Full SAP Calculation Printout

Plot Reference	Apartment 15	**Issued on Date**	12/10/2026
Assessment Reference	REV A	**Plot Type Ref**	
Plot Address	Apartment 15, 58, Shepherds Hill, London, N6 5RW	**SAP Version**	10.2

SAP Rating	102 A	**DER**	-0.75	**TER**	12.14
Environmental	101 A	**% DER < TER**			106.18
CO_2 Emissions (t/year)	-0.09	**DFEE**	32.06	**TFEE**	32.09
Compliance Check	See BREL	**% DFEE < TFEE**			0.11
% DPER < TPER	101.82	**DPER**	-1.17	**TPER**	64.20

Assessor Details	Mr. Ruari Mulvenna	**Assessor ID**	AW51-0001
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)	
Main dwelling						
Ground floor	75.5000	(1b)	x 2.5000	(2b) =	188.7500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.5000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	188.7500	(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) =	0.1589 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.3589 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3051 (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	0.3890	0.3814	0.3737	0.3356	0.3280	0.2898	0.2898	0.2822	0.3051	0.3280	0.3432	0.3585	(22b)
Effective ac	0.5757	0.5727	0.5698	0.5563	0.5538	0.5420	0.5420	0.5398	0.5465	0.5538	0.5589	0.5643	(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	
Main dwelling								
Windows			21.5700	1.1450	24.6985			(27)
External Wall	73.4600	21.5700	51.8900	0.1800	9.3402	110.0000	5707.9000	(29a)
Flat Roof	75.5000		75.5000	0.1100	8.3050	9.0000	679.5000	(30)
Total net area of external elements Aum(A, m2)			148.9600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.3437			(33)
Main dwelling								
Corridor			15.0600	0.0000	0.0000	110.0000	1656.6000	(32)
Party Floor 1			75.5000			40.0000	3020.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11064.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		146.5430 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.2000	0.0640	0.2688
E3 Sill	4.2000	0.0210	0.0882
E4 Jamb	6.3000	0.0160	0.1008
E7 Party floor between dwellings (in blocks of flats)	30.1400	0.0380	1.1453
E16 Corner (normal)	9.0000	0.0540	0.4860
E18 Party wall between dwellings	6.0000	0.0410	0.2460
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9000	0.0000	0.0000

E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0930	-0.8370	
E11 Eaves (insulation at rafter level)	24.6400	0.0190	0.4682	
E14 Flat roof	4.3000	0.1600	0.6880	
P5 Party wall - Roof (insulation at rafter level)	9.2400	0.0390	0.3604	
E13 Gable (insulation at rafter level)	9.2400	0.0580	0.5359	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.5506 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 45.8942 (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	35.8565	35.6735	35.4941	34.6516	34.4939	33.7601	33.7601	33.6242	34.0428	34.4939	34.8128	35.1462	(38)

Heat transfer coeff

	81.7507	81.5677	81.3883	80.5458	80.3882	79.6544	79.6544	79.5185	79.9370	80.3882	80.7071	81.0405	(39)

Average = Sum(39)m / 12 = 80.5451

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0828	1.0804	1.0780	1.0668	1.0647	1.0550	1.0550	1.0532	1.0588	1.0647	1.0690	1.0734	(40)
HLP (average)												1.0668	
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 2.3719 (42)

Hot water usage for mixer showers

87.9853	86.6631	84.7363	81.0498	78.3292	75.2952	73.5707	75.4829	77.5790	80.8366	84.6023	87.6482	(42a)

Hot water usage for baths

27.6407	27.2302	26.6521	25.5863	24.7882	23.9032	23.4252	23.9992	24.6242	25.5712	26.6590	27.5473	(42b)

Hot water usage for other uses

38.9210	37.5057	36.0904	34.6751	33.2598	31.8445	31.8445	33.2598	34.6751	36.0904	37.5057	38.9210	(42c)

Average daily hot water use (litres/day) 142.1296 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	154.5471	151.3990	147.4788	141.3111	136.3771	131.0429	128.8404	132.7419	136.8784	142.4982	148.7670	154.1165	(44)
Energy conte	244.7648	215.5902	226.6695	193.4479	183.5899	161.1325	155.8213	164.3622	168.7847	193.3687	211.9459	241.3092	(45)

Energy content (annual) Total = Sum(45)m = 2360.7867

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

36.7147	32.3385	34.0004	29.0172	27.5385	24.1699	23.3732	24.6543	25.3177	29.0053	31.7919	36.1964	(46)

Water storage loss (or HIU loss):
Store volume 200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.5900 (48)
Temperature factor from Table 2b 0.5400 (49)
Enter (49) or (54) in (55) 0.8586 (55)
Total storage loss

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(56)

If cylinder contains dedicated solar storage

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)

Total per year (kWh/year) = Sum(64)m = 2674.1757 (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

81.3843	71.6837	75.3676	64.3214	61.0436	53.5766	51.8106	54.6504	56.1209	64.2951	70.4720	80.2353	(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	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

23.3720	20.7588	16.8822	12.7809	9.5539	8.0658	8.7154	11.3285	15.2051	19.3064	22.5335	24.0215	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

313.1041	316.3531	308.1656	290.7355	268.7330	248.0538	234.2388	230.9898	239.1773	256.6074	278.6099	299.2891	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	(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)

-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	(71)

Water heating gains (Table 5)

109.3875	106.6722	101.3005	89.3353	82.0479	74.4119	69.6379	73.4549	77.9457	86.4181	97.8778	107.8432	(72)

Total internal gains

544.9059	542.8265	525.3907	491.8940	459.3771	429.5739	411.6344	414.8156	431.3705	461.3744	498.0635	530.1962	(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	
North	2.0800	10.6334	0.5000	0.7000	0.7700	5.3646	(74)
East	8.1600	19.6403	0.5000	0.7000	0.7700	38.8722	(76)
South	11.3300	46.7521	0.5000	0.7000	0.7700	128.4790	(78)

Solar gains	172.7157	296.7096	410.6833	513.5578	577.2046	573.2823	552.6461	505.5330	446.5847	329.3869	207.3783	147.4564	(83)
Total gains	717.6216	839.5361	936.0740	1005.4518	1036.5817	1002.8562	964.2805	920.3486	877.9552	790.7613	705.4418	677.6526	(84)

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7. Mean internal temperature (heating season)

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

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	37.5940	37.6783	37.7613	38.1563	38.2312	38.5834	38.5834	38.6493	38.4469	38.2312	38.0801	37.9234	
alpha	3.5063	3.5119	3.5174	3.5438	3.5487	3.5722	3.5722	3.5766	3.5631	3.5487	3.5387	3.5282	
util living area	0.9474	0.9136	0.8589	0.7676	0.6398	0.4850	0.3572	0.3885	0.5776	0.8013	0.9181	0.9553	(86)
Living	19.5269	19.8251	20.1905	20.5622	20.8176	20.9493	20.9869	20.9821	20.9038	20.5629	19.9771	19.4611	
Non living	18.7008	18.9892	19.3368	19.6843	19.9039	20.0106	20.0330	20.0323	19.9786	19.6963	19.1489	18.6429	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.2464	19.8251	20.1905	20.5622	20.8176	20.9493	20.9869	20.9821	20.9038	20.5629	19.9771	19.6764	(87)
Th 2	20.0149	20.0169	20.0188	20.0280	20.0297	20.0377	20.0377	20.0392	20.0346	20.0297	20.0263	20.0226	(88)
util rest of house	0.9382	0.8995	0.8369	0.7331	0.5898	0.4194	0.2817	0.3110	0.5109	0.7634	0.9024	0.9474	(89)
MIT 2	19.3427	18.9892	19.3368	19.6843	19.9039	20.0106	20.0330	20.0323	19.9786	19.6963	19.1489	18.8359	(90)
Living area fraction									fLA = Living area / (4) =			0.4702	(91)
MIT	19.7676	19.3822	19.7382	20.0971	20.3335	20.4520	20.4815	20.4789	20.4136	20.1037	19.5383	19.2311	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7676	19.3822	19.7382	20.0971	20.3335	20.4520	20.4815	20.4789	20.4136	20.1037	19.5383	19.2311	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9356	0.8890	0.8299	0.7357	0.6060	0.4482	0.3169	0.3469	0.5379	0.7665	0.8931	0.9397	(94)
Useful gains	671.4409	746.3793	776.8274	739.7410	628.1768	449.4726	305.5472	319.2678	472.2584	606.1438	630.0611	636.8074	(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	1264.4888	1181.2828	1077.4392	901.8793	694.0320	466.1343	309.1785	324.3494	504.6942	763.9891	1003.8583	1218.1273	(97)
Space heating kWh	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98a)
Space heating requirement - total per year (kWh/year)												1941.9467	
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	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1941.9467	
Space heating per m2										(98c) / (4) =		25.7211	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	266.3931	(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	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98)
Space heating efficiency (main heating system 1)	266.3931	266.3931	266.3931	266.3931	266.3931	0.0000	0.0000	0.0000	0.0000	266.3931	266.3931	266.3931	(210)
Space heating fuel (main heating system)	165.6303	109.7082	83.9568	43.8223	18.3925	0.0000	0.0000	0.0000	0.0000	44.0841	101.0289	162.3548	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
Efficiency of water heater												285.6977	(216)
(217)m	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	(217)
Fuel for water heating, kWh/month	94.9890	83.8757	88.6553	76.7265	73.5765	65.4155	63.8570	66.8465	68.0939	76.9993	83.2012	93.7795	(219)
Space cooling fuel requirement	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	20.4573	16.4116	14.7769	10.8262	8.3624	6.8322	7.6285	9.9158	12.8797	16.8988	19.0872	21.0259	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-70.0205	-109.3209	-169.8979	-199.2806	-215.7296	-196.2972	-193.3103	-181.8205	-158.7191	-129.1665	-80.3806	-59.1462	(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	-5.1092	-16.0491	-43.6215	-86.8775	-137.7946	-151.2734	-149.6670	-117.8405	-75.9756	-31.1023	-8.7341	-3.7245	(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	728.9778	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	285.6977	
Water heating fuel used	936.0159	(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)	165.1024	(232)

Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2590.8591	(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	-760.7629	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	728.9778	16.4900	120.2084	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0159	16.4900	154.3490	(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	165.1024	16.4900	27.2254	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1763.0899	16.4900	-290.7335	
PV Unit electricity exported	-827.7692	5.5900	-46.2723	
Total			-337.0058	(252)
Total energy cost			-35.2230	(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] =	-0.1052	(257)
SAP value		101.7058	
SAP rating (Section 12)		102	(258)
SAP band		A	

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	728.9778	0.1561	113.8055	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	936.0159	0.1412	132.2052	(264)
Space and water heating			246.0106	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	165.1024	0.1443	23.8294	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1763.0899	0.1338	-235.9582	
PV Unit electricity exported	-827.7692	0.1188	-98.3750	
Total			-334.3332	(269)
Total CO2, kg/year			-64.4931	(272)
CO2 emissions per m2			-0.8500	(273)
EI value			100.7172	
EI rating			101	(274)
EI band			A	

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)	
Main dwelling							
Ground floor		75.5000 (1b)	x	2.5000 (2b)	=	188.7500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.5000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	188.7500	(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) =	0.1589	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	

Measured/design AP50	4.0000	(17)
Infiltration rate	0.3589	(18)
Number of sides sheltered	2	(19)
Shelter factor (20) = 1 - [0.075 x (19)] =	0.8500	(20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) =	0.3051	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.0000	4.8000	4.8000	4.3000	4.3000	3.9000	4.0000	4.0000	4.1000	4.4000	4.3000	4.7000	(22)
Wind factor	1.2500	1.2000	1.2000	1.0750	1.0750	0.9750	1.0000	1.0000	1.0250	1.1000	1.0750	1.1750	(22a)
Adj infilt rate	0.3814	0.3661	0.3661	0.3280	0.3280	0.2975	0.3051	0.3051	0.3127	0.3356	0.3280	0.3585	(22b)
Effective ac	0.5727	0.5670	0.5670	0.5538	0.5538	0.5442	0.5465	0.5465	0.5489	0.5563	0.5538	0.5643	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
Windows			21.5700	1.1450	24.6985			(27)
External Wall	73.4600	21.5700	51.8900	0.1800	9.3402	110.0000	5707.9000	(29a)
Flat Roof	75.5000		75.5000	0.1100	8.3050	9.0000	679.5000	(30)
Total net area of external elements Aum(A, m2)			148.9600					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		42.3437			(33)
Main dwelling								
Corridor			15.0600	0.0000	0.0000	110.0000	1656.6000	(32)
Party Floor 1			75.5000			40.0000	3020.0000	(32d)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) =	11064.0000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	146.5430	(35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.2000	0.0640	0.2688
E3 Sill	4.2000	0.0210	0.0882
E4 Jamb	6.3000	0.0160	0.1008
E7 Party floor between dwellings (in blocks of flats)	30.1400	0.0380	1.1453
E16 Corner (normal)	9.0000	0.0540	0.4860
E18 Party wall between dwellings	6.0000	0.0410	0.2460
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0930	-0.8370
E11 Eaves (insulation at rafter level)	24.6400	0.0190	0.4682
E14 Flat roof	4.3000	0.1600	0.6880
P5 Party wall - Roof (insulation at rafter level)	9.2400	0.0390	0.3604
E13 Gable (insulation at rafter level)	9.2400	0.0580	0.5359

Thermal bridges (Sum(L x Psi) calculated using Appendix K)	3.5506	(36)
Point Thermal bridges (36a) =	0.0000	
Total fabric heat loss (33) + (36) + (36a) =	45.8942	(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	35.6735	35.3184	35.3184	34.4939	34.4939	33.8996	34.0428	34.0428	34.1895	34.6516	34.4939	35.1462	(38)
Heat transfer coeff	81.5677	81.2126	81.2126	80.3882	80.3882	79.7939	79.9370	79.9370	80.0838	80.5458	80.3882	81.0405	(39)
Average = Sum(39)m / 12 =												80.5413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0757	1.0757	1.0647	1.0647	1.0569	1.0588	1.0588	1.0607	1.0668	1.0647	1.0734	(40)
HLP (average)												1.0668	
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	2.3719	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
87.9853	86.6631	84.7363	81.0498	78.3292	75.2952	73.5707	75.4829	77.5790	80.8366	84.6023	87.6482	(42a)

Hot water usage for baths

27.6407	27.2302	26.6521	25.5863	24.7882	23.9032	23.4252	23.9992	24.6242	25.5712	26.6590	27.5473	(42b)

Hot water usage for other uses

38.9210	37.5057	36.0904	34.6751	33.2598	31.8445	31.8445	33.2598	34.6751	36.0904	37.5057	38.9210	(42c)

Average daily hot water use (litres/day)	142.1296	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	154.5471	151.3990	147.4788	141.3111	136.3771	131.0429	128.8404	132.7419	136.8784	142.4982	148.7670	154.1165	(44)
Energy conte	244.7648	215.5902	226.6695	193.4479	183.5899	161.1325	155.8213	164.3622	168.7847	193.3687	211.9459	241.3092	(45)
Energy content (annual)											Total = Sum(45)m =	2360.7867	

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

36.7147	32.3385	34.0004	29.0172	27.5385	24.1699	23.3732	24.6543	25.3177	29.0053	31.7919	36.1964	(46)

Water storage loss (or HIU loss):		
Store volume	200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):	1.5900	(48)
Temperature factor from Table 2b	0.5400	(49)
Enter (49) or (54) in (55)	0.8586	(55)

Total storage loss

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(56)

If cylinder contains dedicated solar storage

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
										Total per year (kWh/year) = Sum(64)m =	2674.1757	(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

81.3843	71.6837	75.3676	64.3214	61.0436	53.5766	51.8106	54.6504	56.1209	64.2951	70.4720	80.2353	(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	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	23.3720	20.7588	16.8822	12.7809	9.5539	8.0658	8.7154	11.3285	15.2051	19.3064	22.5335	24.0215	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	313.1041	316.3531	308.1656	290.7355	268.7330	248.0538	234.2388	230.9898	239.1773	256.6074	278.6099	299.2891	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	(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)													
	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	(71)
Water heating gains (Table 5)													
	109.3875	106.6722	101.3005	89.3353	82.0479	74.4119	69.6379	73.4549	77.9457	86.4181	97.8778	107.8432	(72)
Total internal gains													
	544.9059	542.8265	525.3907	491.8940	459.3771	429.5739	411.6344	414.8156	431.3705	461.3744	498.0635	530.1962	(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	
North	2.0800	11.5821	0.5000	0.7000	0.7700	5.8432	(74)
East	8.1600	21.5869	0.5000	0.7000	0.7700	42.7250	(76)
South	11.3300	49.2853	0.5000	0.7000	0.7700	135.4406	(78)

Solar gains	184.0088	283.6851	394.5562	511.2445	561.5956	596.7497	573.2823	539.0074	471.6454	344.0068	228.1148	154.2691	(83)
Total gains	728.9147	826.5116	919.9470	1003.1385	1020.9727	1026.3236	984.9167	953.8230	903.0159	805.3812	726.1783	684.4653	(84)

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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	37.6783	37.8431	37.8431	38.2312	38.2312	38.5159	38.4469	38.4469	38.3765	38.1563	38.2312	37.9234	
alpha	3.5119	3.5229	3.5229	3.5487	3.5487	3.5677	3.5631	3.5631	3.5584	3.5438	3.5487	3.5282	
util living area													
	0.9385	0.9097	0.8440	0.7324	0.5784	0.3805	0.2343	0.2582	0.4824	0.7508	0.8964	0.9475	(86)
Living	19.6644	19.8909	20.2936	20.6596	20.8864	20.9816	20.9978	20.9967	20.9549	20.6883	20.1487	19.6035	
Non living	18.8367	19.0563	19.4359	19.7719	19.9581	20.0285	20.0343	20.0340	20.0110	19.8037	19.3153	18.7828	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3167	19.8909	20.2936	20.6596	20.8864	20.9816	20.9978	20.9967	20.9549	20.6883	20.1487	19.7988	(87)
Th 2	20.0169	20.0208	20.0208	20.0297	20.0297	20.0362	20.0346	20.0346	20.0330	20.0280	20.0297	20.0226	(88)
util rest of house													
	0.9276	0.8947	0.8190	0.6928	0.5210	0.3103	0.1568	0.1786	0.4084	0.7039	0.8762	0.9380	(89)
MIT 2	19.4132	19.0563	19.4359	19.7719	19.9581	20.0285	20.0343	20.0340	20.0110	19.8037	19.3153	18.9562	(90)
Living area fraction										fLA = Living area / (4) =		0.4702	(91)
MIT	19.8380	19.4487	19.8392	20.1893	20.3946	20.4767	20.4873	20.4867	20.4548	20.2197	19.7072	19.3524	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8380	19.4487	19.8392	20.1893	20.3946	20.4767	20.4873	20.4867	20.4548	20.2197	19.7072	19.3524	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9254	0.8846	0.8138	0.6997	0.5432	0.3428	0.1933	0.2160	0.4414	0.7138	0.8686	0.9303	(94)
Useful gains	674.5430	731.1704	748.6853	701.8675	554.6088	351.7733	190.3899	206.0726	398.5861	574.8529	630.7479	636.7620	(95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	13.0000	16.0000	18.1000	17.9000	15.3000	11.7000	8.0000	5.0000	(96)
Heat loss rate W													
	1210.3043	1140.9319	1010.2202	827.1393	594.4365	357.2102	190.8343	206.7708	412.8164	686.2230	941.1192	1163.1243	(97)
Space heating kWh													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98a)
Space heating requirement - total per year (kWh/year)												1686.3159	
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													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1686.3159	
Space heating per m2											(98c) / (4) =	22.3353	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	266.3930	(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													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98)
Space heating efficiency (main heating system 1)													
	266.3930	266.3930	266.3930	266.3930	266.3930	0.0000	0.0000	0.0000	0.0000	266.3930	266.3930	266.3930	(210)
Space heating fuel (main heating system)													
	149.6310	103.3660	73.0432	33.8581	11.1234	0.0000	0.0000	0.0000	0.0000	31.1042	83.8863	147.0060	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement												
	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258 (64)
Efficiency of water heater												285.6983 (216)
(217)m	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983 (217)
Fuel for water heating, kWh/month												
	94.9888	83.8755	88.6551	76.7263	73.5764	65.4153	63.8568	66.8463	68.0938	76.9991	83.2010	93.7793 (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	20.4573	16.4116	14.7769	10.8262	8.3624	6.8322	7.6285	9.9158	12.8797	16.8988	19.0872	21.0259 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-75.2888	-106.6028	-166.0499	-198.6295	-211.5003	-200.6251	-197.3326	-189.1173	-165.8875	-134.4942	-88.5271	-62.5613 (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	-6.1239	-15.4590	-42.7806	-90.4213	-136.1155	-164.2810	-161.8237	-134.5406	-86.1967	-35.9872	-11.2197	-4.3082 (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	633.0182 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	285.6983
Water heating fuel used	936.0138 (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)	165.1024 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-2685.8738 (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	-951.7394 (238)

10a. Fuel costs - using BEDF prices (599)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	633.0182	26.0000	164.5847	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0138	26.0000	243.3636	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0000	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	165.1024	26.0000	42.9266	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	26.0000	-467.1203	
PV Unit electricity exported	-889.2574	5.8100	-51.6659	
Total			-518.7861	(252)
Total energy cost			-67.9112	(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	633.0182	0.1568	99.2730	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	936.0138	0.1412	132.2049	(264)
Space and water heating			231.4779	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	165.1024	0.1443	23.8294	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	0.1338	-240.3109	
PV Unit electricity exported	-889.2574	0.1181	-105.0240	
Total			-345.3349	(269)
Total CO2, kg/year			-90.0276	(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	633.0182	1.5806	1000.5192	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0138	1.5223	1424.8755	(278)
Space and water heating			2425.3946	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	165.1024	1.5338	253.2396	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	1.4943	-2684.6875	
PV Unit electricity exported	-889.2574	0.4330	-385.0461	

Total	-3069.7337 (283)
Total Primary energy kWh/year	-391.0994 (286)

SAP 10 EPC IMPROVEMENTS

REV A

Current energy efficiency rating:	A 102
Current environmental impact rating:	A 101

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:	A 102
Potential environmental impact rating:	A 101

Fuel prices for cost data on this page from database revision number 599 TEST (30 Sep 2026)
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	£451	£451	£0
Space heating	£165	£165	£0
Water heating	£243	£243	£0
Lighting	£43	£43	£0
Generated (PV)	-£519	-£519	£0
Total cost of fuels	-£68	-£68	£0
Total cost of uses	-£68	-£68	£0
Delivered energy	-13 kWh/m²	-13 kWh/m²	0 kWh/m²
Carbon dioxide emissions	-0.1 tonnes	-0.1 tonnes	0.0 tonnes
CO2 emissions per m²	-1 kg/m²	-1 kg/m²	0 kg/m²
Primary energy	-5 kWh/m²	-5 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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	75.5000 (1b)	x	2.5000 (2b)	=	188.7500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.5000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	188.7500	(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	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) =	0.1589 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.3589 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3051 (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	0.3890	0.3814	0.3737	0.3356	0.3280	0.2898	0.2898	0.2822	0.3051	0.3280	0.3432	0.3585	(22b)

Effective ac	0.5757	0.5727	0.5698	0.5563	0.5538	0.5420	0.5420	0.5398	0.5465	0.5538	0.5589	0.5643	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K	
	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K	
Main dwelling								
Windows			21.5700	1.1450	24.6985			(27)
External Wall	73.4600	21.5700	51.8900	0.1800	9.3402	110.0000	5707.9000	(29a)
Flat Roof	75.5000		75.5000	0.1100	8.3050	9.0000	679.5000	(30)
Total net area of external elements Aum(A, m2)			148.9600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.3437			(33)
Main dwelling								
Corridor			15.0600	0.0000	0.0000	110.0000	1656.6000	(32)
Party Floor 1			75.5000			40.0000	3020.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11064.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		146.5430 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.2000	0.0640	0.2688
E3 Sill	4.2000	0.0210	0.0882
E4 Jamb	6.3000	0.0160	0.1008
E7 Party floor between dwellings (in blocks of flats)	30.1400	0.0380	1.1453
E16 Corner (normal)	9.0000	0.0540	0.4860
E18 Party wall between dwellings	6.0000	0.0410	0.2460
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0930	-0.8370
E11 Eaves (insulation at rafter level)	24.6400	0.0190	0.4682
E14 Flat roof	4.3000	0.1600	0.6880
P5 Party wall - Roof (insulation at rafter level)	9.2400	0.0390	0.3604
E13 Gable (insulation at rafter level)	9.2400	0.0580	0.5359

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5506 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	45.8942 (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	35.8565	35.6735	35.4941	34.6516	34.4939	33.7601	33.7601	33.6242	34.0428	34.4939	34.8128	35.1462	(38)
Heat transfer coeff	81.7507	81.5677	81.3883	80.5458	80.3882	79.6544	79.6544	79.5185	79.9370	80.3882	80.7071	81.0405	(39)
Average = Sum(39)m / 12 =												80.5451	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0828	1.0804	1.0780	1.0668	1.0647	1.0550	1.0550	1.0532	1.0588	1.0647	1.0690	1.0734	(40)
HLP (average)												1.0668	
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		2.3719 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
87.9853	86.6631	84.7363	81.0498	78.3292	75.2952	73.5707	75.4829	77.5790	80.8366	84.6023	87.6482	(42a)

Hot water usage for baths

27.6407	27.2302	26.6521	25.5863	24.7882	23.9032	23.4252	23.9992	24.6242	25.5712	26.6590	27.5473	(42b)

Hot water usage for other uses

38.9210	37.5057	36.0904	34.6751	33.2598	31.8445	31.8445	33.2598	34.6751	36.0904	37.5057	38.9210	(42c)

Average daily hot water use (litres/day)		142.1296 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	154.5471	151.3990	147.4788	141.3111	136.3771	131.0429	128.8404	132.7419	136.8784	142.4982	148.7670	154.1165	(44)
Energy conte	244.7648	215.5902	226.6695	193.4479	183.5899	161.1325	155.8213	164.3622	168.7847	193.3687	211.9459	241.3092	(45)
Energy content (annual)										Total = Sum(45)m =		2360.7867	

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

36.7147	32.3385	34.0004	29.0172	27.5385	24.1699	23.3732	24.6543	25.3177	29.0053	31.7919	36.1964	(46)

Water storage loss (or HIU loss):		
Store volume		200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):		1.5900 (48)
Temperature factor from Table 2b		0.5400 (49)
Enter (49) or (54) in (55)		0.8586 (55)

Total storage loss

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(56)

If cylinder contains dedicated solar storage

26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(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

271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
								Total per year (kWh/year) = Sum(64)m =			2674.1757	(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

81.3843	71.6837	75.3676	64.3214	61.0436	53.5766	51.8106	54.6504	56.1209	64.2951	70.4720	80.2353	(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	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	23.3720	20.7588	16.8822	12.7809	9.5539	8.0658	8.7154	11.3285	15.2051	19.3064	22.5335	24.0215	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	313.1041	316.3531	308.1656	290.7355	268.7330	248.0538	234.2388	230.9898	239.1773	256.6074	278.6099	299.2891	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													

	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	(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)													
	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	(71)
Water heating gains (Table 5)													
	109.3875	106.6722	101.3005	89.3353	82.0479	74.4119	69.6379	73.4549	77.9457	86.4181	97.8778	107.8432	(72)
Total internal gains													
	544.9059	542.8265	525.3907	491.8940	459.3771	429.5739	411.6344	414.8156	431.3705	461.3744	498.0635	530.1962	(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	
North	2.0800	10.6334	0.5000	0.7000	0.7700	5.3646	(74)
East	8.1600	19.6403	0.5000	0.7000	0.7700	38.8722	(76)
South	11.3300	46.7521	0.5000	0.7000	0.7700	128.4790	(78)

Solar gains	172.7157	296.7096	410.6833	513.5578	577.2046	573.2823	552.6461	505.5330	446.5847	329.3869	207.3783	147.4564	(83)
Total gains	717.6216	839.5361	936.0740	1005.4518	1036.5817	1002.8562	964.2805	920.3486	877.9552	790.7613	705.4418	677.6526	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	37.5940	37.6783	37.7613	38.1563	38.2312	38.5834	38.5834	38.6493	38.4469	38.2312	38.0801	37.9234	
alpha	3.5063	3.5119	3.5174	3.5438	3.5487	3.5722	3.5722	3.5766	3.5631	3.5487	3.5387	3.5282	
util living area													
	0.9474	0.9136	0.8589	0.7676	0.6398	0.4850	0.3572	0.3885	0.5776	0.8013	0.9181	0.9553	(86)
Living	19.5269	19.8251	20.1905	20.5622	20.8176	20.9493	20.9869	20.9821	20.9038	20.5629	19.9771	19.4611	
Non living	18.7008	18.9892	19.3368	19.6843	19.9039	20.0106	20.0330	20.0323	19.9786	19.6963	19.1489	18.6429	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.2464	19.8251	20.1905	20.5622	20.8176	20.9493	20.9869	20.9821	20.9038	20.5629	19.9771	19.6764	(87)
Th 2	20.0149	20.0169	20.0188	20.0280	20.0297	20.0377	20.0377	20.0392	20.0346	20.0297	20.0263	20.0226	(88)
util rest of house													
	0.9382	0.8995	0.8369	0.7331	0.5898	0.4194	0.2817	0.3110	0.5109	0.7634	0.9024	0.9474	(89)
MIT 2	19.3427	18.9892	19.3368	19.6843	19.9039	20.0106	20.0330	20.0323	19.9786	19.6963	19.1489	18.8359	(90)
Living area fraction										fLA = Living area / (4) =		0.4702	(91)
MIT	19.7676	19.3822	19.7382	20.0971	20.3335	20.4520	20.4815	20.4789	20.4136	20.1037	19.5383	19.2311	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7676	19.3822	19.7382	20.0971	20.3335	20.4520	20.4815	20.4789	20.4136	20.1037	19.5383	19.2311	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9356	0.8890	0.8299	0.7357	0.6060	0.4482	0.3169	0.3469	0.5379	0.7665	0.8931	0.9397	(94)
Useful gains	671.4409	746.3793	776.8274	739.7410	628.1768	449.4726	305.5472	319.2678	472.2584	606.1438	630.0611	636.8074	(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													
	1264.4888	1181.2828	1077.4392	901.8793	694.0320	466.1343	309.1785	324.3494	504.6942	763.9891	1003.8583	1218.1273	(97)
Space heating kWh													
	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98a)
Space heating requirement - total per year (kWh/year)												1941.9467	
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													
	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1941.9467	
Space heating per m2											(98c) / (4) =	25.7211	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												266.3931	(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													
	441.2277	292.2552	223.6552	116.7396	48.9963	0.0000	0.0000	0.0000	0.0000	117.4369	269.1340	432.5019	(98)
Space heating efficiency (main heating system 1)													
	266.3931	266.3931	266.3931	266.3931	266.3931	0.0000	0.0000	0.0000	0.0000	266.3931	266.3931	266.3931	(210)
Space heating fuel (main heating system)													
	165.6303	109.7082	83.9568	43.8223	18.3925	0.0000	0.0000	0.0000	0.0000	44.0841	101.0289	162.3548	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
Efficiency of water heater												285.6977	(216)
(217)m	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	285.6977	(217)
Fuel for water heating, kWh/month													
	94.9890	83.8757	88.6553	76.7265	73.5765	65.4155	63.8570	66.8465	68.0939	76.9993	83.2012	93.7795	(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	20.4573	16.4116	14.7769	10.8262	8.3624	6.8322	7.6285	9.9158	12.8797	16.8988	19.0872	21.0259	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-70.0205	-109.3209	-169.8979	-199.2806	-215.7296	-196.2972	-193.3103	-181.8205	-158.7191	-129.1665	-80.3806	-59.1462	(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	-5.1092	-16.0491	-43.6215	-86.8775	-137.7946	-151.2734	-149.6670	-117.8405	-75.9756	-31.1023	-8.7341	-3.7245	(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	728.9778	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	285.6977	
Water heating fuel used	936.0159	(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)	165.1024	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2590.8591	(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	-760.7629	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	728.9778	16.4900	120.2084	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0159	16.4900	154.3490	(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	165.1024	16.4900	27.2254	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1763.0899	16.4900	-290.7335	
PV Unit electricity exported	-827.7692	5.5900	-46.2723	
Total			-337.0058	(252)
Total energy cost			-35.2230	(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] =	-0.1052	(257)
SAP value	101.7058	
SAP rating (Section 12)	102	(258)
SAP band	A	

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	728.9778	0.1561	113.8055	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	936.0159	0.1412	132.2052	(264)
Space and water heating			246.0106	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	165.1024	0.1443	23.8294	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1763.0899	0.1338	-235.9582	
PV Unit electricity exported	-827.7692	0.1188	-98.3750	
Total			-334.3332	(269)
Total CO2, kg/year			-64.4931	(272)
CO2 emissions per m2			-0.8500	(273)
EI value			100.7172	
EI rating			101	(274)
EI band			A	

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)	
Main dwelling						
Ground floor	75.5000 (1b)	x	2.5000 (2b)	=	188.7500	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	75.5000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	188.7500	(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) =	0.1589 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.0000 (17)
Infiltration rate		0.3589 (18)
Number of sides sheltered		2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.3051 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.0000	4.8000	4.8000	4.3000	4.3000	3.9000	4.0000	4.0000	4.1000	4.4000	4.3000	4.7000	(22)
Wind factor	1.2500	1.2000	1.2000	1.0750	1.0750	0.9750	1.0000	1.0000	1.0250	1.1000	1.0750	1.1750	(22a)
Adj infilt rate	0.3814	0.3661	0.3661	0.3280	0.3280	0.2975	0.3051	0.3051	0.3127	0.3356	0.3280	0.3585	(22b)
Effective ac	0.5727	0.5670	0.5670	0.5538	0.5538	0.5442	0.5465	0.5465	0.5489	0.5563	0.5538	0.5643	(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	
Main dwelling								
Windows			21.5700	1.1450	24.6985			(27)
External Wall	73.4600	21.5700	51.8900	0.1800	9.3402	110.0000	5707.9000	(29a)
Flat Roof	75.5000		75.5000	0.1100	8.3050	9.0000	679.5000	(30)
Total net area of external elements Aum(A, m2)			148.9600					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.3437			(33)
Main dwelling								
Corridor			15.0600	0.0000	0.0000	110.0000	1656.6000	(32)
Party Floor 1			75.5000			40.0000	3020.0000	(32d)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11064.0000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		146.5430 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element			
E2 Other lintels (including other steel lintels)	4.2000	0.0640	0.2688
E3 Sill	4.2000	0.0210	0.0882
E4 Jamb	6.3000	0.0160	0.1008
E7 Party floor between dwellings (in blocks of flats)	30.1400	0.0380	1.1453
E16 Corner (normal)	9.0000	0.0540	0.4860
E18 Party wall between dwellings	6.0000	0.0410	0.2460
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	5.9000	0.0000	0.0000
E17 Corner (inverted - internal area greater than external area)	9.0000	-0.0930	-0.8370
E11 Eaves (insulation at rafter level)	24.6400	0.0190	0.4682
E14 Flat roof	4.3000	0.1600	0.6880
P5 Party wall - Roof (insulation at rafter level)	9.2400	0.0390	0.3604
E13 Gable (insulation at rafter level)	9.2400	0.0580	0.5359

Thermal bridges (Sum(L x Psi) calculated using Appendix K)		3.5506 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	45.8942 (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	35.6735	35.3184	35.3184	34.4939	34.4939	33.8996	34.0428	34.0428	34.1895	34.6516	34.4939	35.1462	(38)
Heat transfer coeff	81.5677	81.2126	81.2126	80.3882	80.3882	79.7939	79.9370	79.9370	80.0838	80.5458	80.3882	81.0405	(39)
Average = Sum(39)m / 12 =												80.5413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0804	1.0757	1.0757	1.0647	1.0647	1.0569	1.0588	1.0588	1.0607	1.0668	1.0647	1.0734	(40)
HLP (average)												1.0668	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		2.3719 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
87.9853	86.6631	84.7363	81.0498	78.3292	75.2952	73.5707	75.4829	77.5790	80.8366	84.6023	87.6482	(42a)

Hot water usage for baths

27.6407	27.2302	26.6521	25.5863	24.7882	23.9032	23.4252	23.9992	24.6242	25.5712	26.6590	27.5473	(42b)

Hot water usage for other uses

38.9210	37.5057	36.0904	34.6751	33.2598	31.8445	31.8445	33.2598	34.6751	36.0904	37.5057	38.9210	(42c)

Average daily hot water use (litres/day)	142.1296 (43)

Daily hot water use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
154.5471	151.3990	147.4788	141.3111	136.3771	131.0429	128.8404	132.7419	136.8784	142.4982	148.7670	154.1165	(44)

Energy conte	244.7648	215.5902	226.6695	193.4479	183.5899	161.1325	155.8213	164.3622	168.7847	193.3687	211.9459	241.3092	(45)
Energy content (annual)										Total = Sum(45)m =		2360.7867	
Distribution loss (46)m = 0.15 x (45)m													
	36.7147	32.3385	34.0004	29.0172	27.5385	24.1699	23.3732	24.6543	25.3177	29.0053	31.7919	36.1964	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.5900	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8586	(55)
Total storage loss													
	26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(56)
If cylinder contains dedicated solar storage													
	26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166	(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													
	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(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													
	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
										Total per year (kWh/year) = Sum(64)m =		2674.1757	(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													
	81.3843	71.6837	75.3676	64.3214	61.0436	53.5766	51.8106	54.6504	56.1209	64.2951	70.4720	80.2353	(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	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	142.3164	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	23.3720	20.7588	16.8822	12.7809	9.5539	8.0658	8.7154	11.3285	15.2051	19.3064	22.5335	24.0215	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	313.1041	316.3531	308.1656	290.7355	268.7330	248.0538	234.2388	230.9898	239.1773	256.6074	278.6099	299.2891	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	51.6036	(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)													
	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	-94.8776	(71)
Water heating gains (Table 5)													
	109.3875	106.6722	101.3005	89.3353	82.0479	74.4119	69.6379	73.4549	77.9457	86.4181	97.8778	107.8432	(72)
Total internal gains													
	544.9059	542.8265	525.3907	491.8940	459.3771	429.5739	411.6344	414.8156	431.3705	461.3744	498.0635	530.1962	(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	
North	2.0800	11.5821	0.5000	0.7000	0.7700	5.8432	(74)
East	8.1600	21.5869	0.5000	0.7000	0.7700	42.7250	(76)
South	11.3300	49.2853	0.5000	0.7000	0.7700	135.4406	(78)

Solar gains	184.0088	283.6851	394.5562	511.2445	561.5956	596.7497	573.2823	539.0074	471.6454	344.0068	228.1148	154.2691	(83)
Total gains	728.9147	826.5116	919.9470	1003.1385	1020.9727	1026.3236	984.9167	953.8230	903.0159	805.3812	726.1783	684.4653	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	37.6783	37.8431	37.8431	38.2312	38.2312	38.5159	38.4469	38.4469	38.3765	38.1563	38.2312	37.9234	
alpha	3.5119	3.5229	3.5229	3.5487	3.5487	3.5677	3.5631	3.5631	3.5584	3.5438	3.5487	3.5282	
util living area													
	0.9385	0.9097	0.8440	0.7324	0.5784	0.3805	0.2343	0.2582	0.4824	0.7508	0.8964	0.9475	(86)
Living	19.6644	19.8909	20.2936	20.6596	20.8864	20.9816	20.9978	20.9967	20.9549	20.6883	20.1487	19.6035	
Non living	18.8367	19.0563	19.4359	19.7719	19.9581	20.0285	20.0343	20.0340	20.0110	19.8037	19.3153	18.7828	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.3167	19.8909	20.2936	20.6596	20.8864	20.9816	20.9978	20.9967	20.9549	20.6883	20.1487	19.7988	(87)
Th 2	20.0169	20.0208	20.0208	20.0297	20.0297	20.0362	20.0346	20.0346	20.0330	20.0280	20.0297	20.0226	(88)
util rest of house													
	0.9276	0.8947	0.8190	0.6928	0.5210	0.3103	0.1568	0.1786	0.4084	0.7039	0.8762	0.9380	(89)
MIT 2	19.4132	19.0563	19.4359	19.7719	19.9581	20.0285	20.0343	20.0340	20.0110	19.8037	19.3153	18.9562	(90)
Living area fraction										fLA = Living area / (4) =		0.4702	(91)
MIT	19.8380	19.4487	19.8392	20.1893	20.3946	20.4767	20.4873	20.4867	20.4548	20.2197	19.7072	19.3524	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.8380	19.4487	19.8392	20.1893	20.3946	20.4767	20.4873	20.4867	20.4548	20.2197	19.7072	19.3524	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9254	0.8846	0.8138	0.6997	0.5432	0.3428	0.1933	0.2160	0.4414	0.7138	0.8686	0.9303	(94)
Useful gains	674.5430	731.1704	748.6853	701.8675	554.6088	351.7733	190.3899	206.0726	398.5861	574.8529	630.7479	636.7620	(95)
Ext temp.	5.0000	5.4000	7.4000	9.9000	13.0000	16.0000	18.1000	17.9000	15.3000	11.7000	8.0000	5.0000	(96)
Heat loss rate W													
	1210.3043	1140.9319	1010.2202	827.1393	594.4365	357.2102	190.8343	206.7708	412.8164	686.2230	941.1192	1163.1243	(97)
Space heating kWh													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98a)

Space heating requirement - total per year (kWh/year)												1686.3159	
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													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1686.3159	
Space heating per m2											(98c) / (4) =	22.3353	(99)

9a. Energy requirements - Individual heating systems, including micro-CHP

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												266.3930	(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													
	398.6064	275.3597	194.5820	90.1957	29.6318	0.0000	0.0000	0.0000	0.0000	82.8594	223.4673	391.6135	(98)
Space heating efficiency (main heating system 1)													
	266.3930	266.3930	266.3930	266.3930	266.3930	0.0000	0.0000	0.0000	0.0000	266.3930	266.3930	266.3930	(210)
Space heating fuel (main heating system)													
	149.6310	103.3660	73.0432	33.8581	11.1234	0.0000	0.0000	0.0000	0.0000	31.1042	83.8863	147.0060	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	271.3814	239.6310	253.2861	219.2059	210.2065	186.8905	182.4379	190.9788	194.5427	219.9853	237.7039	267.9258	(64)
Efficiency of water heater												285.6983	(216)
(217)m	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	285.6983	(217)
Fuel for water heating, kWh/month													
	94.9888	83.8755	88.6551	76.7263	73.5764	65.4153	63.8568	66.8463	68.0938	76.9991	83.2010	93.7793	(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	20.4573	16.4116	14.7769	10.8262	8.3624	6.8322	7.6285	9.9158	12.8797	16.8988	19.0872	21.0259	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-75.2888	-106.6028	-166.0499	-198.6295	-211.5003	-200.6251	-197.3326	-189.1173	-165.8875	-134.4942	-88.5271	-62.5613	(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	-6.1239	-15.4590	-42.7806	-90.4213	-136.1155	-164.2810	-161.8237	-134.5406	-86.1967	-35.9872	-11.2197	-4.3082	(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												633.0182	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												285.6983	
Water heating fuel used												936.0138	(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)												165.1024	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2685.8738	(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												-951.7394	(238)

10a. Fuel costs - using BEDF prices (599)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	633.0182	26.0000	164.5847	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0138	26.0000	243.3636	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0000	0.0000	(247a)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(249)
Energy for lighting	165.1024	26.0000	42.9266	(250)
Additional standing charges			0.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	26.0000	-467.1203	
PV Unit electricity exported	-889.2574	5.8100	-51.6659	
Total			-518.7861	(252)
Total energy cost			-67.9112	(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	633.0182	0.1568	99.2730	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	936.0138	0.1412	132.2049	(264)
Space and water heating			231.4779	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	165.1024	0.1443	23.8294	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	0.1338	-240.3109	
PV Unit electricity exported	-889.2574	0.1181	-105.0240	
Total			-345.3349	(269)
Total CO2, kg/year			-90.0276	(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	633.0182	1.5806	1000.5192	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	936.0138	1.5223	1424.8755	(278)
Space and water heating			2425.3946	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	165.1024	1.5338	253.2396	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1796.6164	1.4943	-2684.6875	
PV Unit electricity exported	-889.2574	0.4330	-385.0461	
Total			-3069.7337	(283)
Total Primary energy kWh/year			-391.0994	(286)