baths												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Hot water usage for other uses												
	32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697 (42c)
Average daily hot water use (litres/day)												116.4464 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944	(44)
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031	(45)
Energy content (annual)										Total = Sum(45)m =		1934.3409	
Distribution loss (46)m = 0.15 x (45)m													
	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.9660	(55)
Total storage loss													
	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)
If cylinder contains dedicated solar storage													
	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
									Total per year (kWh/year) = Sum(64)m =			2286.9309	(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													
	66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028	(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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	(71)
Water heating gains (Table 5)												
	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446	(72)
Total internal gains												
	416.4986	414.5795	401.2138	375.5543	351.1200	328.7091	315.2854	318.1103	330.7488	353.5304	381.4025	405.7345	(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	2.0300	11.2829	0.6300	0.7000	0.7700	6.9999	(75)
Southeast	1.1500	36.7938	0.6300	0.7000	0.7700	12.9314	(77)
Southwest	11.2500	36.7938	0.6300	0.7000	0.7700	126.5026	(79)
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654	(81)

Solar gains	150.3993	259.8278	365.1822	468.6943	539.7777	542.3848	520.2075	466.1807	400.8732	289.7736	180.8069	128.2812	(83)
Total gains	566.8979	674.4073	766.3960	844.2486	890.8977	871.0939	835.4929	784.2910	731.6220	643.3040	562.2094	534.0158	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	1.3303	1.3316	1.3329	1.3387	1.3398	1.3450	1.3450	1.3460	1.3430	1.3398	1.3376	1.3353
alpha	1.0887	1.0888	1.0889	1.0892	1.0893	1.0897	1.0897	1.0897	1.0895	1.0893	1.0892	1.0890
util living area												
	0.7672	0.7250	0.6733	0.6051	0.5235	0.4315	0.3496	0.3752	0.4964	0.6347	0.7315	0.7789 (86)
MIT	15.5648	16.0804	16.9177	17.9716	19.0132	19.8923	20.3938	20.3160	19.6091	18.2572	16.7120	15.4411 (87)
Th 2	19.4151	19.4163	19.4175	19.4232	19.4242	19.4292	19.4292	19.4301	19.4273	19.4242	19.4221	19.4198 (88)

util rest of house													
	0.7478	0.7026	0.6460	0.5696	0.4751	0.3617	0.2542	0.2806	0.4296	0.5939	0.7057	0.7603	(89)
MIT 2	13.7377	14.3284	15.2912	16.4955	17.6609	18.6093	19.1012	19.0392	18.3374	16.8551	15.0838	13.5985	(90)
Living area fraction										fLA = Living area / (4) =		0.4934	(91)
MIT	14.6392	15.1929	16.0937	17.2239	18.3282	19.2424	19.7390	19.6692	18.9649	17.5469	15.8872	14.5077	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.6392	15.1929	16.0937	17.2239	18.3282	19.2424	19.7390	19.6692	18.9649	17.5469	15.8872	14.5077	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6651	0.6220	0.5718	0.5088	0.4356	0.3524	0.2750	0.2967	0.4066	0.5323	0.6268	0.6775	(94)
Useful gains	377.0502	419.4563	438.2039	429.5575	388.1049	306.9468	229.7566	232.6928	297.5076	342.4483	352.4079	361.8074	(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													
	1005.6801	1000.2230	931.4089	804.5720	640.1393	446.6300	301.9955	314.2973	468.7348	670.9266	850.0757	998.9100	(97)
Space heating kWh													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98a)
Space heating requirement - total per year (kWh/year)												2759.1575	
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													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2759.1575	
Space heating per m2											(98c) / (4) =	53.3068	(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)
Fraction of main heating from main system 2	0.0000 (203)
Fraction of total heating from main system 1	1.0000 (204)
Fraction of total heating from main system 2	0.0000 (205)
Efficiency of main space heating system 1 (in %)	100.0000 (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													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98)
Space heating efficiency (main heating system 1)													
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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	2759.1575 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	100.0000
Water heating fuel used	2286.9309 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
Total electricity for the above, kWh/year	0.0000 (231)
Electricity for lighting (calculated in Appendix L)	128.3962 (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	5174.4846 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2759.1575	16.4900	454.9851	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	16.4900	377.1149	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	128.3962	16.4900	21.1725	(250)
Additional standing charges			0.0000	(251)
Total energy cost			853.2725	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	3.1746	(257)
SAP value		48.5391	
SAP rating (Section 12)		49	(258)
SAP band		E	

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	2759.1575	0.1532	422.7909	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2286.9309	0.1411	322.7993	(264)
Space and water heating			745.5902	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	128.3962	0.1443	18.5315	(268)
Total CO2, kg/year			764.1218	(272)
CO2 emissions per m2			14.7600	(273)
EI value			89.4179	
EI rating			89	(274)
EI band			B	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Ground floor		51.7600 (1b)	x	2.5000 (2b)	=	129.4000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	129.4000	(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)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1546	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.4000	(17)
Infiltration rate		0.3746	(18)
Number of sides sheltered		4	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2622	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.9000	4.7000	4.7000	4.3000	4.3000	3.8000	3.9000	3.9000	4.0000	4.3000	4.2000	4.6000	(22)
Wind factor	1.2250	1.1750	1.1750	1.0750	1.0750	0.9500	0.9750	0.9750	1.0000	1.0750	1.0500	1.1500	(22a)
Adj infilt rate	0.3212	0.3081	0.3081	0.2819	0.2819	0.2491	0.2556	0.2556	0.2622	0.2819	0.2753	0.3015	(22b)
Effective ac	0.5516	0.5475	0.5475	0.5397	0.5397	0.5310	0.5327	0.5327	0.5344	0.5397	0.5379	0.5455	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			15.5800	1.3258	20.6553			(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000	(29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400	(30)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	47.0795			(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			51.7600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		9.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)		26.4520 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	73.5315 (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	23.5536	23.3774	23.3774	23.0472	23.0472	22.6757	22.7463	22.7463	22.8188	23.0472	22.9692	23.2921	(38)
Heat transfer coeff	97.0851	96.9089	96.9089	96.5787	96.5787	96.2072	96.2778	96.2778	96.3503	96.5787	96.5007	96.8236	(39)
Average = Sum(39)m / 12 =												96.5897	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8757	1.8723	1.8723	1.8659	1.8659	1.8587	1.8601	1.8601	1.8615	1.8659	1.8644	1.8706	(40)
HLP (average)												1.8661	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.7420	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247	(42a)

Hot water usage for baths

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)

Hot water usage for other uses

32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697	(42c)

Average daily hot water use (litres/day)	116.4464	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944	(44)
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031	(45)
Energy content (annual)										Total = Sum(45)m =		1934.3409	
Distribution loss (46)m = 0.15 x (45)m	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855	(46)

Water storage loss:		
Store volume	201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	1.6100	(48)
Temperature factor from Table 2b	0.6000	(49)
Enter (49) or (54) in (55)	0.9660	(55)

Total storage loss

29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)

If cylinder contains dedicated solar storage

29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)

Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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

230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)

Total per year (kWh/year) = Sum(64)m =	2286.9309	(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

66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028	(65)

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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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	(71)
Water heating gains (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446	(72)
Total internal gains	416.4986	414.5795	401.2138	375.5543	351.1200	328.7091	315.2854	318.1103	330.7488	353.5304	381.4025	405.7345	(73)

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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	2.0300	12.4928	0.6300	0.7000	0.7700	7.7504	(75)
Southeast	1.1500	39.1209	0.6300	0.7000	0.7700	13.7492	(77)

Southwest				11.2500		39.1209		0.6300		0.7000		0.7700	134.5034 (79)
Northwest				1.1500		12.4928		0.6300		0.7000		0.7700	4.3906 (81)
Solar gains	160.3938	248.9137	352.1123	471.9621	527.9156	567.3932	545.0967	499.6376	425.1820	303.4138	199.1369		134.3112 (83)
Total gains	576.8924	663.4932	753.3261	847.5164	879.0356	896.1023	860.3822	817.7479	755.9307	656.9443	580.5393		540.0457 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	1.3329	1.3353	1.3353	1.3398	1.3398	1.3450	1.3440	1.3440	1.3430	1.3398	1.3409	1.3365	
alpha	1.0889	1.0890	1.0890	1.0893	1.0893	1.0897	1.0896	1.0896	1.0895	1.0893	1.0894	1.0891	
util living area	0.7553	0.7212	0.6619	0.5821	0.4910	0.3633	0.2601	0.2770	0.4430	0.6018	0.7116	0.7676	(86)
MIT	15.8836	16.2616	17.2426	18.3374	19.3863	20.2819	20.6997	20.6679	19.9670	18.6864	17.0812	15.7920	(87)
Th 2	19.4175	19.4198	19.4198	19.4242	19.4242	19.4292	19.4282	19.4282	19.4273	19.4242	19.4253	19.4210	(88)
util rest of house	0.7344	0.6980	0.6323	0.5427	0.4350	0.2788	0.1412	0.1565	0.3642	0.5544	0.6831	0.7473	(89)
MIT 2	14.1113	14.5429	15.6702	16.9113	18.0708	18.9899	19.3405	19.3233	18.7042	17.3382	15.5120	14.0102	(90)
Living area fraction									fLA = Living area / (4) =			0.4934	(91)
MIT	14.9858	15.3910	16.4461	17.6150	18.7199	19.6274	20.0112	19.9868	19.3273	18.0034	16.2863	14.8894	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.9858	15.3910	16.4461	17.6150	18.7199	19.6274	20.0112	19.9868	19.3273	18.0034	16.2863	14.8894	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6523	0.6180	0.5607	0.4878	0.4061	0.2906	0.1891	0.2033	0.3584	0.5015	0.6067	0.6651	(94)
Useful gains	376.3321	410.0493	422.3540	413.4094	356.9891	260.3821	162.7162	166.2304	270.9561	329.4665	352.2206	359.1827	(95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	12.9000	16.0000	18.0000	17.9000	15.2000	11.7000	7.9000	5.0000	(96)
Heat loss rate W	969.4692	968.2124	876.6477	745.1044	562.0780	348.9820	193.6322	200.9092	397.6701	608.7777	809.2805	957.5278	(97)
Space heating kWh	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98a)
Space heating requirement - total per year (kWh/year)												2527.8400	
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	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2527.8400	
Space heating per m2											(98c) / (4) =	48.8377	(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)
Fraction of main heating from main system 2	0.0000 (203)
Fraction of total heating from main system 1	1.0000 (204)
Fraction of total heating from main system 2	0.0000 (205)
Efficiency of main space heating system 1 (in %)	100.0000 (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	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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												2527.8400	(211)
Space heating fuel - main system 2												0.0000	(213)

Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	2286.9309	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	128.3962	(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	4943.1671	(238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2527.8400	26.0600	658.7551	(240)
Space heating - main system 2	0.0000	26.0600	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	26.0600	595.9742	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	128.3962	26.0600	33.4601	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1288.1894	(255)

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	2527.8400	0.1537	388.4663	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2286.9309	0.1411	322.7993	(264)
Space and water heating			711.2656	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	128.3962	0.1443	18.5315	(268)
Total CO2, kg/year			729.7971	(272)

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	2527.8400	1.5689	3966.0352	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	1.5219	3480.5542	(278)
Space and water heating			7446.5894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	128.3962	1.5338	196.9384	(282)
Total Primary energy kWh/year			7643.5278	(286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating: E 49
Current environmental impact rating: B 89

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: E 49
Potential environmental impact rating: B 89

Fuel prices for cost data on this page from database revision number 556 TEST (29 Nov 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£1288	£1288	£0
Space heating	£659	£659	£0
Water heating	£596	£596	£0
Lighting	£33	£33	£0
Total cost of fuels	£1288	£1288	£0

Total cost of uses	£1288	£1288	£0
Delivered energy	96 kWh/m²	96 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.7 tonnes	0.7 tonnes	0.0 tonnes
CO2 emissions per m²	14 kg/m²	14 kg/m²	0 kg/m²
Primary energy	148 kWh/m²	148 kWh/m²	0 kWh/m²

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.7600	(1b)	x 2.5000	(2b) =	129.4000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		129.4000	(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)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1546 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3746 (18)
Number of sides sheltered		4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2622 (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	0.3343	0.3277	0.3212	0.2884	0.2819	0.2491	0.2491	0.2425	0.2622	0.2819	0.2950	0.3081	(22b)
Effective ac	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5475	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			15.5800	1.3258	20.6553			(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000	(29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400	(30)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		47.0795			(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			51.7600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		9.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)		26.4520 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	73.5315 (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	23.7370	23.6444	23.5536	23.1270	23.0472	22.6757	22.6757	22.6069	22.8188	23.0472	23.2086	23.3774	(38)
Heat transfer coeff	97.2685	97.1759	97.0851	96.6585	96.5787	96.2072	96.2072	96.1384	96.3503	96.5787	96.7401	96.9089	(39)
Average = Sum(39)m / 12 =												96.6581	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8792	1.8774	1.8757	1.8674	1.8659	1.8587	1.8587	1.8574	1.8615	1.8659	1.8690	1.8723	(40)
HLP (average)												1.8674	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.7420 (42)
Hot water usage for mixer showers		

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247	(42a)

Hot water usage for baths
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42b)
Hot water usage for other uses
32.4697 31.2890 30.1083 28.9276 27.7469 26.5661 26.5661 27.7469 28.9276 30.1083 31.2890 32.4697 (42c)
Average daily hot water use (litres/day) 116.4464 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944	(44)
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031	(45)
Energy content (annual)											Total = Sum(45)m =	1934.3409	
Distribution loss (46)m = 0.15 x (45)m													
	30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855	(46)
Water storage loss:													
Store volume												201.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.6000	(49)
Enter (49) or (54) in (55)												0.9660	(55)
Total storage loss													
	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)
If cylinder contains dedicated solar storage													
	29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
										Total per year (kWh/year) = Sum(64)m =		2286.9309	(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													
	66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028	(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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	(71)
Water heating gains (Table 5)													
	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446	(72)
Total internal gains													
	416.4986	414.5795	401.2138	375.5543	351.1200	328.7091	315.2854	318.1103	330.7488	353.5304	381.4025	405.7345	(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	2.0300	11.2829	0.6300	0.7000	0.7700	6.9999	(75)
Southeast	1.1500	36.7938	0.6300	0.7000	0.7700	12.9314	(77)
Southwest	11.2500	36.7938	0.6300	0.7000	0.7700	126.5026	(79)
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654	(81)

Solar gains	150.3993	259.8278	365.1822	468.6943	539.7777	542.3848	520.2075	466.1807	400.8732	289.7736	180.8069	128.2812	(83)
Total gains	566.8979	674.4073	766.3960	844.2486	890.8977	871.0939	835.4929	784.2910	731.6220	643.3040	562.2094	534.0158	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	1.3303	1.3316	1.3329	1.3387	1.3398	1.3450	1.3450	1.3460	1.3430	1.3398	1.3376	1.3353	
alpha	1.0887	1.0888	1.0889	1.0892	1.0893	1.0897	1.0897	1.0897	1.0895	1.0893	1.0892	1.0890	
util living area													
	0.7672	0.7250	0.6733	0.6051	0.5235	0.4315	0.3496	0.3752	0.4964	0.6347	0.7315	0.7789	(86)
MIT	15.5648	16.0804	16.9177	17.9716	19.0132	19.8923	20.3938	20.3160	19.6091	18.2572	16.7120	15.4411	(87)
Th 2	19.4151	19.4163	19.4175	19.4232	19.4242	19.4292	19.4292	19.4301	19.4273	19.4242	19.4221	19.4198	(88)
util rest of house													
	0.7478	0.7026	0.6460	0.5696	0.4751	0.3617	0.2542	0.2806	0.4296	0.5939	0.7057	0.7603	(89)
MIT 2	13.7377	14.3284	15.2912	16.4955	17.6609	18.6093	19.1012	19.0392	18.3374	16.8551	15.0838	13.5985	(90)
Living area fraction										fLA = Living area / (4) =		0.4934	(91)
MIT	14.6392	15.1929	16.0937	17.2239	18.3282	19.2424	19.7390	19.6692	18.9649	17.5469	15.8872	14.5077	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.6392	15.1929	16.0937	17.2239	18.3282	19.2424	19.7390	19.6692	18.9649	17.5469	15.8872	14.5077	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6651	0.6220	0.5718	0.5088	0.4356	0.3524	0.2750	0.2967	0.4066	0.5323	0.6268	0.6775	(94)
Useful gains	377.0502	419.4563	438.2039	429.5575	388.1049	306.9468	229.7566	232.6928	297.5076	342.4483	352.4079	361.8074	(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	1005.6801	1000.2230	931.4089	804.5720	640.1393	446.6300	301.9955	314.2973	468.7348	670.9266	850.0757	998.9100	(97)
Space heating kWh	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98a)
Space heating requirement - total per year (kWh/year)												2759.1575	
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	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2759.1575	
Space heating per m2											(98c) / (4) =	53.3068	(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)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(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													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(98)
Space heating efficiency (main heating system 1)													
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)													
	467.7007	390.2753	366.9445	270.0104	187.5136	0.0000	0.0000	0.0000	0.0000	244.3879	358.3208	474.0043	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month													
	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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												2759.1575	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												2286.9309	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												0.0000	(231)
Electricity for lighting (calculated in Appendix L)												128.3962	(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												5174.4846	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2759.1575	16.4900	454.9851	(240)
Space heating - main system 2	0.0000	16.4900	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	16.4900	377.1149	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	128.3962	16.4900	21.1725	(250)
Additional standing charges			0.0000	(251)
Total energy cost			853.2725	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	3.1746	(257)
SAP value		48.5391	
SAP rating (Section 12)		49	(258)
SAP band		E	

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	2759.1575	0.1532	422.7909	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2286.9309	0.1411	322.7993	(264)
Space and water heating			745.5902	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	128.3962	0.1443	18.5315	(268)
Total CO2, kg/year			764.1218	(272)
CO2 emissions per m2			14.7600	(273)
EI value			89.4179	
EI rating			89	(274)
EI band			B	

SAP 10 WORKSHEET FOR New Build (As Designed) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	51.7600	(1b)	x 2.5000	(2b) =	129.4000	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	51.7600					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	129.4000	(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)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1546 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3746 (18)
Number of sides sheltered		4 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.7000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2622 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.9000	4.7000	4.7000	4.3000	4.3000	3.8000	3.9000	3.9000	4.0000	4.3000	4.2000	4.6000	(22)
Wind factor	1.2250	1.1750	1.1750	1.0750	1.0750	0.9500	0.9750	0.9750	1.0000	1.0750	1.0500	1.1500	(22a)
Adj infilt rate	0.3212	0.3081	0.3081	0.2819	0.2819	0.2491	0.2556	0.2556	0.2622	0.2819	0.2753	0.3015	(22b)
Effective ac	0.5516	0.5475	0.5475	0.5397	0.5397	0.5310	0.5327	0.5327	0.5344	0.5397	0.5379	0.5455	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
DTC			1.8900	1.4000	2.6460			(26)
Opening Type 2 (Uw = 1.40)			15.5800	1.3258	20.6553			(27)
External Wall 1	61.0000	15.5800	45.4200	0.2600	11.8092	0.0000	0.0000	(29a)
External Wall 2	19.5000	1.8900	17.6100	0.1800	3.1698	0.0000	0.0000	(29a)
External Roof 1	51.7600		51.7600	0.1700	8.7992	9.0000	465.8400	(30)
Total net area of external elements Aum(A, m2)			132.2600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		47.0795			(33)
Party Wall 1			4.5000	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			51.7600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	465.8400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		9.0000 (35)
Thermal bridges (Default value 0.200 * total exposed area)		26.4520 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	73.5315 (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	23.5536	23.3774	23.3774	23.0472	23.0472	22.6757	22.7463	22.7463	22.8188	23.0472	22.9692	23.2921	(38)
Heat transfer coeff	97.0851	96.9089	96.9089	96.5787	96.5787	96.2072	96.2778	96.2778	96.3503	96.5787	96.5007	96.8236	(39)
Average = Sum(39)m / 12 =												96.5897	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8757	1.8723	1.8723	1.8659	1.8659	1.8587	1.8601	1.8601	1.8615	1.8659	1.8644	1.8706	(40)
HLP (average)												1.8661	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.7420 (42)

Hot water usage for mixer showers

94.2860	92.8690	90.8043	86.8537	83.9383	80.6871	78.8391	80.8883	83.1345	86.6253	90.6607	93.9247	(42a)

Hot water usage for baths

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42b)

Hot water usage for other uses

32.4697	31.2890	30.1083	28.9276	27.7469	26.5661	26.5661	27.7469	28.9276	30.1083	31.2890	32.4697	(42c)

Average daily hot water use (litres/day) 116.4464 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	126.7557	124.1580	120.9126	115.7813	111.6852	107.2533	105.4053	108.6351	112.0621	116.7336	121.9497	126.3944	(44)
Energy conte	200.7500	176.7994	185.8381	158.4988	150.3497	131.8804	127.4785	134.5130	138.1837	158.4064	173.7397	197.9031	(45)
Energy content (annual)										Total = Sum(45)m =		1934.3409	

Distribution loss (46)m = 0.15 x (45)m

30.1125	26.5199	27.8757	23.7748	22.5525	19.7821	19.1218	20.1769	20.7276	23.7610	26.0610	29.6855	(46)

Water storage loss:

Store volume 201.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)

Temperature factor from Table 2b 0.6000 (49)

Enter (49) or (54) in (55) 0.9660 (55)

Total storage loss

29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(56)

If cylinder contains dedicated solar storage

29.9460	27.0480	29.9460	28.9800	29.9460	28.9800	29.9460	29.9460	28.9800	29.9460	28.9800	29.9460	(57)
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)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Primary loss / Combi loss

Total heat required for water heating calculated for each month

230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(62)
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)
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)
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)
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)

WWHRS / PV diverter / Solar input / FGHRS

Output from w/h

230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
									Total per year (kWh/year) = Sum(64)m =		2286.9309	(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

66.7494	58.7858	61.7912	52.7009	49.9913	43.8502	42.3866	44.7256	45.9461	52.6701	57.7684	65.8028	(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	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	104.5194	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1758	16.1436	13.1289	9.9394	7.4298	6.2726	6.7777	8.8099	11.8247	15.0141	17.5237	18.6810	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	226.5722	228.9233	222.9985	210.3855	194.4638	179.4997	169.5027	167.1516	173.0763	185.6894	201.6110	216.5752	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	47.1939	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	-69.6796	(71)
Water heating gains (Table 5)	89.7169	87.4789	83.0526	73.1956	67.1926	60.9031	56.9713	60.1150	63.8140	70.7932	80.2340	88.4446	(72)
Total internal gains	416.4986	414.5795	401.2138	375.5543	351.1200	328.7091	315.2854	318.1103	330.7488	353.5304	381.4025	405.7345	(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	2.0300	12.4928	0.6300	0.7000	0.7700	7.7504	(75)
Southeast	1.1500	39.1209	0.6300	0.7000	0.7700	13.7492	(77)
Southwest	11.2500	39.1209	0.6300	0.7000	0.7700	134.5034	(79)
Northwest	1.1500	12.4928	0.6300	0.7000	0.7700	4.3906	(81)

Solar gains	160.3938	248.9137	352.1123	471.9621	527.9156	567.3932	545.0967	499.6376	425.1820	303.4138	199.1369	134.3112	(83)
Total gains	576.8924	663.4932	753.3261	847.5164	879.0356	896.1023	860.3822	817.7479	755.9307	656.9443	580.5393	540.0457	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	1.3329	1.3353	1.3353	1.3398	1.3398	1.3450	1.3440	1.3440	1.3430	1.3398	1.3409	1.3365
alpha	1.0889	1.0890	1.0890	1.0893	1.0893	1.0897	1.0896	1.0896	1.0895	1.0893	1.0894	1.0891

util living area													
	0.7553	0.7212	0.6619	0.5821	0.4910	0.3633	0.2601	0.2770	0.4430	0.6018	0.7116	0.7676	(86)
MIT	15.8836	16.2616	17.2426	18.3374	19.3863	20.2819	20.6997	20.6679	19.9670	18.6864	17.0812	15.7920	(87)
Th 2	19.4175	19.4198	19.4198	19.4242	19.4242	19.4292	19.4282	19.4282	19.4273	19.4242	19.4253	19.4210	(88)
util rest of house													
	0.7344	0.6980	0.6323	0.5427	0.4350	0.2788	0.1412	0.1565	0.3642	0.5544	0.6831	0.7473	(89)
MIT 2	14.1113	14.5429	15.6702	16.9113	18.0708	18.9899	19.3405	19.3233	18.7042	17.3382	15.5120	14.0102	(90)
Living area fraction										fLA = Living area / (4) =		0.4934	(91)
MIT	14.9858	15.3910	16.4461	17.6150	18.7199	19.6274	20.0112	19.9868	19.3273	18.0034	16.2863	14.8894	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.9858	15.3910	16.4461	17.6150	18.7199	19.6274	20.0112	19.9868	19.3273	18.0034	16.2863	14.8894	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6523	0.6180	0.5607	0.4878	0.4061	0.2906	0.1891	0.2033	0.3584	0.5015	0.6067	0.6651	(94)
Useful gains	376.3321	410.0493	422.3540	413.4094	356.9891	260.3821	162.7162	166.2304	270.9561	329.4665	352.2206	359.1827	(95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	12.9000	16.0000	18.0000	17.9000	15.2000	11.7000	7.9000	5.0000	(96)
Heat loss rate W	969.4692	968.2124	876.6477	745.1044	562.0780	348.9820	193.6322	200.9092	397.6701	608.7777	809.2805	957.5278	(97)
Space heating kWh	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98a)
Space heating requirement - total per year (kWh/year)												2527.8400	
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	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2527.8400	
Space heating per m2											(98c) / (4) =	48.8377	(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)
Fraction of main heating from main system 2	0.0000	(203)
Fraction of total heating from main system 1	1.0000	(204)
Fraction of total heating from main system 2	0.0000	(205)
Efficiency of main space heating system 1 (in %)	100.0000	(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	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	441.2939	375.0856	337.9946	238.8204	152.5861	0.0000	0.0000	0.0000	0.0000	207.8075	329.0831	445.1688	(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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	230.6960	203.8474	215.7841	187.4788	180.2957	160.8604	157.4245	164.4590	167.1637	188.3524	202.7197	227.8491	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)
Lighting	15.9092	12.7629	11.4916	8.4192	6.5033	5.3132	5.9325	7.7113	10.0162	13.1418	14.8436	16.3513	(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	2527.8400	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	100.0000	
Water heating fuel used	2286.9309	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	128.3962	(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 4943.1671 (238)

10a. Fuel costs - using BEDF prices (556)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2527.8400	26.0600	658.7551	(240)
Space heating - main system 2	0.0000	26.0600	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	26.0600	595.9742	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	128.3962	26.0600	33.4601	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1288.1894	(255)

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	2527.8400	0.1537	388.4663	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2286.9309	0.1411	322.7993	(264)
Space and water heating			711.2656	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	128.3962	0.1443	18.5315	(268)
Total CO2, kg/year			729.7971	(272)

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	2527.8400	1.5689	3966.0352	(275)
Space heating - main system 2	0.0000	0.0000	0.0000	(276)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2286.9309	1.5219	3480.5542	(278)
Space and water heating			7446.5894	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	128.3962	1.5338	196.9384	(282)
Total Primary energy kWh/year			7643.5278	(286)