Full SAP Calculation Printout

Property Reference	NG34 9BD HL 2	**Issued on Date**	07/02/2024
Assessment Reference	00001	**Prop Type Ref**	
Property	Holiday Let 2, 2 Fen Road, Little Hale, Sleaford, Lincs, NG34 9BD		

SAP Rating	73 C	**DER**		**TER**	
Environmental	84 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.05	**DFEE**		**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**		**TPER**	

Assessor Details	Mr. Jake Eaton	**Assessor ID**	P711-0001
Client	Mr Paul Pocklington, Mr Paul Pocklington		

SAP 10 WORKSHEET FOR Conversion (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	41.8300 (1b)	x	3.1800 (2b)	=	133.0194	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.8300					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	133.0194	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.9900	(17)
Infiltration rate		0.2495	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2308	(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	0.2943	0.2885	0.2827	0.2539	0.2481	0.2192	0.2192	0.2135	0.2308	0.2481	0.2596	0.2712	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	82.8000	(23c)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Effective ac	0.3803	0.3745	0.3687	0.3399	0.3341	0.3052	0.3052	0.2995	0.3168	0.3341	0.3456	0.3572	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Opening Type 1			2.1000	1.0000	2.1000			(26)
Opening Type 2 (Uw = 0.80)			9.4500	0.7752	7.3256			(27)
Opening			1.2900	0.7752	1.0000			(27a)
Heatloss Floor 1			41.8300	0.1000	4.1830	75.0000	3137.2500	(28a)
Upgraded Existing Wall	14.7700	11.5500	3.2200	0.1500	0.4830	9.0000	28.9800	(29a)
External Wall 2	44.4300		44.4300	0.1300	5.7759	60.0000	2665.8000	(29a)
Upgraded Sloping Roof	16.7600	1.2900	15.4700	0.1100	1.7017	9.0000	139.2300	(30)
Extension Slope Roof	34.3100		34.3100	0.1000	3.4310	9.0000	308.7900	(30)
Total net area of external elements Aum(A, m2)			152.1000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		26.0002			(33)
Party Wall 1			14.1900	0.0000	0.0000	70.0000	993.3000	(32)
Internal Wall 1			51.6400			75.0000	3873.0000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 11146.3500	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	266.4678	(35)

Thermal bridges (Default value 0.200 * total exposed area) 30.4200 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 56.4202 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6918	16.4385	16.1852	14.9189	14.6656	13.3993	13.3993	13.1460	13.9058	14.6656	15.1722	15.6787	(38)
Heat transfer coeff	73.1120	72.8587	72.6054	71.3391	71.0858	69.8195	69.8195	69.5662	70.3260	71.0858	71.5924	72.0989	(39)
Average = Sum(39)m / 12 =												71.2758	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7478	1.7418	1.7357	1.7055	1.6994	1.6691	1.6691	1.6631	1.6812	1.6994	1.7115	1.7236	(40)
HLP (average)												1.7039	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4558 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	54.7066	53.8844	52.6864	50.3943	48.7027	46.8163	45.7440	46.9330	48.2363	50.2617	52.6031	54.4970	(42a)
Hot water usage for baths	21.0349	20.7225	20.2826	19.4714	18.8641	18.1906	17.8268	18.2637	18.7393	19.4599	20.2878	20.9638	(42b)
Hot water usage for other uses	29.5386	28.4645	27.3904	26.3162	25.2421	24.1680	24.1680	25.2421	26.3162	27.3904	28.4645	29.5386	(42c)
Average daily hot water use (litres/day)												96.7936	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.2801	103.0714	100.3594	96.1819	92.8089	89.1748	87.7388	90.4387	93.2918	97.1120	101.3554	104.9994	(44)
Energy conte	166.7380	146.7724	154.2486	131.6683	124.9386	109.6509	106.1125	111.9821	115.0381	131.7801	144.3994	164.4037	(45)
Energy content (annual)										Total = Sum(45)m =		1607.7325	
Distribution loss (46)m = 0.15 x (45)m	25.0107	22.0159	23.1373	19.7502	18.7408	16.4476	15.9169	16.7973	17.2557	19.7670	21.6599	24.6606	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(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	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(64)
										Total per year (kWh/year) = Sum(64)m =		2207.7325	(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	68.1801	60.3087	64.0274	56.1085	54.2818	48.7877	48.0221	49.9738	50.5789	56.5566	60.3416	67.4039	(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	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.4768	11.9699	9.7346	7.3697	5.5090	4.6509	5.0255	6.5323	8.7676	11.1325	12.9933	13.8513	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	188.3013	190.2553	185.3314	174.8488	161.6165	149.1800	140.8716	138.9177	143.8416	154.3242	167.5565	179.9930	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	(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)	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	(71)
Water heating gains (Table 5)	91.6399	89.7450	86.0583	77.9284	72.9594	67.7607	64.5459	67.1690	70.2485	76.0170	83.8077	90.5967	(72)
Total internal gains	367.7241	366.2764	355.4304	334.4530	314.3909	295.8976	284.7490	286.9250	297.1638	315.7797	338.6635	358.7471	(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	
East	5.2500	19.6403	0.6800	0.7500	0.7700	36.4427	(76)
South	4.2000	46.7521	0.6800	0.7500	0.7700	69.3990	(78)
North	1.2900	15.6897	0.6800	0.7000	1.0000	8.6707	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	114.5124	201.2111	291.3406	387.3532	457.5671	464.5844	443.6189	389.7226	324.3864	226.7346	138.2877	97.2646	(83)
Total gains	482.2365	567.4874	646.7710	721.8063	771.9581	760.4820	728.3679	676.6476	621.5502	542.5143	476.9512	456.0117	(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	42.3489	42.4961	42.6443	43.4013	43.5559	44.3459	44.3459	44.5074	44.0265	43.5559	43.2478	42.9439	
alpha	3.8233	3.8331	3.8430	3.8934	3.9037	3.9564	3.9564	3.9672	3.9351	3.9037	3.8832	3.8629	
util living area	0.9825	0.9671	0.9345	0.8601	0.7303	0.5557	0.4136	0.4598	0.6891	0.8982	0.9692	0.9856	(86)

MIT	19.6823	19.8851	20.1760	20.5167	20.7585	20.8814	20.9121	20.9073	20.8263	20.5005	20.0333	19.6541	(87)
Th 2	19.5067	19.5110	19.5153	19.5369	19.5413	19.5630	19.5630	19.5674	19.5543	19.5413	19.5326	19.5240	(88)
util rest of house													
	0.9763	0.9560	0.9126	0.8150	0.6515	0.4444	0.2826	0.3231	0.5782	0.8538	0.9568	0.9805	(89)
MIT 2	18.0416	18.2978	18.6572	19.0705	19.3232	19.4444	19.4607	19.4638	19.4017	19.0708	18.5039	18.0189	(90)
Living area fraction										fLA = Living area / (4) =		0.4903	(91)
MIT	18.8460	19.0761	19.4019	19.7796	20.0270	20.1490	20.1723	20.1716	20.1002	19.7718	19.2538	18.8206	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.6960	18.9261	19.2519	19.6296	19.8770	19.9990	20.0223	20.0216	19.9502	19.6218	19.1038	18.6706	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9719	0.9505	0.9078	0.8183	0.6712	0.4796	0.3254	0.3677	0.6112	0.8568	0.9521	0.9766	(94)
Useful gains	468.7055	539.3765	587.1628	590.6608	518.1239	364.7459	236.9859	248.7775	379.8767	464.8103	454.0911	445.3270	(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													
	1052.5232	1021.9213	925.8588	765.4427	581.2659	376.9556	238.9460	251.9403	411.4197	641.3233	859.3805	1043.3175	(97)
Space heating kWh													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98a)
Space heating requirement - total per year (kWh/year)												2051.4799	
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													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2051.4799	
Space heating per m2											(98c) / (4) =	49.0433	(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 %)	84.0000 (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													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98)
Space heating efficiency (main heating system 1)													
	84.0000	84.0000	84.0000	84.0000	84.0000	0.0000	0.0000	0.0000	0.0000	84.0000	84.0000	84.0000	(210)
Space heating fuel (main heating system)													
	517.0957	386.0359	299.9879	149.8130	55.9257	0.0000	0.0000	0.0000	0.0000	156.3401	347.3909	529.6488	(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													
	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(64)
Efficiency of water heater												75.0000	(216)
(217)m	80.7643	80.4024	79.7069	78.4473	76.7329	75.0000	75.0000	75.0000	75.0000	78.5177	80.1620	80.8360	(217)
Fuel for water heating, kWh/month													
	206.4501	182.5471	193.5197	167.8430	162.8227	146.2012	141.4833	149.3094	153.3842	167.8349	180.1344	203.3793	(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	64.5854	58.3352	64.5854	62.5020	64.5854	62.5020	64.5854	64.5854	62.5020	64.5854	62.5020	64.5854	(231)
Lighting	11.7961	9.4633	8.5206	6.2426	4.8220	3.9396	4.3987	5.7177	7.4267	9.7442	11.0061	12.1240	(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	2442.2379 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	75.0000
Water heating fuel used	2054.9092 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.6000, SFP = 0.7360)	
mechanical ventilation fans (SFP = 0.7360)	119.4408 (230a)
central heating pump	41.0000 (230c)
maintaining electric keep-hot facility for gas combi boiler	600.0000 (230f)
Total electricity for the above, kWh/year	760.4408 (231)
Electricity for lighting (calculated in Appendix L)	95.2015 (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	5352.7894 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2442.2379	3.6400	88.8975	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2054.9092	3.6400	74.7987	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	760.4408	16.4900	125.3967	(249)
Energy for lighting	95.2015	16.4900	15.6987	(250)
Additional standing charges			92.0000	(251)
Total energy cost			396.7916	(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] =	1.6451	(257)
SAP value		73.3328	
SAP rating (Section 12)		73	(258)
SAP band		C	

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	2442.2379	0.2100	512.8700	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2054.9092	0.2100	431.5309	(264)
Space and water heating			944.4009	(265)
Pumps, fans and electric keep-hot	760.4408	0.1387	105.4825	(267)
Energy for lighting	95.2015	0.1443	13.7405	(268)
Total CO2, kg/year			1063.6239	(272)
CO2 emissions per m2			25.4300	(273)
EI value			83.5857	
EI rating			84	(274)
EI band			B	

SAP 10 WORKSHEET FOR Conversion (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	41.8300	(1b)	x 3.1800	(2b) =	133.0194	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.8300					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		133.0194	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.9900	(17)
Infiltration rate		0.2495	(18)
Number of sides sheltered		1	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2308	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.4000	5.1000	5.0000	4.6000	4.4000	3.9000	4.1000	4.0000	4.2000	4.5000	4.8000	4.9000	(22)
Wind factor	1.3500	1.2750	1.2500	1.1500	1.1000	0.9750	1.0250	1.0000	1.0500	1.1250	1.2000	1.2250	(22a)
Adj infilt rate	0.3116	0.2943	0.2885	0.2654	0.2539	0.2250	0.2366	0.2308	0.2423	0.2596	0.2769	0.2827	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000	(23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	82.8000	(23c)

Effective ac	0.3976	0.3803	0.3745	0.3514	0.3399	0.3110	0.3226	0.3168	0.3283	0.3456	0.3629	0.3687	(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	
Opening Type 1			2.1000	1.0000	2.1000			(26)
Opening Type 2 (Uw = 0.80)			9.4500	0.7752	7.3256			(27)
Opening			1.2900	0.7752	1.0000			(27a)
Heatloss Floor 1			41.8300	0.1000	4.1830	75.0000	3137.2500	(28a)
Upgraded Existing Wall	14.7700	11.5500	3.2200	0.1500	0.4830	9.0000	28.9800	(29a)
External Wall 2	44.4300		44.4300	0.1300	5.7759	60.0000	2665.8000	(29a)
Upgraded Sloping Roof	16.7600	1.2900	15.4700	0.1100	1.7017	9.0000	139.2300	(30)
Extension Slope Roof	34.3100		34.3100	0.1000	3.4310	9.0000	308.7900	(30)
Total net area of external elements Aum(A, m2)			152.1000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.0002			(33)
Party Wall 1			14.1900	0.0000	0.0000	70.0000	993.3000	(32)
Internal Wall 1			51.6400			75.0000	3873.0000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11146.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		266.4678 (35)
Thermal bridges (Default value 0.200 * total exposed area)		30.4200 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	56.4202 (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	17.4516	16.6918	16.4385	15.4254	14.9189	13.6526	14.1591	13.9058	14.4124	15.1722	15.9320	16.1852	(38)
Heat transfer coeff	73.8718	73.1120	72.8587	71.8456	71.3391	70.0727	70.5793	70.3260	70.8325	71.5924	72.3522	72.6054	(39)
Average = Sum(39)m / 12 =												71.7823	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7660	1.7478	1.7418	1.7176	1.7055	1.6752	1.6873	1.6812	1.6933	1.7115	1.7297	1.7357	(40)
HLP (average)												1.7160	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4558 (42)
Hot water usage for mixer showers	54.7066	53.8844	52.6864	50.3943	48.7027	46.8163	45.7440	46.9330	48.2363	50.2617	52.6031	54.4970 (42a)
Hot water usage for baths	21.0349	20.7225	20.2826	19.4714	18.8641	18.1906	17.8268	18.2637	18.7393	19.4599	20.2878	20.9638 (42b)
Hot water usage for other uses	29.5386	28.4645	27.3904	26.3162	25.2421	24.1680	24.1680	25.2421	26.3162	27.3904	28.4645	29.5386 (42c)
Average daily hot water use (litres/day)												96.7936 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.2801	103.0714	100.3594	96.1819	92.8089	89.1748	87.7388	90.4387	93.2918	97.1120	101.3554	104.9994	(44)
Energy conte	166.7380	146.7724	154.2486	131.6683	124.9386	109.6509	106.1125	111.9821	115.0381	131.7801	144.3994	164.4037	(45)
Energy content (annual)										Total = Sum(45)m =		1607.7325	
Distribution loss (46)m = 0.15 x (45)m	25.0107	22.0159	23.1373	19.7502	18.7408	16.4476	15.9169	16.7973	17.2557	19.7670	21.6599	24.6606	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(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	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(64)
										Total per year (kWh/year) = Sum(64)m =		2207.7325	(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	68.1801	60.3087	64.0274	56.1085	54.2818	48.7877	48.0221	49.9738	50.5789	56.5566	60.3416	67.4039	(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	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.4768	11.9699	9.7346	7.3697	5.5090	4.6509	5.0255	6.5323	8.7676	11.1325	12.9933	13.8513	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	188.3013	190.2553	185.3314	174.8488	161.6165	149.1800	140.8716	138.9177	143.8416	154.3242	167.5565	179.9930	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	(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)	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	(71)
Water heating gains (Table 5)	91.6399	89.7450	86.0583	77.9284	72.9594	67.7607	64.5459	67.1690	70.2485	76.0170	83.8077	90.5967	(72)
Total internal gains	367.7241	366.2764	355.4304	334.4530	314.3909	295.8976	284.7490	286.9250	297.1638	315.7797	338.6635	358.7471	(73)

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains

	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W	
East	5.2500	21.8216	0.6800	0.7500	0.7700	40.4901	(76)
South	4.2000	51.3807	0.6800	0.7500	0.7700	76.2698	(78)
North	1.2900	17.3429	0.6800	0.7000	1.0000	9.5843	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	126.3442	210.2433	300.9864	408.3490	475.0297	493.5438	468.0919	412.6716	347.2708	244.9928	153.3964	109.9458	(83)
Total gains	494.0683	576.5197	656.4167	742.8020	789.4207	789.4414	752.8410	699.5966	644.4347	560.7724	492.0599	468.6929	(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	41.9133	42.3489	42.4961	43.0953	43.4013	44.1856	43.8685	44.0265	43.7117	43.2478	42.7936	42.6443	
alpha	3.7942	3.8233	3.8331	3.8730	3.8934	3.9457	3.9246	3.9351	3.9141	3.8832	3.8529	3.8430	
util living area	0.9811	0.9656	0.9295	0.8437	0.7014	0.5034	0.3611	0.3954	0.6468	0.8824	0.9664	0.9846	(86)
MIT	19.6824	19.8922	20.2040	20.5526	20.7854	20.8950	20.9157	20.9137	20.8483	20.5404	20.0397	19.6499	(87)
Th 2	19.4939	19.5067	19.5110	19.5283	19.5369	19.5587	19.5500	19.5543	19.5456	19.5326	19.5196	19.5153	(88)
util rest of house	0.9746	0.9541	0.9058	0.7944	0.6173	0.3895	0.2291	0.2559	0.5286	0.8320	0.9530	0.9792	(89)
MIT 2	18.0320	18.3030	18.6874	19.1017	19.3428	19.4477	19.4482	19.4523	19.4085	19.1070	18.5016	18.0069	(90)
Living area fraction									fLA = Living area / (4) =			0.4903	(91)
MIT	18.8412	19.0822	19.4310	19.8131	20.0502	20.1573	20.1677	20.1688	20.1145	19.8098	19.2558	18.8125	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.6912	18.9322	19.2810	19.6631	19.9002	20.0073	20.0177	20.0188	19.9645	19.6598	19.1058	18.6625	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9700	0.9484	0.9014	0.7995	0.6398	0.4262	0.2723	0.3015	0.5651	0.8371	0.9482	0.9751	(94)
Useful gains	479.2485	546.7899	591.7183	593.8758	505.0977	336.4393	205.0049	210.9439	364.1756	469.4427	466.5621	457.0175	(95)
Ext temp.	4.3000	4.9000	6.7000	9.2000	12.1000	15.1000	17.1000	17.0000	14.5000	10.9000	7.1000	4.1000	(96)
Heat loss rate W	1063.1046	1025.9228	916.6370	751.7272	556.4560	343.8707	205.9300	212.3027	387.0625	627.1361	868.6423	1057.3163	(97)
Space heating kWh	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98a)
Space heating requirement - total per year (kWh/year)												2003.4134	
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	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2003.4134	
Space heating per m2										(98c) / (4) =		47.8942	(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 %)	84.0000 (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	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98)
Space heating efficiency (main heating system 1)	84.0000	84.0000	84.0000	84.0000	84.0000	0.0000	0.0000	0.0000	0.0000	84.0000	84.0000	84.0000	(210)
Space heating fuel (main heating system)	517.1297	383.3064	287.7851	135.3012	45.4888	0.0000	0.0000	0.0000	0.0000	139.6713	344.6402	531.6932	(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	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(64)
Efficiency of water heater												75.0000	(216)
(217)m	80.7644	80.3871	79.6136	78.2333	76.4620	75.0000	75.0000	75.0000	75.0000	78.2793	80.1445	80.8439	(217)
Fuel for water heating, kWh/month	206.4497	182.5820	193.7465	168.3020	163.3995	146.2012	141.4833	149.3094	153.3842	168.3460	180.1738	203.3594	(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	64.5854	58.3352	64.5854	62.5020	64.5854	62.5020	64.5854	64.5854	62.5020	64.5854	62.5020	64.5854	(231)
Lighting	11.7961	9.4633	8.5206	6.2426	4.8220	3.9396	4.3987	5.7177	7.4267	9.7442	11.0061	12.1240	(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												2385.0159	(211)
Space heating fuel - main system 2												0.0000	(213)

Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	75.0000	
Water heating fuel used	2056.7370	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.6000, SFP = 0.7360)		
mechanical ventilation fans (SFP = 0.7360)	119.4408	(230a)
central heating pump	41.0000	(230c)
maintaining electric keep-hot facility for gas combi boiler	600.0000	(230f)
Total electricity for the above, kWh/year	760.4408	(231)
Electricity for lighting (calculated in Appendix L)	95.2015	(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	5297.3951	(238)

10a. Fuel costs - using BEDF prices (536)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2385.0159	6.1900	147.6325	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2056.7370	6.1900	127.3120	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	760.4408	25.1600	191.3269	(249)
Energy for lighting	95.2015	25.1600	23.9527	(250)
Additional standing charges			102.0000	(251)
Total energy cost			592.2241	(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	2385.0159	0.2100	500.8533	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2056.7370	0.2100	431.9148	(264)
Space and water heating			932.7681	(265)
Pumps, fans and electric keep-hot	760.4408	0.1387	105.4825	(267)
Energy for lighting	95.2015	0.1443	13.7405	(268)
Total CO2, kg/year			1051.9911	(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	2385.0159	1.1300	2695.0680	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2056.7370	1.1300	2324.1128	(278)
Space and water heating			5019.1807	(279)
Pumps, fans and electric keep-hot	760.4408	1.5128	1150.3948	(281)
Energy for lighting	95.2015	1.5338	146.0233	(282)
Total Primary energy kWh/year			6315.5988	(286)

SAP 10 EPC IMPROVEMENTS

00001

Current energy efficiency rating: C 73
Current environmental impact rating: B 84

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

Recommended measures:	SAP change	Cost change	CO2 change
N Solar water heating	+ 1.0	-£ 33	-168 kg (16.0%)
U Solar photovoltaic panels	+ 11.5	-£ 245	-237 kg (26.8%)

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
Solar water heating	£33	4.03 kg/m²	C 74	B 86
Solar photovoltaic panels	£245	5.67 kg/m²	B 86	B 89
Total Savings	£278	9.69 kg/m²		

Potential energy efficiency rating: B 86
Potential environmental impact rating: B 89

Fuel prices for cost data on this page from database revision number 536 TEST (31 Jan 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, East Pennines):

	Current	Potential	Saving
Electricity	£215	£235	-£20
Mains gas	£377	£324	£53
Space heating	£441	£461	-£20

Water heating	£127	£74	£53
Lighting	£24	£24	£0
Generated (PV)	-£0	-£245	£245
Total cost of fuels	£592	£314	£278
Total cost of uses	£592	£314	£278
Delivered energy	127 kWh/m²	64 kWh/m²	62 kWh/m²
Carbon dioxide emissions	1.1 tonnes	0.6 tonnes	0.4 tonnes
CO2 emissions per m²	25 kg/m²	15 kg/m²	10 kg/m²
Primary energy	151 kWh/m²	93 kWh/m²	58 kWh/m²

SAP 10 WORKSHEET FOR Conversion (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)	
Ground floor	41.8300 (1b)	x	3.1800 (2b)	=	133.0194	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.8300					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	133.0194	(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	0 * 10 =	0.0000 (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) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes
Pressure Test Method		Blower Door
Measured/design AP50		4.9900 (17)
Infiltration rate		0.2495 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.2308 (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	0.2943	0.2885	0.2827	0.2539	0.2481	0.2192	0.2192	0.2135	0.2308	0.2481	0.2596	0.2712	(22b)

Balanced mechanical ventilation with heat recovery

If mechanical ventilation	0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)	0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =	82.8000 (23c)

Effective ac	0.3803	0.3745	0.3687	0.3399	0.3341	0.3052	0.3052	0.2995	0.3168	0.3341	0.3456	0.3572	(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	
Opening Type 1			2.1000	1.0000	2.1000			(26)
Opening Type 2 (Uw = 0.80)			9.4500	0.7752	7.3256			(27)
Opening			1.2900	0.7752	1.0000			(27a)
Heatloss Floor 1			41.8300	0.1000	4.1830	75.0000	3137.2500	(28a)
Upgraded Existing Wall	14.7700	11.5500	3.2200	0.1500	0.4830	9.0000	28.9800	(29a)
External Wall 2	44.4300		44.4300	0.1300	5.7759	60.0000	2665.8000	(29a)
Upgraded Sloping Roof	16.7600	1.2900	15.4700	0.1100	1.7017	9.0000	139.2300	(30)
Extension Slope Roof	34.3100		34.3100	0.1000	3.4310	9.0000	308.7900	(30)
Total net area of external elements Aum(A, m2)			152.1000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.0002			(33)
Party Wall 1			14.1900	0.0000	0.0000	70.0000	993.3000	(32)
Internal Wall 1			51.6400			75.0000	3873.0000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 11146.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	266.4678 (35)
Thermal bridges (Default value 0.200 * total exposed area)	30.4200 (36)
Point Thermal bridges	(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) = 56.4202 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	16.6918	16.4385	16.1852	14.9189	14.6656	13.3993	13.3993	13.1460	13.9058	14.6656	15.1722	15.6787	(38)
Heat transfer coeff	73.1120	72.8587	72.6054	71.3391	71.0858	69.8195	69.8195	69.5662	70.3260	71.0858	71.5924	72.0989	(39)
Average = Sum(39)m / 12 =												71.2758	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

HLP	1.7478	1.7418	1.7357	1.7055	1.6994	1.6691	1.6691	1.6631	1.6812	1.6994	1.7115	1.7236	(40)
HLP (average)												1.7039	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4558	(42)
Hot water usage for mixer showers													
	54.7066	53.8844	52.6864	50.3943	48.7027	46.8163	45.7440	46.9330	48.2363	50.2617	52.6031	54.4970	(42a)
Hot water usage for baths													
	21.0349	20.7225	20.2826	19.4714	18.8641	18.1906	17.8268	18.2637	18.7393	19.4599	20.2878	20.9638	(42b)
Hot water usage for other uses													
	29.5386	28.4645	27.3904	26.3162	25.2421	24.1680	24.1680	25.2421	26.3162	27.3904	28.4645	29.5386	(42c)
Average daily hot water use (litres/day)												96.7936	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	105.2801	103.0714	100.3594	96.1819	92.8089	89.1748	87.7388	90.4387	93.2918	97.1120	101.3554	104.9994	(44)
Energy conte	166.7380	146.7724	154.2486	131.6683	124.9386	109.6509	106.1125	111.9821	115.0381	131.7801	144.3994	164.4037	(45)
Energy content (annual)										Total = Sum(45)m =		1607.7325	
Distribution loss (46)m = 0.15 x (45)m													
	25.0107	22.0159	23.1373	19.7502	18.7408	16.4476	15.9169	16.7973	17.2557	19.7670	21.6599	24.6606	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month													
	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(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)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												1.8000	(H3)
Collector 2nd order heat loss coefficient												0.0000	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												1.0000	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												3.9667	(H11)
Dedicated solar storage volume												75.0000	(H12)
Effective solar volume												75.0000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.3161	(H16)
Heat delivered to hot water												599.6770	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												599.6770	
Solar input	-0.0000	-16.2682	-56.7042	-77.1216	-100.2133	-92.4307	-91.8069	-80.6739	-56.0044	-28.4538	-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													
	217.6969	176.5315	148.5033	103.8618	75.6842	66.5353	65.2645	82.2670	108.3488	154.2852	193.7144	215.3626	(64)
										Total per year (kWh/year) = Sum(64)m =		1608.0556	(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)
Heat gains from water heating, kWh/month													
	68.1801	60.3087	64.0274	56.1085	54.2818	48.7877	48.0221	49.9738	50.5789	56.5566	60.3416	67.4039	(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	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	13.4768	11.9699	9.7346	7.3697	5.5090	4.6509	5.0255	6.5323	8.7676	11.1325	12.9933	13.8513	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	188.3013	190.2553	185.3314	174.8488	161.6165	149.1800	140.8716	138.9177	143.8416	154.3242	167.5565	179.9930	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	(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)													
	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	(71)
Water heating gains (Table 5)													
	91.6399	89.7450	86.0583	77.9284	72.9594	67.7607	64.5459	67.1690	70.2485	76.0170	83.8077	90.5967	(72)
Total internal gains													
	367.7241	366.2764	355.4304	334.4530	314.3909	295.8976	284.7490	286.9250	297.1638	315.7797	338.6635	358.7471	(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	
East	5.2500	19.6403	0.6800	0.7500	0.7700	36.4427	(76)
South	4.2000	46.7521	0.6800	0.7500	0.7700	69.3990	(78)
North	1.2900	15.6897	0.6800	0.7000	1.0000	8.6707	(82)

Solar gains	114.5124	201.2111	291.3406	387.3532	457.5671	464.5844	443.6189	389.7226	324.3864	226.7346	138.2877	97.2646	(83)
Total gains	482.2365	567.4874	646.7710	721.8063	771.9581	760.4820	728.3679	676.6476	621.5502	542.5143	476.9512	456.0117	(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	42.3489	42.4961	42.6443	43.4013	43.5559	44.3459	44.3459	44.5074	44.0265	43.5559	43.2478	42.9439	
alpha	3.8233	3.8331	3.8430	3.8934	3.9037	3.9564	3.9564	3.9672	3.9351	3.9037	3.8832	3.8629	
util living area													
	0.9825	0.9671	0.9345	0.8601	0.7303	0.5557	0.4136	0.4598	0.6891	0.8982	0.9692	0.9856	(86)
MIT	19.6823	19.8851	20.1760	20.5167	20.7585	20.8814	20.9121	20.9073	20.8263	20.5005	20.0333	19.6541	(87)
Th 2	19.5067	19.5110	19.5153	19.5369	19.5413	19.5630	19.5630	19.5674	19.5543	19.5413	19.5326	19.5240	(88)
util rest of house													
	0.9763	0.9560	0.9126	0.8150	0.6515	0.4444	0.2826	0.3231	0.5782	0.8538	0.9568	0.9805	(89)
MIT 2	18.0416	18.2978	18.6572	19.0705	19.3232	19.4444	19.4607	19.4638	19.4017	19.0708	18.5039	18.0189	(90)
Living area fraction										fLA = Living area / (4) =		0.4903	(91)
MIT	18.8460	19.0761	19.4019	19.7796	20.0270	20.1490	20.1723	20.1716	20.1002	19.7718	19.2538	18.8206	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.6960	18.9261	19.2519	19.6296	19.8770	19.9990	20.0223	20.0216	19.9502	19.6218	19.1038	18.6706	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9719	0.9505	0.9078	0.8183	0.6712	0.4796	0.3254	0.3677	0.6112	0.8568	0.9521	0.9766	(94)
Useful gains	468.7055	539.3765	587.1628	590.6608	518.1239	364.7459	236.9859	248.7775	379.8767	464.8103	454.0911	445.3270	(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													
	1052.5232	1021.9213	925.8588	765.4427	581.2659	376.9556	238.9460	251.9403	411.4197	641.3233	859.3805	1043.3175	(97)
Space heating kWh													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98a)
Space heating requirement - total per year (kWh/year)												2051.4799	
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													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2051.4799	
Space heating per m2											(98c) / (4) =	49.0433	(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 %)	84.0000	(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													
	434.3604	324.2701	251.9898	125.8429	46.9776	0.0000	0.0000	0.0000	0.0000	131.3257	291.8084	444.9050	(98)
Space heating efficiency (main heating system 1)													
	84.0000	84.0000	84.0000	84.0000	84.0000	0.0000	0.0000	0.0000	0.0000	84.0000	84.0000	84.0000	(210)
Space heating fuel (main heating system)													
	517.0957	386.0359	299.9879	149.8130	55.9257	0.0000	0.0000	0.0000	0.0000	156.3401	347.3909	529.6488	(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													
	217.6969	176.5315	148.5033	103.8618	75.6842	66.5353	65.2645	82.2670	108.3488	154.2852	193.7144	215.3626	(64)
Efficiency of water heater												75.0000	(216)
(217)m	80.7643	80.5910	80.4216	79.6769	78.2092	75.0000	75.0000	75.0000	75.0000	78.8863	80.1620	80.8360	(217)
Fuel for water heating, kWh/month													
	206.4501	161.9338	121.2914	68.4599	31.6143	22.9603	19.0742	41.7442	78.7116	130.9813	180.1344	203.3793	(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	71.3799	64.4722	71.3799	69.0773	71.3799	69.0773	71.3799	71.3799	69.0773	71.3799	69.0773	71.3799	(231)
Lighting	11.7961	9.4633	8.5206	6.2426	4.8220	3.9396	4.3987	5.7177	7.4267	9.7442	11.0061	12.1240	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-31.5318	-44.3776	-64.0512	-72.7363	-79.6155	-75.4909	-75.2037	-70.7359	-62.4503	-51.7336	-34.9045	-27.3229	(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	-18.5547	-39.2024	-78.2951	-118.0357	-156.0673	-156.2228	-153.4479	-129.0381	-94.0128	-55.1122	-24.5053	-14.5910	(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	2442.2379	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	75.0000	
Water heating fuel used	1266.7347	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
(BalancedWithHeatRecovery, Database: in-use factor = 1.6000, SFP = 0.7360)		
mechanical ventilation fans (SFP = 0.7360)	119.4408	(230a)
central heating pump	41.0000	(230c)
maintaining electric keep-hot facility for gas combi boiler	600.0000	(230f)
pump for solar water heating	80.0000	(230g)
Total electricity for the above, kWh/year	840.4408	(231)
Electricity for lighting (calculated in Appendix L)	95.2015	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-1727.2394	(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 2917.3755 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2442.2379	3.6400	88.8975	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1266.7347	3.6400	46.1091	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	760.4408	16.4900	125.3967	(249)
Pump for solar water heating	80.0000	16.4900	13.1920	(249)
Energy for lighting	95.2015	16.4900	15.6987	(250)
Additional standing charges			92.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-690.1541	16.4900	-113.8064	
PV Unit electricity exported	-1037.0852	5.5900	-57.9731	
Total			-171.7795	(252)
Total energy cost			209.5145	(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] = 0.8687 (257)
SAP value 85.9191
SAP rating (Section 12) 86 (258)
SAP band B

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	2442.2379	0.2100	512.8700	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1266.7347	0.2100	266.0143	(264)
Space and water heating			778.8842	(265)
Pumps, fans and electric keep-hot	840.4408	0.1387	116.5795	(267)
Energy for lighting	95.2015	0.1443	13.7405	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-690.1541	0.1343	-92.6583	
PV Unit electricity exported	-1037.0852	0.1259	-130.6190	
Total			-223.2774	(269)
Total CO2, kg/year			685.9269	(272)
CO2 emissions per m2			16.4000	(273)
EI value			89.4145	
EI rating			89	(274)
EI band			B	

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

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1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	41.8300	(1b)	x 3.1800	(2b) =	133.0194	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.8300					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		133.0194	(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	0 * 10 =	0.0000	(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) =	0.0000 / (5) =	0.0000	(8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		4.9900	(17)
Infiltration rate		0.2495	(18)
Number of sides sheltered		1	(19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.9250 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2308 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.4000	5.1000	5.0000	4.6000	4.4000	3.9000	4.1000	4.0000	4.2000	4.5000	4.8000	4.9000	(22)
Wind factor	1.3500	1.2750	1.2500	1.1500	1.1000	0.9750	1.0250	1.0000	1.0500	1.1250	1.2000	1.2250	(22a)
Adj infilt rate	0.3116	0.2943	0.2885	0.2654	0.2539	0.2250	0.2366	0.2308	0.2423	0.2596	0.2769	0.2827	(22b)

Balanced mechanical ventilation with heat recovery
If mechanical ventilation 0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 82.8000 (23c)

Effective ac	0.3976	0.3803	0.3745	0.3514	0.3399	0.3110	0.3226	0.3168	0.3283	0.3456	0.3629	0.3687	(25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Opening Type 1			2.1000	1.0000	2.1000			(26)
Opening Type 2 (Uw = 0.80)			9.4500	0.7752	7.3256			(27)
Opening			1.2900	0.7752	1.0000			(27a)
Heatloss Floor 1			41.8300	0.1000	4.1830	75.0000	3137.2500	(28a)
Upgraded Existing Wall	14.7700	11.5500	3.2200	0.1500	0.4830	9.0000	28.9800	(29a)
External Wall 2	44.4300		44.4300	0.1300	5.7759	60.0000	2665.8000	(29a)
Upgraded Sloping Roof	16.7600	1.2900	15.4700	0.1100	1.7017	9.0000	139.2300	(30)
Extension Slope Roof	34.3100		34.3100	0.1000	3.4310	9.0000	308.7900	(30)
Total net area of external elements Aum(A, m2)			152.1000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	26.0002			(33)
Party Wall 1			14.1900	0.0000	0.0000	70.0000	993.3000	(32)
Internal Wall 1			51.6400			75.0000	3873.0000	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 11146.3500 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 266.4678 (35)
Thermal bridges (Default value 0.200 * total exposed area) 30.4200 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 56.4202 (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	17.4516	16.6918	16.4385	15.4254	14.9189	13.6526	14.1591	13.9058	14.4124	15.1722	15.9320	16.1852	(38)
Heat transfer coeff	73.8718	73.1120	72.8587	71.8456	71.3391	70.0727	70.5793	70.3260	70.8325	71.5924	72.3522	72.6054	(39)
Average = Sum(39)m / 12 =												71.7823	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.7660	1.7478	1.7418	1.7176	1.7055	1.6752	1.6873	1.6812	1.6933	1.7115	1.7297	1.7357	(40)
HLP (average)												1.7160	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4558 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	54.7066	53.8844	52.6864	50.3943	48.7027	46.8163	45.7440	46.9330	48.2363	50.2617	52.6031	54.4970	(42a)
Hot water usage for baths	21.0349	20.7225	20.2826	19.4714	18.8641	18.1906	17.8268	18.2637	18.7393	19.4599	20.2878	20.9638	(42b)
Hot water usage for other uses	29.5386	28.4645	27.3904	26.3162	25.2421	24.1680	24.1680	25.2421	26.3162	27.3904	28.4645	29.5386	(42c)
Average daily hot water use (litres/day)												96.7936	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	105.2801	103.0714	100.3594	96.1819	92.8089	89.1748	87.7388	90.4387	93.2918	97.1120	101.3554	104.9994	(44)
Energy conte	166.7380	146.7724	154.2486	131.6683	124.9386	109.6509	106.1125	111.9821	115.0381	131.7801	144.3994	164.4037	(45)
Energy content (annual)										Total = Sum(45)m =		1607.7325	
Distribution loss (46)m = 0.15 x (45)m	25.0107	22.0159	23.1373	19.7502	18.7408	16.4476	15.9169	16.7973	17.2557	19.7670	21.6599	24.6606	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	50.9589	46.0274	50.9589	49.3151	50.9589	49.3151	50.9589	50.9589	49.3151	50.9589	49.3151	50.9589	(61)
Total heat required for water heating calculated for each month	217.6969	192.7998	205.2075	180.9833	175.8975	158.9659	157.0714	162.9410	164.3532	182.7390	193.7144	215.3626	(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)

Aperture area of solar collector	3.0000 (H1)
Zero-loss collector efficiency	0.8000 (H2)
Collector linear heat loss coefficient	1.8000 (H3)
Collector 2nd order heat loss coefficient	0.0000 (H4)
Collector loop efficiency	0.9000 (H5)
Incidence angle modifier	1.0000 (H6)
Overshading factor	0.8000 (H8)
Overall heat loss coefficient of system	6.5000 (H10)
Heat loss coefficient of collector loop	3.9667 (H11)
Dedicated solar storage volume	75.0000 (H12)
Effective solar volume	75.0000 (H14)
Reference volume	225.0000 (H15)
Storage tank correction coefficient	1.3161 (H16)
Heat delivered to hot water	649.9136 (H24)
Heat delivered to space heating	0.0000 (H29)
Solar input	649.9136

Solar input	-0.0000	-18.8289	-60.0873	-82.9002	-104.8075	-99.0701	-97.7509	-87.0640	-62.5356	-34.5754	-2.2937	-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	217.6969	173.9709	145.1203	98.0831	71.0900	59.8958	59.3205	75.8769	101.8176	148.1637	191.4207	215.3626	(64)
									Total per year (kWh/year) = Sum(64)m =			1557.8190	(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
68.1801 60.3087 64.0274 56.1085 54.2818 48.7877 48.0221 49.9738 50.5789 56.5566 60.3416 67.4039 (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	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	87.3468	(66)

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

	13.4768	11.9699	9.7346	7.3697	5.5090	4.6509	5.0255	6.5323	8.7676	11.1325	12.9933	13.8513	(67)

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

	188.3013	190.2553	185.3314	174.8488	161.6165	149.1800	140.8716	138.9177	143.8416	154.3242	167.5565	179.9930	(68)

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

	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	45.1905	(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)

	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	-58.2312	(71)

Water heating gains (Table 5)

	91.6399	89.7450	86.0583	77.9284	72.9594	67.7607	64.5459	67.1690	70.2485	76.0170	83.8077	90.5967	(72)

Total internal gains

	367.7241	366.2764	355.4304	334.4530	314.3909	295.8976	284.7490	286.9250	297.1638	315.7797	338.6635	358.7471	(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	
East	5.2500	21.8216	0.6800	0.7500	0.7700	40.4901	(76)
South	4.2000	51.3807	0.6800	0.7500	0.7700	76.2698	(78)
North	1.2900	17.3429	0.6800	0.7000	1.0000	9.5843	(82)

Solar gains	126.3442	210.2433	300.9864	408.3490	475.0297	493.5438	468.0919	412.6716	347.2708	244.9928	153.3964	109.9458	(83)
Total gains	494.0683	576.5197	656.4167	742.8020	789.4207	789.4414	752.8410	699.5966	644.4347	560.7724	492.0599	468.6929	(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	41.9133	42.3489	42.4961	43.0953	43.4013	44.1856	43.8685	44.0265	43.7117	43.2478	42.7936	42.6443	
alpha	3.7942	3.8233	3.8331	3.8730	3.8934	3.9457	3.9246	3.9351	3.9141	3.8832	3.8529	3.8430	
util living area	0.9811	0.9656	0.9295	0.8437	0.7014	0.5034	0.3611	0.3954	0.6468	0.8824	0.9664	0.9846	(86)
MIT	19.6824	19.8922	20.2040	20.5526	20.7854	20.8950	20.9157	20.9137	20.8483	20.5404	20.0397	19.6499	(87)
Th 2	19.4939	19.5067	19.5110	19.5283	19.5369	19.5587	19.5500	19.5543	19.5456	19.5326	19.5196	19.5153	(88)
util rest of house	0.9746	0.9541	0.9058	0.7944	0.6173	0.3895	0.2291	0.2559	0.5286	0.8320	0.9530	0.9792	(89)
MIT 2	18.0320	18.3030	18.6874	19.1017	19.3428	19.4477	19.4482	19.4523	19.4085	19.1070	18.5016	18.0069	(90)
Living area fraction									fLA = Living area / (4) =			0.4903	(91)
MIT	18.8412	19.0822	19.4310	19.8131	20.0502	20.1573	20.1677	20.1688	20.1145	19.8098	19.2558	18.8125	(92)
Temperature adjustment												-0.1500	
adjusted MIT	18.6912	18.9322	19.2810	19.6631	19.9002	20.0073	20.0177	20.0188	19.9645	19.6598	19.1058	18.6625	(93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9700	0.9484	0.9014	0.7995	0.6398	0.4262	0.2723	0.3015	0.5651	0.8371	0.9482	0.9751	(94)
Useful gains	479.2485	546.7899	591.7183	593.8758	505.0977	336.4393	205.0049	210.9439	364.1756	469.4427	466.5621	457.0175	(95)
Ext temp.	4.3000	4.9000	6.7000	9.2000	12.1000	15.1000	17.1000	17.0000	14.5000	10.9000	7.1000	4.1000	(96)
Heat loss rate W	1063.1046	1025.9228	916.6370	751.7272	556.4560	343.8707	205.9300	212.3027	387.0625	627.1361	868.6423	1057.3163	(97)
Space heating kWh	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98a)
Space heating requirement - total per year (kWh/year)												2003.4134	
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	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2003.4134	
Space heating per m2											(98c) / (4) =	47.8942	(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 %)	84.0000	(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	434.3890	321.9773	241.7395	113.6530	38.2106	0.0000	0.0000	0.0000	0.0000	117.3239	289.4978	446.6223	(98)
Space heating efficiency (main heating system 1)	84.0000	84.0000	84.0000	84.0000	0.0000	0.0000	0.0000	0.0000	84.0000	84.0000	84.0000	84.0000	(210)
Space heating fuel (main heating system)	517.1297	383.3064	287.7851	135.3012	45.4888	0.0000	0.0000	0.0000	0.0000	139.6713	344.6402	531.6932	(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												
	217.6969	173.9709	145.1203	98.0831	71.0900	59.8958	59.3205	75.8769	101.8176	148.1637	191.4207	215.3626 (64)
Efficiency of water heater												75.0000 (216)
(217)m	80.7644	80.6069	80.3816	79.5765	77.9185	75.0000	75.0000	75.0000	75.0000	78.7276	80.1707	80.8439 (217)
Fuel for water heating, kWh/month												
	206.4497	158.7252	117.1429	61.2845	25.8361	14.1077	11.1488	33.2241	70.0033	123.4697	177.2538	203.3594 (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	71.3799	64.4722	71.3799	69.0773	71.3799	69.0773	71.3799	71.3799	69.0773	71.3799	69.0773	71.3799 (231)
Lighting	11.7961	9.4633	8.5206	6.2426	4.8220	3.9396	4.3987	5.7177	7.4267	9.7442	11.0061	12.1240 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-34.0526	-45.8019	-65.3794	-74.7247	-80.9462	-77.4200	-76.9360	-72.6521	-64.7760	-54.3817	-37.6998	-30.1175 (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	-21.3880	-41.7973	-82.0211	-126.6107	-163.7841	-168.7120	-164.3361	-139.0328	-103.0362	-61.3975	-28.4128	-17.4146 (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	2385.0159 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	75.0000
Water heating fuel used	1202.0051 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
(BalancedWithHeatRecovery, Database: in-use factor = 1.6000, SFP = 0.7360)	
mechanical ventilation fans (SFP = 0.7360)	119.4408 (230a)
central heating pump	41.0000 (230c)
maintaining electric keep-hot facility for gas combi boiler	600.0000 (230f)
pump for solar water heating	80.0000 (230g)
Total electricity for the above, kWh/year	840.4408 (231)
Electricity for lighting (calculated in Appendix L)	95.2015 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1832.8312 (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	2689.8321 (238)

10a. Fuel costs - using BEDF prices (536)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2385.0159	6.1900	147.6325	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1202.0051	6.1900	74.4041	(247)
Energy for instantaneous electric shower(s)	0.0000	25.1600	0.0000	(247a)
Pumps, fans and electric keep-hot	760.4408	25.1600	191.3269	(249)
Pump for solar water heating	80.0000	25.1600	20.1280	(249)
Energy for lighting	95.2015	25.1600	23.9527	(250)
Additional standing charges			102.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-714.8879	25.1600	-179.8658	
PV Unit electricity exported	-1117.9433	5.8100	-64.9525	
Total			-244.8183	(252)
Total energy cost			314.6259	(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	2385.0159	0.2100	500.8533	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1202.0051	0.2100	252.4211	(264)
Space and water heating			753.2744	(265)
Pumps, fans and electric keep-hot	840.4408	0.1387	116.5795	(267)
Energy for lighting	95.2015	0.1443	13.7405	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-714.8879	0.1345	-96.1202	
PV Unit electricity exported	-1117.9433	0.1261	-140.9585	
Total			-237.0787	(269)
Total CO2, kg/year			646.5157	(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	2385.0159	1.1300	2695.0680	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1202.0051	1.1300	1358.2658	(278)
Space and water heating			4053.3337	(279)
Pumps, fans and electric keep-hot	840.4408	1.5128	1271.4188	(281)
Energy for lighting	95.2015	1.5338	146.0233	(282)

Energy saving/generation technologies			
PV Unit electricity used in dwelling	-714.8879	1.4969	-1070.1201
PV Unit electricity exported	-1117.9433	0.4628	-517.4122
Total			-1587.5323 (283)
Total Primary energy kWh/year			3883.2435 (286)