Full SAP Calculation Printout

Property Reference	8517-4	**Issued on Date**	11/12/2024
Assessment Reference	Baseline	**Prop Type Ref**	
Property	Flat 4, 78, Great North Road, London, N2 0NL		

SAP Rating	44 E	**DER**	15.62	**TER**	14.80
Environmental	88 B	**% DER < TER**			-5.54
CO_2 Emissions (t/year)	0.83	**DFEE**	69.37	**TFEE**	47.79
Compliance Check	See BREL	**% DFEE < TFEE**			-45.15
% DPER < TPER	-109.61	**DPER**	163.16	**TPER**	77.84

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	56.2600	(1b)	x 3.2500	(2b) =	182.8450	(1b) - (3b) (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600					
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		182.8450	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1641 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3841 (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) =	0.2689 (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	0.3428	0.3361	0.3293	0.2957	0.2890	0.2554	0.2554	0.2487	0.2689	0.2890	0.3025	0.3159	(22b)
Effective ac	0.5588	0.5565	0.5542	0.5437	0.5418	0.5326	0.5326	0.5309	0.5361	0.5418	0.5457	0.5499	(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)			9.7900	1.3258	12.9792			(27)
Opening			2.9700	1.2357	3.6702			(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000	(29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000	(29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100	(30)
Total net area of external elements Aum(A, m2)			160.5900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.3164			(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			56.2600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	479.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		8.5249 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.1180 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	83.4344 (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	33.7144	33.5767	33.4418	32.8080	32.6895	32.1375	32.1375	32.0353	32.3501	32.6895	32.9293	33.1801	(38)

Heat transfer coeff

	117.1488	117.0112	116.8762	116.2425	116.1239	115.5719	115.5719	115.4697	115.7845	116.1239	116.3638	116.6145 (39)
Average = Sum(39)m / 12 =												116.2419

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0823	2.0798	2.0774	2.0662	2.0641	2.0542	2.0542	2.0524	2.0580	2.0641	2.0683	2.0728	(40)
HLP (average)												2.0662	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8742 (42)

Hot water usage for mixer showers

	98.2137	96.7377	94.5869	90.4719	87.4350	84.0484	82.1234	84.2579	86.5977	90.2339	94.4374	97.8374 (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

	33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234 (42c)

Average daily hot water use (litres/day) 121.2982 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	132.0371	129.3312	125.9504	120.6054	116.3386	111.7220	109.7971	113.1615	116.7312	121.5974	127.0308	131.6608	(44)
Energy conte	209.1144	184.1658	193.5811	165.1028	156.6142	137.3753	132.7900	140.1176	143.9413	165.0065	180.9787	206.1489	(45)
Energy content (annual)										Total = Sum(45)m =		2014.9366	
Distribution loss (46)m = 0.15 x (45)m													
	31.3672	27.6249	29.0372	24.7654	23.4921	20.6063	19.9185	21.0176	21.5912	24.7510	27.1468	30.9223	(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

	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949 (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

	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949 (64)
										Total per year (kWh/year) = Sum(64)m =		2367.5266 (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

	69.5305	61.2351	64.3657	54.8967	52.0742	45.6773	44.1527	46.5891	47.8605	54.8647	60.1754	68.5445 (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	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	(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)													
	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	(71)
Water heating gains (Table 5)													
	93.4550	91.1237	86.5131	76.2454	69.9922	63.4407	59.3450	62.6197	66.4729	73.7428	83.5770	92.1297	(72)
Total internal gains													
	442.5449	440.5569	426.3223	399.0422	372.9466	349.0393	334.7251	337.6565	351.1336	375.4159	405.0925	431.0010	(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	
Southwest	8.6400	36.7938	0.6300	0.7000	0.7700	97.1540	(79)
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654	(81)
Northeast	2.9700	26.0000	0.6300	0.7000	1.0000	30.6486	(82)

Solar gains	131.7680	237.2158	354.1364	481.2595	572.6796	581.9598	555.5869	486.2383	398.4571	270.5655	160.2578	111.1366	(83)
Total gains	574.3129	677.7727	780.4587	880.3017	945.6262	930.9990	890.3120	823.8948	749.5906	645.9814	565.3503	542.1376	(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	1.1372	1.1386	1.1399	1.1461	1.1473	1.1527	1.1527	1.1538	1.1506	1.1473	1.1449	1.1424	
alpha	1.0758	1.0759	1.0760	1.0764	1.0765	1.0768	1.0768	1.0769	1.0767	1.0765	1.0763	1.0762	
util living area													
	0.7949	0.7579	0.7072	0.6368	0.5527	0.4590	0.3763	0.4060	0.5350	0.6739	0.7635	0.8050	(86)
MIT	15.2836	15.7717	16.6348	17.7514	18.8578	19.7937	20.3298	20.2399	19.4661	18.0310	16.4509	15.1706	(87)
Th 2	19.2790	19.2806	19.2822	19.2896	19.2910	19.2974	19.2974	19.2986	19.2949	19.2910	19.2882	19.2853	(88)

util rest of house													
	0.7756	0.7354	0.6792	0.5993	0.5002	0.3813	0.2673	0.2982	0.4615	0.6314	0.7377	0.7865	(89)
MIT 2	13.3574	13.9186	14.9130	16.1901	17.4276	18.4362	18.9593	18.8902	18.1258	16.5478	14.7302	13.2307	(90)
Living area fraction										fLA = Living area / (4) =		0.4575	(91)
MIT	14.2387	14.7664	15.7008	16.9045	18.0820	19.0573	19.5863	19.5077	18.7390	17.2264	15.5174	14.1183	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.2387	14.7664	15.7008	16.9045	18.0820	19.0573	19.5863	19.5077	18.7390	17.2264	15.5174	14.1183	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6921	0.6520	0.6003	0.5327	0.4554	0.3686	0.2882	0.3134	0.4326	0.5635	0.6561	0.7034	(94)
Useful gains	397.4657	441.9050	468.4911	468.9782	430.6226	343.1691	256.5898	258.1738	324.2393	364.0367	370.9428	381.3613	(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													
	1164.3084	1154.4831	1075.3525	930.4571	741.0977	515.1357	345.1349	358.8465	537.1258	769.4847	979.4831	1156.6137	(97)
Space heating kWh													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(98a)
Space heating requirement - total per year (kWh/year)												3380.7367	
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													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3380.7367	
Space heating per m2											(98c) / (4) =	60.0913	(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													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(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)													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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	3380.7367	(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	2367.5266	(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)	138.2270	(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	5886.4903	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3380.7367	16.4900	557.4835	(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)	2367.5266	16.4900	390.4051	(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	138.2270	16.4900	22.7936	(250)
Additional standing charges			0.0000	(251)
Total energy cost			970.6822	(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] =	3.4510	(257)
SAP value		44.0597	
SAP rating (Section 12)		44	(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	3380.7367	0.1532	517.9000	(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)	2367.5266	0.1412	334.2111	(264)
Space and water heating			852.1111	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	138.2270	0.1443	19.9504	(268)
Total CO2, kg/year			872.0615	(272)
CO2 emissions per m2			15.5000	(273)
EI value			88.4598	
EI rating			88	(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		56.2600 (1b)	x	3.2500 (2b)	=	182.8450	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	182.8450	(5)

2. Ventilation rate

		m3 per hour	
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

		Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1641	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.4000	(17)
Infiltration rate		0.3841	(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) =	0.2689	(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	0.3293	0.3159	0.3159	0.2890	0.2890	0.2554	0.2621	0.2621	0.2689	0.2890	0.2823	0.3092	(22b)
Effective ac	0.5542	0.5499	0.5499	0.5418	0.5418	0.5326	0.5344	0.5344	0.5361	0.5418	0.5398	0.5478	(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)			9.7900	1.3258	12.9792			(27)
Opening			2.9700	1.2357	3.6702			(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000	(29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000	(29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100	(30)
Total net area of external elements Aum(A, m2)			160.5900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	51.3164			(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			56.2600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	479.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		8.5249 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.1180 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	83.4344 (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	33.4418	33.1801	33.1801	32.6895	32.6895	32.1375	32.2424	32.2424	32.3501	32.6895	32.5736	33.0534	(38)
Heat transfer coeff	116.8762	116.6145	116.6145	116.1239	116.1239	115.5719	115.6769	115.6769	115.7845	116.1239	116.0080	116.4878	(39)
Average = Sum(39)m / 12 =												116.1402	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0774	2.0728	2.0728	2.0641	2.0641	2.0542	2.0561	2.0561	2.0580	2.0641	2.0620	2.0705	(40)
HLP (average)												2.0643	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8742 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
98.2137	96.7377	94.5869	90.4719	87.4350	84.0484	82.1234	84.2579	86.5977	90.2339	94.4374	97.8374	(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

33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234	(42c)

Average daily hot water use (litres/day)		121.2982 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	132.0371	129.3312	125.9504	120.6054	116.3386	111.7220	109.7971	113.1615	116.7312	121.5974	127.0308	131.6608	(44)
Energy conte	209.1144	184.1658	193.5811	165.1028	156.6142	137.3753	132.7900	140.1176	143.9413	165.0065	180.9787	206.1489	(45)
Energy content (annual)										Total = Sum(45)m =		2014.9366	

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

31.3672	27.6249	29.0372	24.7654	23.4921	20.6063	19.9185	21.0176	21.5912	24.7510	27.1468	30.9223	(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

239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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

239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(64)
								Total per year (kWh/year) = Sum(64)m =			2367.5266	(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

69.5305	61.2351	64.3657	54.8967	52.0742	45.6773	44.1527	46.5891	47.8605	54.8647	60.1754	68.5445	(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	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	(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)	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	(71)
Water heating gains (Table 5)	93.4550	91.1237	86.5131	76.2454	69.9922	63.4407	59.3450	62.6197	66.4729	73.7428	83.5770	92.1297	(72)
Total internal gains	442.5449	440.5569	426.3223	399.0422	372.9466	349.0393	334.7251	337.6565	351.1336	375.4159	405.0925	431.0010	(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	
Southwest	8.6400	39.1209	0.6300	0.7000	0.7700	103.2986	(79)

Northwest				1.1500		12.4928		0.6300		0.7000		0.7700	4.3906 (81)
Northeast				2.9700		29.0000		0.6300		0.7000		1.0000	34.1850 (82)
Solar gains	141.8743	229.6177	344.9452	488.4619	563.0822	611.2944	584.8696	524.7002	426.6413	286.2902	178.2517	117.4402 (83)	
Total gains	584.4192	670.1746	771.2676	887.5041	936.0288	960.3337	919.5946	862.3567	777.7748	661.7062	583.3442	548.4413 (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	1.1399	1.1424	1.1424	1.1473	1.1473	1.1527	1.1517	1.1517	1.1506	1.1473	1.1484	1.1437	
alpha	1.0760	1.0762	1.0762	1.0765	1.0765	1.0768	1.0768	1.0768	1.0767	1.0765	1.0766	1.0762	
util living area	0.7840	0.7533	0.6953	0.6135	0.5197	0.3890	0.2826	0.3032	0.4804	0.6420	0.7453	0.7946	(86)
MIT	15.6069	15.9684	16.9816	18.1382	19.2542	20.2109	20.6636	20.6252	19.8516	18.4815	16.8255	15.5274	(87)
Th 2	19.2822	19.2853	19.2853	19.2910	19.2910	19.2974	19.2962	19.2962	19.2949	19.2910	19.2923	19.2867	(88)
util rest of house	0.7631	0.7299	0.6647	0.5715	0.4584	0.2932	0.1432	0.1614	0.3921	0.5919	0.7165	0.7745	(89)
MIT 2	13.7371	14.1516	15.3177	16.6300	17.8627	18.8411	19.2127	19.1941	18.5211	17.0567	15.1663	13.6500	(90)
Living area fraction										fLA = Living area / (4) =		0.4575	(91)
MIT	14.5926	14.9828	16.0789	17.3200	18.4993	19.4678	19.8765	19.8488	19.1298	17.7086	15.9254	14.5089	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.5926	14.9828	16.0789	17.3200	18.4993	19.4678	19.8765	19.8488	19.1298	17.7086	15.9254	14.5089	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6797	0.6470	0.5881	0.5107	0.4247	0.3040	0.1960	0.2129	0.3820	0.5321	0.6366	0.6914	(94)
Useful gains	397.2121	433.6054	453.5554	453.2918	397.4882	291.9267	180.1958	183.5891	297.1472	352.1257	371.3526	379.1657	(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	1121.1466	1117.4956	1012.0885	861.6425	650.2163	400.7809	217.0729	225.4351	455.0137	697.7389	931.0126	1107.6751	(97)
Space heating kWh	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(98a)
Space heating requirement - total per year (kWh/year)												3097.8747	
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	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3097.8747	
Space heating per m2											(98c) / (4) =	55.0635	(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)
Space heating requirement	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(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)	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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												3097.8747	(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	2367.5266	(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)	138.2270	(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	5603.6283	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3097.8747	26.0600	807.3062	(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)	2367.5266	26.0600	616.9774	(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	138.2270	26.0600	36.0219	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1460.3055	(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	3097.8747	0.1536	475.9321	(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)	2367.5266	0.1412	334.2111	(264)
Space and water heating			810.1432	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	138.2270	0.1443	19.9504	(268)
Total CO2, kg/year			830.0936	(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	3097.8747	1.5688	4859.8929	(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)	2367.5266	1.5220	3603.3495	(278)
Space and water heating			8463.2424	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	138.2270	1.5338	212.0171	(282)
Total Primary energy kWh/year			8675.2595	(286)

SAP 10 EPC IMPROVEMENTS

Baseline

Current energy efficiency rating: E 44
Current environmental impact rating: B 88

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 44
Potential environmental impact rating: B 88

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	£1460	£1460	£0
Space heating	£807	£807	£0
Water heating	£617	£617	£0
Lighting	£36	£36	£0
Total cost of fuels	£1460	£1460	£0

Total cost of uses	£1460	£1460	£0
Delivered energy	100 kWh/m²	100 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.8 tonnes	0.8 tonnes	0.0 tonnes
CO2 emissions per m²	15 kg/m²	15 kg/m²	0 kg/m²
Primary energy	154 kWh/m²	154 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	56.2600	(1b)	x 3.2500	(2b) =	182.8450	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		182.8450	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1641 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.4000 (17)
Infiltration rate		0.3841 (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) =	0.2689 (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	0.3428	0.3361	0.3293	0.2957	0.2890	0.2554	0.2554	0.2487	0.2689	0.2890	0.3025	0.3159	(22b)
Effective ac	0.5588	0.5565	0.5542	0.5437	0.5418	0.5326	0.5326	0.5309	0.5361	0.5418	0.5457	0.5499	(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)			9.7900	1.3258	12.9792			(27)
Opening			2.9700	1.2357	3.6702			(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000	(29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000	(29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100	(30)
Total net area of external elements Aum(A, m2)			160.5900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.3164			(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			56.2600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	479.6100 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		8.5249 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.1180 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	83.4344 (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	33.7144	33.5767	33.4418	32.8080	32.6895	32.1375	32.1375	32.0353	32.3501	32.6895	32.9293	33.1801	(38)
Heat transfer coeff	117.1488	117.0112	116.8762	116.2425	116.1239	115.5719	115.5719	115.4697	115.7845	116.1239	116.3638	116.6145	(39)
Average = Sum(39)m / 12 =												116.2419	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0823	2.0798	2.0774	2.0662	2.0641	2.0542	2.0542	2.0524	2.0580	2.0641	2.0683	2.0728	(40)
HLP (average)												2.0662	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8742 (42)
Hot water usage for mixer showers		

	98.2137	96.7377	94.5869	90.4719	87.4350	84.0484	82.1234	84.2579	86.5977	90.2339	94.4374	97.8374	(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													
	33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234	(42c)
Average daily hot water use (litres/day)												121.2982	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	132.0371	129.3312	125.9504	120.6054	116.3386	111.7220	109.7971	113.1615	116.7312	121.5974	127.0308	131.6608	(44)
Energy conte	209.1144	184.1658	193.5811	165.1028	156.6142	137.3753	132.7900	140.1176	143.9413	165.0065	180.9787	206.1489	(45)
Energy content (annual)										Total = Sum(45)m =		2014.9366	
Distribution loss (46)m = 0.15 x (45)m													
	31.3672	27.6249	29.0372	24.7654	23.4921	20.6063	19.9185	21.0176	21.5912	24.7510	27.1468	30.9223	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(64)
										Total per year (kWh/year) = Sum(64)m =		2367.5266	(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													
	69.5305	61.2351	64.3657	54.8967	52.0742	45.6773	44.1527	46.5891	47.8605	54.8647	60.1754	68.5445	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	(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)													
	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	(71)
Water heating gains (Table 5)													
	93.4550	91.1237	86.5131	76.2454	69.9922	63.4407	59.3450	62.6197	66.4729	73.7428	83.5770	92.1297	(72)
Total internal gains													
	442.5449	440.5569	426.3223	399.0422	372.9466	349.0393	334.7251	337.6565	351.1336	375.4159	405.0925	431.0010	(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	
Southwest	8.6400	36.7938	0.6300	0.7000	0.7700	97.1540	(79)
Northwest	1.1500	11.2829	0.6300	0.7000	0.7700	3.9654	(81)
Northeast	2.9700	26.0000	0.6300	0.7000	1.0000	30.6486	(82)

Solar gains	131.7680	237.2158	354.1364	481.2595	572.6796	581.9598	555.5869	486.2383	398.4571	270.5655	160.2578	111.1366	(83)
Total gains	574.3129	677.7727	780.4587	880.3017	945.6262	930.9990	890.3120	823.8948	749.5906	645.9814	565.3503	542.1376	(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	1.1372	1.1386	1.1399	1.1461	1.1473	1.1527	1.1527	1.1538	1.1506	1.1473	1.1449	1.1424	
alpha	1.0758	1.0759	1.0760	1.0764	1.0765	1.0768	1.0768	1.0769	1.0767	1.0765	1.0763	1.0762	
util living area													
	0.7949	0.7579	0.7072	0.6368	0.5527	0.4590	0.3763	0.4060	0.5350	0.6739	0.7635	0.8050	(86)
MIT	15.2836	15.7717	16.6348	17.7514	18.8578	19.7937	20.3298	20.2399	19.4661	18.0310	16.4509	15.1706	(87)
Th 2	19.2790	19.2806	19.2822	19.2896	19.2910	19.2974	19.2974	19.2986	19.2949	19.2910	19.2882	19.2853	(88)
util rest of house													
	0.7756	0.7354	0.6792	0.5993	0.5002	0.3813	0.2673	0.2982	0.4615	0.6314	0.7377	0.7865	(89)
MIT 2	13.3574	13.9186	14.9130	16.1901	17.4276	18.4362	18.9593	18.8902	18.1258	16.5478	14.7302	13.2307	(90)
Living area fraction										fLA = Living area / (4) =		0.4575	(91)
MIT	14.2387	14.7664	15.7008	16.9045	18.0820	19.0573	19.5863	19.5077	18.7390	17.2264	15.5174	14.1183	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.2387	14.7664	15.7008	16.9045	18.0820	19.0573	19.5863	19.5077	18.7390	17.2264	15.5174	14.1183	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6921	0.6520	0.6003	0.5327	0.4554	0.3686	0.2882	0.3134	0.4326	0.5635	0.6561	0.7034	(94)
Useful gains	397.4657	441.9050	468.4911	468.9782	430.6226	343.1691	256.5898	258.1738	324.2393	364.0367	370.9428	381.3613	(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	1164.3084	1154.4831	1075.3525	930.4571	741.0977	515.1357	345.1349	358.8465	537.1258	769.4847	979.4831	1156.6137	(97)
Space heating kWh	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(98a)
Space heating requirement - total per year (kWh/year)												3380.7367	
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	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3380.7367	
Space heating per m2											(98c) / (4) =	60.0913	(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													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(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)													
	570.5309	478.8525	451.5049	332.2647	230.9935	0.0000	0.0000	0.0000	0.0000	301.6533	438.1490	576.7878	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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													
	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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												3380.7367	(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												2367.5266	(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)												138.2270	(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												5886.4903	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3380.7367	16.4900	557.4835	(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)	2367.5266	16.4900	390.4051	(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	138.2270	16.4900	22.7936	(250)
Additional standing charges			0.0000	(251)
Total energy cost			970.6822	(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] =	3.4510 (257)
SAP value		44.0597
SAP rating (Section 12)		44 (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	3380.7367	0.1532	517.9000	(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)	2367.5266	0.1412	334.2111	(264)
Space and water heating			852.1111	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	138.2270	0.1443	19.9504	(268)
Total CO2, kg/year			872.0615	(272)
CO2 emissions per m2			15.5000	(273)
EI value			88.4598	
EI rating			88	(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	56.2600 (1b)	x	3.2500 (2b)	=	182.8450	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2600					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	182.8450	(5)

2. Ventilation rate

	m3 per hour		
Number of open chimneys	0 * 80 =	0.0000	(6a)
Number of open flues	0 * 20 =	0.0000	(6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000	(6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000	(6d)
Number of flues attached to other heater	0 * 35 =	0.0000	(6e)
Number of blocked chimneys	0 * 20 =	0.0000	(6f)
Number of intermittent extract fans	3 * 10 =	30.0000	(7a)
Number of passive vents	0 * 10 =	0.0000	(7b)
Number of flueless gas fires	0 * 40 =	0.0000	(7c)

	Air changes per hour		
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	30.0000 / (5) =	0.1641	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.4000	(17)
Infiltration rate		0.3841	(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) =	0.2689	(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	0.3293	0.3159	0.3159	0.2890	0.2890	0.2554	0.2621	0.2621	0.2689	0.2890	0.2823	0.3092	(22b)
Effective ac	0.5542	0.5499	0.5499	0.5418	0.5418	0.5326	0.5344	0.5344	0.5361	0.5418	0.5398	0.5478	(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)			9.7900	1.3258	12.9792			(27)
Opening			2.9700	1.2357	3.6702			(27a)
External Wall 1	88.3500	9.7900	78.5600	0.2600	20.4256	0.0000	0.0000	(29a)
External Wall 2	15.9800	1.8900	14.0900	0.1800	2.5362	0.0000	0.0000	(29a)
External Roof 1	56.2600	2.9700	53.2900	0.1700	9.0593	9.0000	479.6100	(30)
Total net area of external elements Aum(A, m2)			160.5900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		51.3164			(33)
Party Wall 1			6.3900	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			56.2600			0.0000	0.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	479.6100	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		8.5249	(35)
Thermal bridges (Default value 0.200 * total exposed area)		32.1180	(36)
Point Thermal bridges	(36a) =	0.0000	

Total fabric heat loss (33) + (36) + (36a) = 83.4344 (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	33.4418	33.1801	33.1801	32.6895	32.6895	32.1375	32.2424	32.2424	32.3501	32.6895	32.5736	33.0534	(38)
Heat transfer coeff	116.8762	116.6145	116.6145	116.1239	116.1239	115.5719	115.6769	115.6769	115.7845	116.1239	116.0080	116.4878	(39)
Average = Sum(39)m / 12 =												116.1402	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0774	2.0728	2.0728	2.0641	2.0641	2.0542	2.0561	2.0561	2.0580	2.0641	2.0620	2.0705	(40)
HLP (average)												2.0643	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8742 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	98.2137	96.7377	94.5869	90.4719	87.4350	84.0484	82.1234	84.2579	86.5977	90.2339	94.4374	97.8374	(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	33.8234	32.5934	31.3635	30.1336	28.9036	27.6737	27.6737	28.9036	30.1336	31.3635	32.5934	33.8234	(42c)
Average daily hot water use (litres/day)												121.2982	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	132.0371	129.3312	125.9504	120.6054	116.3386	111.7220	109.7971	113.1615	116.7312	121.5974	127.0308	131.6608	(44)
Energy conte	209.1144	184.1658	193.5811	165.1028	156.6142	137.3753	132.7900	140.1176	143.9413	165.0065	180.9787	206.1489	(45)
Energy content (annual)										Total = Sum(45)m =		2014.9366	
Distribution loss (46)m = 0.15 x (45)m	31.3672	27.6249	29.0372	24.7654	23.4921	20.6063	19.9185	21.0176	21.5912	24.7510	27.1468	30.9223	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(64)
									Total per year (kWh/year) = Sum(64)m =			2367.5266	(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	69.5305	61.2351	64.3657	54.8967	52.0742	45.6773	44.1527	46.5891	47.8605	54.8647	60.1754	68.5445	(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	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	112.4502	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.5675	17.3796	14.1341	10.7004	7.9987	6.7528	7.2967	9.4845	12.7300	16.1637	18.8654	20.1113	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9198	246.4509	240.0726	226.4938	209.3531	193.2432	182.4808	179.9497	186.3280	199.9068	217.0475	233.1574	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	48.1192	(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)	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	-74.9668	(71)
Water heating gains (Table 5)	93.4550	91.1237	86.5131	76.2454	69.9922	63.4407	59.3450	62.6197	66.4729	73.7428	83.5770	92.1297	(72)
Total internal gains	442.5449	440.5569	426.3223	399.0422	372.9466	349.0393	334.7251	337.6565	351.1336	375.4159	405.0925	431.0010	(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	
Southwest	8.6400	39.1209	0.6300	0.7000	0.7700	103.2986	(79)
Northwest	1.1500	12.4928	0.6300	0.7000	0.7700	4.3906	(81)
Northeast	2.9700	29.0000	0.6300	0.7000	1.0000	34.1850	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	141.8743	229.6177	344.9452	488.4619	563.0822	611.2944	584.8696	524.7002	426.6413	286.2902	178.2517	117.4402	(83)
Total gains	584.4192	670.1746	771.2676	887.5041	936.0288	960.3337	919.5946	862.3567	777.7748	661.7062	583.3442	548.4413	(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	1.1399	1.1424	1.1424	1.1473	1.1473	1.1527	1.1517	1.1517	1.1506	1.1473	1.1484	1.1437
alpha	1.0760	1.0762	1.0762	1.0765	1.0765	1.0768	1.0768	1.0768	1.0767	1.0765	1.0766	1.0762

util living area
0.7840 0.7533 0.6953 0.6135 0.5197 0.3890 0.2826 0.3032 0.4804 0.6420 0.7453 0.7946 (86)

MIT 15.6069 15.9684 16.9816 18.1382 19.2542 20.2109 20.6636 20.6252 19.8516 18.4815 16.8255 15.5274 (87)
Th 2 19.2822 19.2853 19.2853 19.2910 19.2910 19.2974 19.2962 19.2962 19.2949 19.2910 19.2923 19.2867 (88)
util rest of house
0.7631 0.7299 0.6647 0.5715 0.4584 0.2932 0.1432 0.1614 0.3921 0.5919 0.7165 0.7745 (89)
MIT 2 13.7371 14.1516 15.3177 16.6300 17.8627 18.8411 19.2127 19.1941 18.5211 17.0567 15.1663 13.6500 (90)
Living area fraction fLA = Living area / (4) = 0.4575 (91)
MIT 14.5926 14.9828 16.0789 17.3200 18.4993 19.4678 19.8765 19.8488 19.1298 17.7086 15.9254 14.5089 (92)
Temperature adjustment 0.0000
adjusted MIT 14.5926 14.9828 16.0789 17.3200 18.4993 19.4678 19.8765 19.8488 19.1298 17.7086 15.9254 14.5089 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.6797	0.6470	0.5881	0.5107	0.4247	0.3040	0.1960	0.2129	0.3820	0.5321	0.6366	0.6914	(94)
Useful gains	397.2121	433.6054	453.5554	453.2918	397.4882	291.9267	180.1958	183.5891	297.1472	352.1257	371.3526	379.1657	(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	1121.1466	1117.4956	1012.0885	861.6425	650.2163	400.7809	217.0729	225.4351	455.0137	697.7389	931.0126	1107.6751	(97)
Space heating kWh	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(98a)
Space heating requirement - total per year (kWh/year)												3097.8747	
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	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3097.8747	
Space heating per m2											(98c) / (4) =	55.0635	(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	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(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)	538.6073	459.5742	415.5487	294.0124	188.0297	0.0000	0.0000	0.0000	0.0000	257.1362	402.9552	542.0110	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	239.0604	211.2138	223.5271	194.0828	186.5602	166.3553	162.7360	170.0636	172.9213	194.9525	209.9587	236.0949	(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	17.1273	13.7401	12.3715	9.0639	7.0012	5.7200	6.3867	8.3017	10.7831	14.1480	15.9801	17.6033	(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 3097.8747 (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 2367.5266 (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) 138.2270 (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 5603.6283 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3097.8747	26.0600	807.3062	(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)	2367.5266	26.0600	616.9774	(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	138.2270	26.0600	36.0219	(250)
Additional standing charges			0.0000	(251)
Total energy cost			1460.3055	(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	3097.8747	0.1536	475.9321	(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)	2367.5266	0.1412	334.2111	(264)
Space and water heating			810.1432	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	138.2270	0.1443	19.9504	(268)
Total CO2, kg/year			830.0936	(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	3097.8747	1.5688	4859.8929	(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)	2367.5266	1.5220	3603.3495	(278)
Space and water heating			8463.2424	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	138.2270	1.5338	212.0171	(282)
Total Primary energy kWh/year			8675.2595	(286)