

Full SAP Calculation Printout



Property Reference	Flat A			Issued on Date	29/05/2025
Assessment Reference	Flat A - FINAL DESIGN CALCS	Prop Type Ref	Flat A		
Property	Swanley Centre, 53-54, Nightingale Way, Swanley, Kent, BR8 7TQ				
SAP Rating	81 B	DER	7.08	TER	
Environmental	96 A	% DER < TER			N/A
CO ₂ Emissions (t/year)	0.23	DFEE	64.22	TFEE	
Compliance Check	N/A	% DFEE < TFEE			
% DPER < TPER		DPER	69.91	TPER	
Assessor Details	Mr. Matthew Denyer			Assessor ID	DC72-0001
Client	Mian Siddique, Mian Siddique				

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.7000 (1b)	2.4000 (2b)	100.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.7000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	100.0800 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.2500	(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) =	0.2125 (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	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.3659	0.3606	0.3553	0.3287	0.3234	0.2969	0.2969	0.2916	0.3075	0.3234	0.3341	0.3447 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.1000	0.7752	6.2791		(27)
Front Door			1.8900	3.0000	5.6700		(26)
External Walls Existing	38.5000	8.1000	30.4000	0.2600	7.9040	9.0000	273.6000 (29a)
External Wall Semi Exposed	20.7500	1.8900	18.8600	0.2000	3.7720	17.0000	320.6200 (29a)
Flat Roof	41.7000		41.7000	0.1600	6.6720	9.0000	375.3000 (30)
Total net area of external elements Aum(A, m ²)			100.9500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.2971		(33)
Main dwelling							
Party Wall 1			19.7500	0.0000	0.0000	180.0000	3555.0000 (32)
Party Floor 1			41.7000			80.0000	3336.0000 (32d)
Internal Wall 1			40.0000			9.0000	360.0000 (32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8220.5200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							197.1348 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.1900 (36)

$$\begin{aligned} (33) + (36) + (36a) &= 50.4871 \quad (37) \end{aligned}$$
[illegible]

4. Water heating energy requirements (kWh/year)

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

6. Solar gains

7. Mean internal temperature (heating season)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	36.4932	36.5958	36.6990	37.2238	37.3306	37.8738	37.8738	37.9843	37.6546	37.3306	37.1177	36.9072
alpha	3.4329	3.4397	3.4466	3.4816	3.4887	3.5249	3.5249	3.5323	3.5103	3.4887	3.4745	3.4605
util living area	0.9789	0.9674	0.9473	0.8965	0.8006	0.6453	0.4979	0.5436	0.7549	0.9134	0.9660	0.9814 (86)
MIT	18.8474	19.1107	19.5122	20.0697	20.5421	20.8515	20.9551	20.9386	20.7277	20.1340	19.4140	18.8151 (87)
Th 2	20.2497	20.2518	20.2539	20.2645	20.2666	20.2771	20.2771	20.2792	20.2729	20.2666	20.2624	20.2581 (88)
util rest of house	0.9760	0.9629	0.9395	0.8807	0.7693	0.5911	0.4250	0.4706	0.7080	0.8970	0.9604	0.9788 (89)
MIT 2	18.4711	18.7038	19.0568	19.5459	19.9414	20.1888	20.2568	20.2500	20.0987	19.6085	18.9799	18.4489 (90)
Living area fraction	18.6327	18.8785	19.2523	19.7708	20.1992	20.4732	20.5565	20.5456	FLA = Living area / (4) =	19.8341	19.1662	0.4293 (91)
MIT	18.6327	18.8785	19.2523	19.7708	20.1992	20.4732	20.5565	20.5456	20.3687	19.8341	19.1662	18.6061 (92)
Temperature adjustment	18.5327	18.7785	19.1523	19.6708	20.0992	20.3732	20.4565	20.4456	20.2687	19.7341	19.0662	-0.1000
adjusted MIT	18.5327	18.7785	19.1523	19.6708	20.0992	20.3732	20.4565	20.4456	20.2687	19.7341	19.0662	18.5061 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9668	0.9512	0.9254	0.8659	0.7614	0.5987	0.4436	0.4881	0.7077	0.8828	0.9488	0.9704 (94)
Useful gains	374.1008	413.3603	432.3176	440.4696	407.1668	315.8187	224.1268	231.4298	314.0389	357.5756	360.2951	361.4714 (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	890.5756	865.9793	787.2470	660.7269	513.7740	348.0786	232.5178	243.2037	374.0889	558.7219	736.1626	885.1292 (97)
Space heating kWh	384.2573	304.1600	264.0675	158.5852	79.3158	0.0000	0.0000	0.0000	0.0000	149.6528	270.6246	389.6014 (98a)
Space heating requirement - total per year (kWh/year)												2000.2645
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	384.2573	304.1600	264.0675	158.5852	79.3158	0.0000	0.0000	0.0000	0.0000	149.6528	270.6246	389.6014 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2000.2645
Space heating per m2										(98c) / (4) =		47.9680 (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 %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	384.2573	304.1600	264.0675	158.5852	79.3158	0.0000	0.0000	0.0000	0.0000	149.6528	270.6246	389.6014 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	384.2573	304.1600	264.0675	158.5852	79.3158	0.0000	0.0000	0.0000	0.0000	149.6528	270.6246	389.6014 (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	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693 (219)

Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.2040	11.9262	13.2040	12.7781	13.2040	12.7781	13.2040	13.2040	12.7781	13.2040	12.7781	13.2040 (231)
Lighting	14.7758	11.8537	10.6730	7.8195	6.0400	4.9347	5.5099	7.1619	9.3026	12.2056	13.7862	15.1865 (232)

Electricity generated by PVs (Appendix M) (negative quantity)	-66.9086	-95.6538	-131.0284	-126.8533	-110.1847	-69.5899	-69.0424	-68.8117	-67.0343	-97.4879	-72.8158	-57.5046 (233a)
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Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
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Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
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Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
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Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
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Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
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Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
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Annual totals kWh/year												
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Space heating fuel - main system 1												2000.2645 (211)
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Space heating fuel - main system 2												0.0000 (213)
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Space heating fuel - secondary												0.0000 (215)
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Efficiency of water heater												100.0000
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Water heating fuel used												580.4911 (219)
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Space cooling fuel												0.0000 (221)
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Electricity for pumps and fans:												
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(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9375)												
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mechanical ventilation fans (SFP = 0.9375)												114.4665 (230a)
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central heating pump												41.0000 (230c)
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Total electricity for the above, kWh/year												155.4665 (231)
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Electricity for lighting (calculated in Appendix L)												119.2493 (232)
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Energy saving/generation technologies (Appendices M ,N and Q)												
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PV generation												-1032.9154 (233)
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Wind generation												0.0000 (234)
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Hydro-electric generation (Appendix N)												0.0000 (235a)
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Electricity generated - Micro CHP (Appendix N)												0.0000 (235)
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Appendix Q - special features												
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Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1822.5560 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2000.2645	0.1548	309.5713	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	580.4911	0.1572	91.2358	(264)
Space and water heating			400.8071	(265)
Pumps, fans and electric keep-hot	155.4665	0.1387	21.5651	(267)
Energy for lighting	119.2493	0.1443	17.2114	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1032.9154	0.1399	-144.4688	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-144.4688	(269)
Total CO2, kg/year			295.1148	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			7.0800	(273)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2000.2645	1.5730	3146.3743	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	580.4911	1.5817	918.1513	(278)
Space and water heating			4064.5256	(279)
Pumps, fans and electric keep-hot	155.4665	1.5128	235.1897	(281)
Energy for lighting	119.2493	1.5338	182.9086	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-1032.9154	1.5173	-1567.2455	
PV Unit electricity exported	0.0000	0.0000	0.0000	
Total			-1567.2455	(283)
Total Primary energy kWh/year			2915.3784	(286)
Dwelling Primary energy Rate (DPER)			69.9100	(287)

SAP 10 WORKSHEET FOR Conversion (As Designed) (Version 10.2, February 2022) CALCULATION OF FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	41.7000	2.4000	100.0800	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.7000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	100.0800	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	2 * 10 =	20.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	20.0000 / (5) =	0.1998 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.4498	(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) =	0.3824	(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	0.4875	0.4780	0.4684	0.4206	0.4110	0.3632	0.3632	0.3537	0.3824	0.4110	0.4302	0.4493	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.6188	0.6142	0.6097	0.5885	0.5845	0.5660	0.5660	0.5625	0.5731	0.5845	0.5925	0.6009	(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	
Main dwelling								
Upgraded Windows			8.1000	0.7752	6.2791			(27)
Front Door			1.8900	3.0000	5.6700			(26)
External Walls Existing	38.5000	8.1000	30.4000	0.2600	7.9040	9.0000	273.6000	(29a)
External Wall Semi Exposed	20.7500	1.8900	18.8600	0.2000	3.7720	17.0000	320.6200	(29a)
Flat Roof	41.7000		41.7000	0.1600	6.6720	9.0000	375.3000	(30)
Total net area of external elements Aum(A, m2)			100.9500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	30.2971			(33)
Main dwelling								
Party Wall 1			19.7500	0.0000	0.0000	180.0000	3555.0000	(32)
Party Floor 1			41.7000			80.0000	3336.0000	(32d)
Internal Wall 1			40.0000			9.0000	360.0000	(32c)

Heat capacity Cm = Sum(A x k)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
 Thermal bridges (Default value 0.200 * total exposed area)
 Point Thermal bridges
 Total fabric heat loss

													(28)...(30) + (32) + (32a)...(32e) =	8220.5200 (34)
														197.1348 (35)
														20.1900 (36)
													(36a) =	0.0000
													(33) + (36) + (36a) =	50.4871 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)														
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Heat transfer coeff	20.4379	20.2855	20.1361	19.4345	19.3032	18.6921	18.6921	18.5789	18.9275	19.3032	19.5688	19.8464	(38)	
Average = Sum(39)m / 12 =	70.9250	70.7726	70.6232	69.9215	69.7903	69.1791	69.1791	69.0660	69.4145	69.7903	70.0558	70.3335	(39)	69.9209
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	1.7008	1.6972	1.6936	1.6768	1.6736	1.6590	1.6590	1.6563	1.6646	1.6736	1.6800	1.6867	(40)	1.6768
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31		

4. Water heating energy requirements (kWh/year)

Assumed occupancy														1.4522 (42)
Hot water usage for mixer showers														
Hot water usage for baths	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)	
Hot water usage for other uses	21.0092	20.6972	20.2578	19.4477	18.8410	18.1684	17.8050	18.2414	18.7164	19.4362	20.2630	20.9382	(42b)	
Average daily hot water use (litres/day)	29.5022	28.4294	27.3565	26.2837	25.2109	24.1381	24.1381	25.2109	26.2837	27.3565	28.4294	29.5022	(42c)	
													(43)	46.2990
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Energy conte	50.5114	49.1265	47.6143	45.7314	44.0520	42.3065	41.9432	43.4523	45.0002	46.7927	48.6924	50.4403	(44)	
Energy content (annual)	79.9976	69.9555	73.1815	62.6040	59.3024	52.0208	50.7266	53.8030	55.4897	63.4973	69.3712	78.9774	(45)	
Distribution loss (46)m = 0.15 x (45)m														768.9271
Distribution 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	(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														
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	(57)	
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	(59)	
Total heat required for water heating calculated for each month	67.9980	59.4622	62.2043	53.2134	50.4071	44.2177	43.1176	45.7326	47.1662	53.9727	58.9655	67.1308	(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	67.9980	59.4622	62.2043	53.2134	50.4071	44.2177	43.1176	45.7326	47.1662	53.9727	58.9655	67.1308	(64)	
12Total per year (kWh/year)														654 (64)
Electric shower(s)	38.8951	34.6559	37.8429	36.1130	36.7907	35.0947	36.2645	36.7907	36.1130	37.8429	37.1313	38.8951	(64a)	
Heat gains from water heating, kWh/month	26.7233	23.5295	25.0118	22.3316	21.7994	19.8281	19.8455	20.6308	20.8198	22.9539	24.0242	26.5065	(65)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =														442.4299 (64a)

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

Metabolic gains (Table 5), Watts														
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	72.6109	(66)	
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	65.4608	72.4744	65.4608	67.6428	65.4608	67.6428	65.4608	65.4608	67.6428	65.4608	67.6428	65.4608	(67)	
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	125.8315	127.1372	123.8468	116.8419	107.9995	99.6888	94.1368	92.8311	96.1215	103.1264	111.9688	120.2795	(68)	
Pumps, fans	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	30.2611	(69)	
Losses e.g. evaporation (negative values) (Table 5)	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)	
Water heating gains (Table 5)	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	(71)	
Total internal gains	35.9184	35.0142	33.6180	31.0161	29.3003	27.5390	26.6741	27.7296	28.9164	30.8520	33.3670	35.6270	(72)	
	271.9939	279.4091	267.7088	260.2841	247.5438	239.6539	231.0550	230.8047	237.4640	244.2225	257.7618	266.1505	(73)	

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
Southwest	3.7800	36.7938	0.5700	0.7000	0.7700	38.4568 (79)

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Northwest	4.3200		11.2829		0.5700		0.7000		0.7700		13.4776 (81)	
Solar gains	51.9344	92.9402	139.0557	192.2278	233.5033	239.8168	227.8789	195.8622	157.2766	105.9248	63.0207	43.9175 (83)
Total gains	323.9283	372.3492	406.7646	452.5119	481.0471	479.4708	458.9339	426.6669	394.7405	350.1472	320.7825	310.0680 (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	32.1957	32.2650	32.3333	32.6577	32.7191	33.0082	33.0082	33.0623	32.8962	32.7191	32.5951	32.4664
alpha	3.1464	3.1510	3.1556	3.1772	3.1813	3.2005	3.2005	3.2042	3.1931	3.1813	3.1730	3.1644
util living area	0.9877	0.9800	0.9666	0.9313	0.8602	0.7307	0.5902	0.6406	0.8293	0.9465	0.9800	0.9893 (86)
MIT	18.6184	18.8647	19.2596	19.8247	20.3485	20.7434	20.9069	20.8766	20.5794	19.9077	19.1761	18.5832 (87)
Th 2	19.5402	19.5429	19.5454	19.5575	19.5598	19.5704	19.5704	19.5723	19.5663	19.5598	19.5552	19.5504 (88)
util rest of house	0.9841	0.9742	0.9562	0.9080	0.8082	0.6241	0.4282	0.4821	0.7462	0.9237	0.9732	0.9862 (89)
MIT 2	17.4407	17.6859	18.0768	18.6323	19.1173	19.4465	19.5454	19.5351	19.3308	18.7237	18.0051	17.4126 (90)
Living area fraction	17.9462	18.1920	18.5845	19.1441	19.6458	20.0032	20.1299	20.1109	19.8668	19.2320	18.5078	17.9151 (92)
Temperature adjustment	17.9462	18.1920	18.5845	19.1441	19.6458	20.0032	20.1299	20.1109	19.8668	19.2320	18.5078	0.0000
adjusted MIT	17.9462	18.1920	18.5845	19.1441	19.6458	20.0032	20.1299	20.1109	19.8668	19.2320	18.5078	17.9151 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9785	0.9667	0.9471	0.8997	0.8119	0.6602	0.4965	0.5476	0.7668	0.9169	0.9662	0.9811 (94)
Useful gains	316.9705	359.9556	385.2345	407.1140	390.5465	316.5397	227.8734	233.6515	302.6906	321.0424	309.9382	304.2181 (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	967.8594	940.7058	853.4482	716.2850	554.5418	373.7908	244.1928	256.3003	400.2994	602.4281	799.1807	964.6325 (97)
Space heating kWh	484.2613	390.2641	348.3510	222.6031	122.0125	0.0000	0.0000	0.0000	0.0000	209.3510	352.2546	491.3483 (98a)
Space heating requirement - total per year (kWh/year)												2620.4458
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	484.2613	390.2641	348.3510	222.6031	122.0125	0.0000	0.0000	0.0000	0.0000	209.3510	352.2546	491.3483 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2620.4458
Space heating per m2												62.8404 (99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	650.2840	511.9257	524.9014	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.6843	0.7634	0.7249	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	445.0180	390.8145	380.4919	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	536.5712	513.9275	477.4676	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	65.9183	91.5961	72.1499	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction									fc = cooled area / (4) =			1.0000 (105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	16.4796	22.8990	18.0375	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												57.4161 (107)
Energy for space heating												62.8404 (99)
Energy for space cooling												1.3769 (108)
Total												64.2173 (109)
Fabric Energy Efficiency (DFEE)												64.2 (109)

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

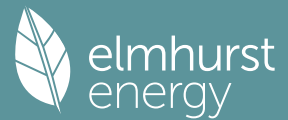
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.7000 (1b)	x 2.4000 (2b)	= 100.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	100.0800 (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)

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Number of flues attached to solid fuel boiler
Number of flues attached to other heater
Number of blocked chimneys
Number of intermittent extract fans
Number of passive vents
Number of flueless gas fires

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
0 * 10 = 0.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Blower Door
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.2125 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
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
Adj infilt rate	0.2709	0.2656	0.2603	0.2338	0.2284	0.2019	0.2019	0.1966	0.2125	0.2284	0.2391	0.2497

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

Effective ac	0.3659	0.3606	0.3553	0.3287	0.3234	0.2969	0.2969	0.2916	0.3075	0.3234	0.3341	0.3447
--------------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------	--------

(22)
(22a)
(22b)
(23a)
(23b)
(23c)
(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
Upgraded Windows
Front Door
External Walls Existing
External Wall Semi Exposed
Flat Roof
Total net area of external elements Aum(A, m2)
Fabric heat loss, W/K = Sum (A x U)
Main dwelling
Party Wall 1
Party Floor 1
Internal Wall 1

Heat capacity Cm = Sum(A x k)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
Thermal bridges (Default value 0.200 * total exposed area)
Point Thermal bridges
Total fabric heat loss

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

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	12.0856	11.9101	11.7347	10.8574	10.6820	9.8047	9.8047	9.6293	10.1556	10.6820	11.0329	11.3838
Heat transfer coeff	62.5727	62.3972	62.2218	61.3445	61.1690	60.2918	60.2918	60.1163	60.6427	61.1690	61.5200	61.8709
Average = Sum(39)m / 12 =												61.3006

HLP
HLP (average)
Days in mont

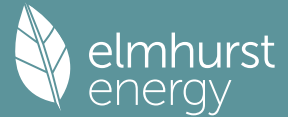
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.5005	1.4963	1.4921	1.4711	1.4669	1.4458	1.4458	1.4416	1.4543	1.4669	1.4753	1.4837
	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy
Hot water usage for mixer showers
Hot water usage for baths
Hot water usage for other uses
Average daily hot water use (litres/day)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	89.9215	87.9180	85.5576	82.1583	79.3293	76.3153	75.2973	77.6491	80.1094	83.2554	86.7014	89.7225
Energy conte	142.4137	125.1940	131.4988	112.4706	106.7925	93.8386	91.0655	96.1458	98.7829	112.9768	123.5221	140.4837
Energy content (annual)												
Distribution loss (46)m = 0.15 x (45)m	21.3621	18.7791	19.7248	16.8706	16.0189	14.0758	13.6598	14.4219	14.8174	16.9465	18.5283	21.0726
Water storage loss:												
Store volume												100.0000
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152
Volume factor from Table 2a												1.0627
Temperature factor from Table 2b												0.6000
Enter (49) or (54) in (55)												0.9682
Total storage loss	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142
If cylinder contains dedicated solar storage	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142
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
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
Total heat required for water heating calculated for each month	172.4279	152.3036	161.5130	141.5166	136.8067	122.8846	121.0797	126.1600	127.8289	142.9910	152.5681	170.4979
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
PV diverter	-28.6858	-62.4902	-129.7446	-202.3577	-271.1888	-273.7772	-269.3569	-223.8529	-159.3735	-90.1112	-38.4500	-22.3286
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
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
Output from w/h	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693

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Total per year (kWh/year) = Sum(64)m =											580.4911 (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 (64a)	
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											0.0000 (64a)	
Heat gains from water heating, kWh/month	71.3639	63.3147	67.7347	60.6333	59.5199	54.4381	54.2907	55.9798	56.0821	61.5762	64.3079	70.7222 (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	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8810	14.9935	12.1936	9.2313	6.9005	5.8257	6.2949	8.1823	10.9823	13.9445	16.2753	17.3502 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.8082	189.7570	184.8460	174.3909	161.1932	148.7893	140.5027	138.5538	143.4649	153.9200	167.1176	179.5216 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887 (71)
Water heating gains (Table 5)	95.9192	94.2183	91.0413	84.2129	79.9998	75.6085	72.9713	75.2417	77.8918	82.7637	89.3165	95.0567 (72)
Total internal gains	377.8183	376.1787	365.2907	345.0450	325.3034	304.4334	293.9788	296.1877	306.5489	327.8381	349.9194	369.1383 (73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Southwest	3.7800		36.7938		0.5700		0.7000		0.7700		38.4568 (79)	
Northwest	4.3200		11.2829		0.5700		0.7000		0.7700		13.4776 (81)	
Solar gains	51.9344	92.9402	139.0557	192.2278	233.5033	239.8168	227.8789	195.8622	157.2766	105.9248	63.0207	43.9175 (83)
Total gains	429.7526	469.1189	504.3464	537.2728	558.8068	544.2502	521.8577	492.0499	463.8255	433.7628	412.9400	413.0558 (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	36.4932	36.5958	36.6990	37.2238	37.3306	37.8738	37.8738	37.9843	37.6546	37.3306	37.1177	36.9072
alpha	3.4329	3.4397	3.4466	3.4816	3.4887	3.5249	3.5249	3.5323	3.5103	3.4887	3.4745	3.4605
util living area	0.9716	0.9598	0.9357	0.8828	0.7841	0.6312	0.4842	0.5273	0.7366	0.8981	0.9571	0.9749 (86)
MIT	18.9726	19.2073	19.6073	20.1290	20.5747	20.8617	20.9588	20.9442	20.7496	20.1977	19.5063	18.9354 (87)
Th 2	20.2497	20.2518	20.2539	20.2645	20.2666	20.2771	20.2771	20.2792	20.2729	20.2666	20.2624	20.2581 (88)
util rest of house	0.9677	0.9543	0.9266	0.8656	0.7516	0.5770	0.4126	0.4555	0.6887	0.8796	0.9503	0.9714 (89)
MIT 2	18.5807	18.7878	19.1384	19.5951	19.9663	20.1952	20.2586	20.2528	20.1139	19.6611	19.0598	18.5543 (90)
Living area fraction	18.7490	18.9679	19.3397	19.8243	20.2275	20.4813	20.5592	20.5496	20.3868	19.8915	19.2515	18.7179 (92)
MIT	18.7490	18.9679	19.3397	19.8243	20.2275	20.4813	20.5592	20.5496	20.3868	19.8915	19.2515	18.7179 (92)
Temperature adjustment	18.6490	18.8679	19.2397	19.7243	20.1275	20.3813	20.4592	20.4496	20.2868	19.7915	19.1515	-0.1000
adjusted MIT	18.6490	18.8679	19.2397	19.7243	20.1275	20.3813	20.4592	20.4496	20.2868	19.7915	19.1515	18.6179 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9568	0.9414	0.9116	0.8510	0.7449	0.5852	0.4312	0.4730	0.6897	0.8656	0.9375	0.9614 (94)	
Useful gains	411.1844	441.6370	459.7651	457.2385	416.2472	318.5056	224.9995	232.7633	319.8804	375.4777	387.1127	397.0944 (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	897.8526	871.5557	792.6850	664.0086	515.5014	348.5648	232.6769	243.4461	375.1831	562.2324	741.4061	892.0480 (97)	
Space heating kWh	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (98a)	
Space heating requirement - total per year (kWh/year)												1883.6809	
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	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												1883.6809	
Space heating per m2											(98c) / (4) =		45.1722 (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 %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (98)
Space heating efficiency (main heating system 1)												
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)												
	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (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)

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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	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693 (217)
Space cooling fuel requirement												
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.2040	11.9262	13.2040	12.7781	13.2040	12.7781	13.2040	13.2040	12.7781	13.2040	12.7781	13.2040 (231)
Lighting	14.7758	11.8537	10.6730	7.8195	6.0400	4.9347	5.5099	7.1619	9.3026	12.2056	13.7862	15.1865 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-66.5043	-94.9039	-129.1244	-124.5392	-108.1572	-69.5899	-69.0424	-68.8117	-67.0343	-96.2856	-72.3145	-57.2031 (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												1883.6809 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												580.4911 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9375)												
mechanical ventilation fans (SFP = 0.9375)												114.4665 (230a)
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												155.4665 (231)
Electricity for lighting (calculated in Appendix L)												119.2493 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1023.5107 (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												1715.3771 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1883.6809	16.4900	310.6190 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	580.4911	16.4900	95.7230 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	155.4665	16.4900	25.6364 (249)
Energy for lighting	119.2493	16.4900	19.6642 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1023.5107	16.4900	-168.7769
PV Unit electricity exported	0.0000	5.5900	0.0000
Total			-168.7769 (252)
Total energy cost			282.8657 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	1.1745 (257)
SAP value	80.9609
SAP rating (Section 12)	81 (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	1883.6809	0.1548	291.6170 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	580.4911	0.1572	91.2358 (264)
Space and water heating			382.8528 (265)
Pumps, fans and electric keep-hot	155.4665	0.1387	21.5651 (267)
Energy for lighting	119.2493	0.1443	17.2114 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1023.5107	0.1398	-143.1048
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-143.1048 (269)
Total CO2, kg/year			278.5245 (272)
CO2 emissions per m2			6.6800 (273)
EI value			95.6952
EI rating			96 (274)

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EI band A

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 (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	41.7000 (1b)	x 2.4000 (2b)	= 100.0800 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.7000		(4)
Dwelling volume		(3a) + (3b) + (3c) + (3d) + (3e) ... (3n) =	100.0800 (5)

2. Ventilation rate

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

Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.2500	(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) =		0.2125 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.2000	4.1000	3.5000	3.5000	3.2000	3.3000	3.1000	3.3000	3.5000	3.5000	3.9000 (22)
Wind factor	1.1000	1.0500	1.0250	0.8750	0.8750	0.8000	0.8250	0.7750	0.8250	0.8750	0.8750	0.9750 (22a)
Adj infilt rate	0.2338	0.2231	0.2178	0.1859	0.1859	0.1700	0.1753	0.1647	0.1753	0.1859	0.1859	0.2072 (22b)
Balanced mechanical ventilation with heat recovery												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.3287	0.3181	0.3128	0.2809	0.2809	0.2650	0.2703	0.2597	0.2703	0.2809	0.2809	0.3022 (25)

3. Heat losses and heat loss parameter

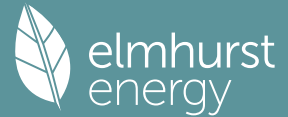
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Upgraded Windows			8.1000	0.7752	6.2791		(27)
Front Door			1.8900	3.0000	5.6700		(26)
External Walls Existing	38.5000	8.1000	30.4000	0.2600	7.9040	9.0000	273.6000 (29a)
External Wall Semi Exposed	20.7500	1.8900	18.8600	0.2000	3.7720	17.0000	320.6200 (29a)
Flat Roof	41.7000		41.7000	0.1600	6.6720	9.0000	375.3000 (30)
Total net area of external elements Aum(A, m ²)			100.9500				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.2971		(33)
Main dwelling							
Party Wall 1			19.7500	0.0000	0.0000	180.0000	3555.0000 (32)
Party Floor 1			41.7000			80.0000	3336.0000 (32d)
Internal Wall 1			40.0000			9.0000	360.0000 (32c)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	8220.5200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							197.1348 (35)
Thermal bridges (Default value 0.200 * total exposed area)							20.1900 (36)
Point Thermal bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	50.4871 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	10.8574	10.5065	10.3311	9.2784	9.2784	8.7520	8.9274	8.5765	8.9274	9.2784	9.2784	9.9802 (38)
Average = Sum(39)m / 12 =	61.3445	60.9936	60.8181	59.7654	59.7654	59.2391	59.4145	59.0636	59.4145	59.7654	59.7654	60.4672 (39)
												59.9847
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4711	1.4627	1.4585	1.4332	1.4332	1.4206	1.4248	1.4164	1.4248	1.4332	1.4332	1.4501 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.4522 (42)
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Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	58.8666	57.9923	56.7612	54.4912	52.7915	50.9068	49.8887	51.1112	52.4423	54.4591	56.7758	58.6676 (42b)
Hot water usage for other uses	31.0549	29.9256	28.7964	27.6671	26.5378	25.4086	25.4086	26.5378	27.6671	28.7964	29.9256	31.0549 (42c)
Average daily hot water use (litres/day)												82.8103 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content (annual)	89.9215	87.9180	85.5576	82.1583	79.3293	76.3153	75.2973	77.6491	80.1094	83.2554	86.7014	89.7225 (44)
Distribution loss (46)m = 0.15 x (45)m	142.4137	125.1940	131.4988	112.4706	106.7925	93.8386	91.0655	96.1458	98.7829	112.9768	123.5221	140.4837 (45)
Water storage loss:	21.3621	18.7791	19.7248	16.8706	16.0189	14.0758	13.6598	14.4219	14.8174	16.9465	18.5283	21.0726 (46)
Store volume												100.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0627 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												0.9682 (55)
Total storage loss	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142 (56)
If cylinder contains dedicated solar storage	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142 (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	172.4279	152.3036	161.5130	141.5166	136.8067	122.8846	121.0797	126.1600	127.8289	142.9910	152.5681	170.4979 (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	-33.7971	-62.1339	-130.0677	-215.7180	-278.1708	-304.4745	-299.4843	-252.2874	-180.5101	-101.8686	-46.7315	-25.9716 (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	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263 (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	71.3639	63.3147	67.7347	60.6333	59.5199	54.4381	54.2907	55.9798	56.0821	61.5762	64.3079	70.7222 (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	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8810	14.9935	12.1936	9.2313	6.9005	5.8257	6.2949	8.1823	10.9823	13.9445	16.2753	17.3502 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.8082	189.7570	184.8460	174.3909	161.1932	148.7893	140.5027	138.5538	143.4649	153.9200	167.1176	179.5216 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887 (71)
Water heating gains (Table 5)	95.9192	94.2183	91.0413	84.2129	79.9998	75.6085	72.9713	75.2417	77.8918	82.7637	89.3165	95.0567 (72)
Total internal gains	377.8183	376.1787	365.2907	345.0450	325.3034	304.4334	293.9788	296.1877	306.5489	327.8381	349.9194	369.1383 (73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W		
Southwest					3.7800	40.2665	0.5700	0.7000	0.7700	42.0864 (79)		
Northwest					4.3200	12.9148	0.5700	0.7000	0.7700	15.4268 (81)		
Solar gains	57.5132	91.2640	138.1749	201.9255	238.9628	262.5163	249.2806	215.7699	172.5455	114.8685	71.5595	48.1294 (83)
Total gains	435.3315	467.4428	503.4656	546.9705	564.2662	566.9497	543.2594	511.9577	479.0944	442.7066	421.4789	417.2678 (84)

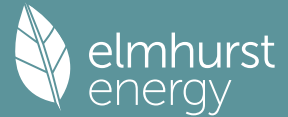
7. Mean internal temperature (heating season)

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	37.2238	37.4380	37.5460	38.2073	38.2073	38.5468	38.4330	38.6613	38.4330	38.2073	38.2073	37.7639
alpha	3.4816	3.4959	3.5031	3.5472	3.5472	3.5698	3.5622	3.5774	3.5622	3.5472	3.5472	3.5176
util living area	0.9663	0.9558	0.9258	0.8568	0.7324	0.5379	0.3445	0.3838	0.6691	0.8685	0.9454	0.9698 (86)
MIT	19.1768	19.3565	19.7837	20.3032	20.7093	20.9316	20.9903	20.9857	20.8432	20.3800	19.7405	19.1626 (87)
Th 2	20.2645	20.2687	20.2708	20.2834	20.2834	20.2897	20.2876	20.2918	20.2876	20.2834	20.2834	20.2750 (88)
util rest of house	0.9616	0.9497	0.9151	0.8361	0.6938	0.4784	0.2701	0.3073	0.6138	0.8449	0.9367	0.9655 (89)
MIT 2	18.7711	18.9311	19.3044	19.7568	20.0866	20.2533	20.2846	20.2869	20.1945	19.8274	19.2797	18.7666 (90)
Living area fraction	18.9453	19.1137	19.5101	19.9913	20.3539	20.5444	20.5875	20.5869	20.4730	20.0646	19.4775	0.4293 (91)
MIT	18.9453	19.1137	19.5101	19.9913	20.3539	20.5444	20.5875	20.5869	20.4730	20.0646	19.4775	18.9366 (92)
Temperature adjustment	18.8453	19.0137	19.4101	19.8913	20.2539	20.4444	20.4875	20.4869	20.3730	19.9646	19.3775	-0.1000
adjusted MIT	18.8453	19.0137	19.4101	19.8913	20.2539	20.4444	20.4875	20.4869	20.3730	19.9646	19.3775	18.8366 (93)

8. Space heating requirement

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

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Utilisation	0.9499	0.9366	0.9001	0.8234	0.6921	0.4918	0.2913	0.3287	0.6208	0.8329	0.9231	0.9547 (94)
Useful gains	413.5305	437.7916	453.1749	450.3749	390.5478	278.8136	158.2325	168.2674	297.4427	368.7302	389.0610	398.3503 (95)
Ext temp.	5.0000	5.4000	7.2000	9.6000	12.6000	15.5000	17.8000	17.6000	14.8000	11.4000	7.9000	5.0000 (96)
Heat loss rate W	849.3307	830.3474	742.5979	615.0652	457.4388	292.9028	159.6761	170.5088	331.1146	511.8675	685.9577	836.6593 (97)
Space heating kWh	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019 (98a)
Space heating requirement - total per year (kWh/year)												1618.0692
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	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1618.0692
Space heating per m2												38.8026 (99)
										(98c) / (4) =		

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 %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019 (98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019 (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	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263 (64)
Efficiency of water heater (217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (216)
Fuel for water heating, kWh/month	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263 (219)
Space cooling fuel requirement (221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	13.2040	11.9262	13.2040	12.7781	13.2040	12.7781	13.2040	13.2040	12.7781	13.2040	12.7781	13.2040 (231)
Lighting	14.7758	11.8537	10.6730	7.8195	6.0400	4.9347	5.5099	7.1619	9.3026	12.2056	13.7862	15.1865 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-72.1520	-93.3497	-125.2257	-119.0108	-99.1253	-69.4061	-68.8840	-69.1123	-68.1680	-95.6122	-78.4190	-61.7280 (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												1618.0692 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												100.0000
Water heating fuel used												551.7311 (219)
Space cooling fuel												0.0000 (221)
Electricity for pumps and fans:												
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9375)												
mechanical ventilation fans (SFP = 0.9375)												114.4665 (230a)
central heating pump												41.0000 (230c)
Total electricity for the above, kWh/year												155.4665 (231)
Electricity for lighting (calculated in Appendix L)												119.2493 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1020.1930 (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												1424.3232 (238)

10a. Fuel costs - using BEDF prices (571)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1618.0692	26.0600	421.6688 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	551.7311	26.0600	143.7811 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	155.4665	26.0600	40.5146 (249)
Energy for lighting	119.2493	26.0600	31.0764 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	26.0600	-265.8623
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-265.8623 (252)

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Total energy cost

371.1786 (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	1618.0692	0.1554	251.4457 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	551.7311	0.1576	86.9669 (264)
Space and water heating			338.4126 (265)
Pumps, fans and electric keep-hot	155.4665	0.1387	21.5651 (267)
Energy for lighting	119.2493	0.1443	17.2114 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	0.1401	-142.8974
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-142.8974 (269)
Total CO2, kg/year			234.2916 (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	1618.0692	1.5753	2549.0008 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	551.7311	1.5834	873.5948 (278)
Space and water heating			3422.5956 (279)
Pumps, fans and electric keep-hot	155.4665	1.5128	235.1897 (281)
Energy for lighting	119.2493	1.5338	182.9086 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	1.5180	-1548.6941
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1548.6941 (283)
Total Primary energy kWh/year			2291.9998 (286)

SAP 10 EPC IMPROVEMENTS

Flat A - FINAL DESIGN CALCS

Current energy efficiency rating: B 81
Current environmental impact rating: A 96

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

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

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

Potential energy efficiency rating: B 81
Potential environmental impact rating: A 96

Fuel prices for cost data on this page from database revision number 571 TEST (07 May 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current £637	Potential £637	Saving £0
Electricity			
Space heating	£462	£462	£0
Water heating	£144	£144	£0
Lighting	£31	£31	£0
Generated (PV)	-£266	-£266	£0
Total cost of fuels	£371	£371	£0
Total cost of uses	£371	£371	£0
Delivered energy	34 kWh/m²	34 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO2 emissions per m²	6 kg/m²	6 kg/m²	0 kg/m²
Primary energy	55 kWh/m²	55 kWh/m²	0 kWh/m²

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

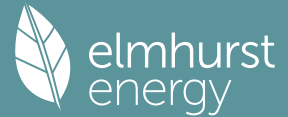
1. Overall dwelling characteristics

Area

Storey height

Volume

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Main dwelling
Ground floor
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 41.7000
Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 100.0800

2. Ventilation rate

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 0.0000 / (5) = 0.0000 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.2500 (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) = 0.2125 (21)

Wind speed Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Wind factor 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)
Adj infilt rate 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)
Balanced mechanical ventilation with heat recovery 0.2709 0.2656 0.2603 0.2338 0.2284 0.2019 0.2019 0.1966 0.2125 0.2284 0.2391 0.2497 (22b)
If mechanical ventilation 0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a) 0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) = 81.0000 (23c)
Effective ac 0.3659 0.3606 0.3553 0.3287 0.3234 0.2969 0.2969 0.2916 0.3075 0.3234 0.3341 0.3447 (25)

3. Heat losses and heat loss parameter

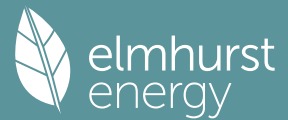
Element Gross Openings NetArea U-value A x U K-value A x K
Main dwelling m2 m2 m2 W/m2K W/K kJ/m2K kJ/K
Upgraded Windows 8.1000 0.7752 6.2791 (27)
Front Door 1.8900 3.0000 5.6700 (26)
External Walls Existing 38.5000 8.1000 30.4000 0.2600 7.9040 9.0000 273.6000 (29a)
External Wall Semi Exposed 20.7500 1.8900 18.8600 0.2000 3.7720 17.0000 320.6200 (29a)
Flat Roof 41.7000 0.1600 6.6720 9.0000 375.3000 (30)
Total net area of external elements Aum(A, m2) 100.9500 (31)
Fabric heat loss, W/K = Sum (A x U) (26)...(30) + (32) = 30.2971 (33)
Main dwelling
Party Wall 1 19.7500 0.0000 0.0000 180.0000 3555.0000 (32)
Party Floor 1 41.7000 80.0000 3336.0000 (32d)
Internal Wall 1 40.0000 9.0000 360.0000 (32c)
Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 8220.5200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 197.1348 (35)
Thermal bridges (Default value 0.200 * total exposed area) 20.1900 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 50.4871 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
(38)m Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Heat transfer coeff 12.0856 11.9101 11.7347 10.8574 10.6820 9.8047 9.8047 9.6293 10.1556 10.6820 11.0329 11.3838 (38)
Average = Sum(39)m / 12 = 62.5727 62.3972 62.2218 61.3445 61.1690 60.2918 60.2918 60.1163 60.6427 61.1690 61.5200 61.3006 (39)
HLP Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP (average) 1.5005 1.4963 1.4921 1.4711 1.4669 1.4458 1.4458 1.4416 1.4543 1.4669 1.4753 1.4837 (40)
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.4522 (42)
Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)
Hot water usage for baths 58.8666 57.9923 56.7612 54.4912 52.7915 50.9068 49.8887 51.1112 52.4423 54.4591 56.7758 58.6676 (42b)
Hot water usage for other uses 31.0549 29.9256 28.7964 27.6671 26.5378 25.4086 25.4086 26.5378 27.6671 28.7964 29.9256 31.0549 (42c)
Average daily hot water use (litres/day) 82.8103 (43)
Daily hot water use Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Energy conte 89.9215 87.9180 85.5576 82.1583 79.3293 76.3153 75.2973 77.6491 80.1094 83.2554 86.7014 89.7225 (44)
Energy content (annual) 142.4137 125.1940 131.4988 112.4706 106.7925 93.8386 91.0655 96.1458 98.7829 112.9768 123.5221 140.4837 (45)
Distribution loss (46)m = 0.15 x (45)m Total = Sum(45)m = 1375.1852
Water storage loss: 21.3621 18.7791 19.7248 16.8706 16.0189 14.0758 13.6598 14.4219 14.8174 16.9465 18.5283 21.0726 (46)
Store volume 100.0000 (47)
b) If manufacturer declared loss factor is not known :
Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0152 (51)
Volume factor from Table 2a 1.0627 (52)

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Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												0.9682 (55)
Total storage loss	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142 (56)
If cylinder contains dedicated solar storage	30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142 (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	172.4279	152.3036	161.5130	141.5166	136.8067	122.8846	121.0797	126.1600	127.8289	142.9910	152.5681	170.4979 (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	-28.6858	-62.4902	-129.7446	-202.3577	-271.1888	-273.7772	-269.3569	-223.8529	-159.3735	-90.1112	-38.4500	-22.3286 (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	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693 (64)
	Total per year (kWh/year) = Sum(64)m =											580.4911 (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	71.3639	63.3147	67.7347	60.6333	59.5199	54.4381	54.2907	55.9798	56.0821	61.5762	64.3079	70.7222 (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	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	16.8810	14.9935	12.1936	9.2313	6.9005	5.8257	6.2949	8.1823	10.9823	13.9445	16.2753	17.3502 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	187.8082	189.7570	184.8460	174.3909	161.1932	148.7893	140.5027	138.5538	143.4649	153.9200	167.1176	179.5216 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655 (69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887 (71)
Water heating gains (Table 5)	95.9192	94.2183	91.0413	84.2129	79.9998	75.6085	72.9713	75.2417	77.8918	82.7637	89.3165	95.0567 (72)
Total internal gains	377.8183	376.1787	365.2907	345.0450	325.3034	304.4334	293.9788	296.1877	306.5489	327.8381	349.9194	369.1383 (73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southwest				3.7800	36.7938	0.5700		0.7000		0.7700		38.4568 (79)
Northwest				4.3200	11.2829	0.5700		0.7000		0.7700		13.4776 (81)
Solar gains	51.9344	92.9402	139.0557	192.2278	233.5033	239.8168	227.8789	195.8622	157.2766	105.9248	63.0207	43.9175 (83)
Total gains	429.7526	469.1189	504.3464	537.2728	558.8068	544.2502	521.8577	492.0499	463.8255	433.7628	412.9400	413.0558 (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	36.4932	36.5958	36.6990	37.2238	37.3306	37.8738	37.8738	37.9843	37.6546	37.3306	37.1177	36.9072
alpha	3.4329	3.4397	3.4466	3.4816	3.4887	3.5249	3.5249	3.5323	3.5103	3.4887	3.4745	3.4605
util living area	0.9716	0.9598	0.9357	0.8828	0.7841	0.6312	0.4842	0.5273	0.7366	0.8981	0.9571	0.9749 (86)
MIT	18.9726	19.2073	19.6073	20.1290	20.5747	20.8617	20.9588	20.9442	20.7496	20.1977	19.5063	18.9354 (87)
Th 2	20.2497	20.2518	20.2539	20.2645	20.2666	20.2771	20.2771	20.2792	20.2729	20.2666	20.2624	20.2581 (88)
util rest of house	0.9677	0.9543	0.9266	0.8656	0.7516	0.5770	0.4126	0.4555	0.6887	0.8796	0.9503	0.9714 (89)
MIT 2	18.5807	18.7878	19.1384	19.5951	19.9663	20.1952	20.2586	20.2528	20.1139	19.6611	19.0598	18.5543 (90)
Living area fraction	18.7490	18.9679	19.3397	19.8243	20.2275	20.4813	20.5592	20.5496	20.3868	19.8915	19.2515	0.4293 (91)
MIT	18.7490	18.9679	19.3397	19.8243	20.2275	20.4813	20.5592	20.5496	20.3868	19.8915	19.2515	18.7179 (92)
Temperature adjustment	18.6490	18.8679	19.2397	19.7243	20.1275	20.3813	20.4592	20.4496	20.2868	19.7915	19.1515	-0.1000
adjusted MIT	18.6490	18.8679	19.2397	19.7243	20.1275	20.3813	20.4592	20.4496	20.2868	19.7915	19.1515	18.6179 (93)

8. Space heating requirement

Utilisation	0.9568	0.9414	0.9116	0.8510	0.7449	0.5852	0.4312	0.4730	0.6897	0.8656	0.9375	0.9614 (94)
Useful gains	411.1844	441.6370	459.7651	457.2385	416.2472	318.5056	224.9995	232.7633	319.8804	375.4777	387.1127	397.0944 (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	897.8526	871.5557	792.6850	664.0086	515.5014	348.5648	232.6769	243.4461	375.1831	562.2324	741.4061	892.0480 (97)
Space heating kWh	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (98a)
Space heating requirement - total per year (kWh/year)												1883.6809
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	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1883.6809
Space heating per m ²												(98c) / (4) = 45.1722 (99)

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

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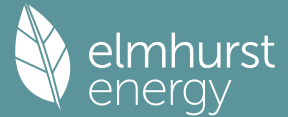


Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	362.0812	288.9054	247.6924	148.8745	73.8451	0.0000	0.0000	0.0000	0.0000	138.9455	255.0913	368.2455	(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	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	143.7421	89.8134	31.7684	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	52.8798	114.1181	148.1693	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	13.2040	11.9262	13.2040	12.7781	13.2040	12.7781	13.2040	13.2040	12.7781	13.2040	12.7781	13.2040	(231)
Lighting	14.7758	11.8537	10.6730	7.8195	6.0400	4.9347	5.5099	7.1619	9.3026	12.2056	13.7862	15.1865	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-66.5043	-94.9039	-129.1244	-124.5392	-108.1572	-69.5899	-69.0424	-68.8117	-67.0343	-96.2856	-72.3145	-57.2031	(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													1883.6809 (211)
Space heating fuel - main system 2													0.0000 (213)
Space heating fuel - secondary													0.0000 (215)
Efficiency of water heater													100.0000
Water heating fuel used													580.4911 (219)
Space cooling fuel													0.0000 (221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9375)													
mechanical ventilation fans (SFP = 0.9375)													114.4665 (230a)
central heating pump													41.0000 (230c)
Total electricity for the above, kWh/year													155.4665 (231)
Electricity for lighting (calculated in Appendix L)													119.2493 (232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation													-1023.5107 (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													1715.3771 (238)

10a. Fuel costs - using Table 12 prices													

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Space heating - main system 1	kWh/year	kg CO2/kWh	kg CO2/year
Total CO2 associated with community systems	1883.6809	0.1548	291.6170 (261)
Water heating (other fuel)			0.0000 (373)
Space and water heating	580.4911	0.1572	91.2358 (264)
Pumps, fans and electric keep-hot			382.8528 (265)
Energy for lighting	155.4665	0.1387	21.5651 (267)
	119.2493	0.1443	17.2114 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1023.5107	0.1398	-143.1048
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-143.1048 (269)
Total CO2, kg/year			278.5245 (272)
CO2 emissions per m2			6.6800 (273)
EI value			95.6952
EI rating			96 (274)
EI band			A

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

1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.7000 (1b)	x 2.4000 (2b)	= 100.0800 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.7000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	100.0800 (5)

2. Ventilation rate

Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.2500	(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) =	0.2125 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind factor	4.4000	4.2000	4.1000	3.5000	3.5000	3.2000	3.3000	3.1000	3.3000	3.5000	3.5000	3.9000
Adj infilt rate	1.1000	1.0500	1.0250	0.8750	0.8750	0.8000	0.8250	0.7750	0.8250	0.8750	0.8750	0.9750
Balanced mechanical ventilation with heat recovery	0.2338	0.2231	0.2178	0.1859	0.1859	0.1700	0.1753	0.1647	0.1753	0.1859	0.1859	0.2072
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												81.0000 (23c)
Effective ac	0.3287	0.3181	0.3128	0.2809	0.2809	0.2650	0.2703	0.2597	0.2703	0.2809	0.2809	0.3022

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												
Upgraded Windows			8.1000	0.7752	6.2791		(27)					
Front Door			1.8900	3.0000	5.6700		(26)					
External Walls Existing	38.5000	8.1000	30.4000	0.2600	7.9040	9.0000	273.6000 (29a)					
External Wall Semi Exposed	20.7500	1.8900	18.8600	0.2000	3.7720	17.0000	320.6200 (29a)					
Flat Roof	41.7000		41.7000	0.1600	6.6720	9.0000	375.3000 (30)					
Total net area of external elements Aum(A, m2)			100.9500				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		30.2971		(33)					
Main dwelling												
Party Wall 1			19.7500	0.0000	0.0000	180.0000	3555.0000 (32)					
Party Floor 1			41.7000			80.0000	3336.0000 (32d)					
Internal Wall 1			40.0000			9.0000	360.0000 (32c)					
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		8220.5200 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							197.1348 (35)					
Thermal bridges (Default value 0.200 * total exposed area)							20.1900 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss					(33) + (36) + (36a) =		50.4871 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	10.8574	10.5065	10.3311	9.2784	9.2784	8.7520	8.9274	8.5765	8.9274	9.2784	9.2784	9.9802 (38)

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Heat transfer coeff	61.3445	60.9936	60.8181	59.7654	59.7654	59.2391	59.4145	59.0636	59.4145	59.7654	59.7654	60.4672 (39)
Average = Sum(39)m / 12 =												59.9847
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.4711	1.4627	1.4585	1.4332	1.4332	1.4206	1.4248	1.4164	1.4248	1.4332	1.4332	1.4501 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	1.4385 (40)
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.4522 (42)
Hot water usage for mixer showers												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths												
58.8666	57.9923	56.7612	54.4912	52.7915	50.9068	49.8887	51.1112	52.4423	54.4591	56.7758	58.6676	(42b)
Hot water usage for other uses												
31.0549	29.9256	28.7964	27.6671	26.5378	25.4086	25.4086	26.5378	27.6671	28.7964	29.9256	31.0549	(42c)
Average daily hot water use (litres/day)												82.8103 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	89.9215	87.9180	85.5576	82.1583	79.3293	76.3153	75.2973	77.6491	80.1094	83.2554	86.7014	89.7225 (44)
Energy conte	142.4137	125.1940	131.4988	112.4706	106.7925	93.8386	91.0655	96.1458	98.7829	112.9768	123.5221	140.4837 (45)
Energy content (annual)										Total = Sum(45)m =		1375.1852
Distribution loss (46)m = 0.15 x (45)m												
21.3621	18.7791	19.7248	16.8706	16.0189	14.0758	13.6598	14.4219	14.8174	16.9465	18.5283	21.0726	(46)
Water storage loss:												
Store volume												100.0000 (47)
b) If manufacturer declared loss factor is not known :												
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152 (51)
Volume factor from Table 2a												1.0627 (52)
Temperature factor from Table 2b												0.6000 (53)
Enter (49) or (54) in (55)												0.9682 (55)
Total storage loss												
30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142	(56)
If cylinder contains dedicated solar storage												
30.0142	27.1096	30.0142	29.0460	30.0142	29.0460	30.0142	30.0142	29.0460	30.0142	29.0460	30.0142	(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	(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	(61)
Total heat required for water heating calculated for each month												
172.4279	152.3036	161.5130	141.5166	136.8067	122.8846	121.0797	126.1600	127.8289	142.9910	152.5681	170.4979	(62)
WWHRS	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	-33.7971	-62.1339	-130.0677	-215.7180	-278.1708	-304.4745	-299.4843	-252.2874	-180.5101	-101.8686	-46.7315	-25.9716 (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	(63c)
FGHRS	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	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263 (64)
										Total per year (kWh/year) = Sum(64)m =		551.7311 (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												
71.3639	63.3147	67.7347	60.6333	59.5199	54.4381	54.2907	55.9798	56.0821	61.5762	64.3079	70.7222	(65)

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

Metabolic gains (Table 5), Watts												
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	87.1330	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
16.8810	14.9935	12.1936	9.2313	6.9005	5.8257	6.2949	8.1823	10.9823	13.9445	16.2753	17.3502	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
187.8082	189.7570	184.8460	174.3909	161.1932	148.7893	140.5027	138.5538	143.4649	153.9200	167.1176	179.5216	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	45.1655	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)												
-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	-58.0887	(71)
Water heating gains (Table 5)												
95.9192	94.2183	91.0413	84.2129	79.9998	75.6085	72.9713	75.2417	77.8918	82.7637	89.3165	95.0567	(72)
Total internal gains												
377.8183	376.1787	365.2907	345.0450	325.3034	304.4334	293.9788	296.1877	306.5489	327.8381	349.9194	369.1383	(73)

6. Solar gains

[Jan]														
					Area m2	Solar flux Table 6a W/m2		g Specific data or Table 6b		FF Specific data or Table 6c		Access factor Table 6d		Gains W
Southwest					3.7800	40.2665		0.5700		0.7000		0.7700		42.0864 (79)
Northwest					4.3200	12.9148		0.5700		0.7000		0.7700		15.4268 (81)
Solar gains	57.5132	91.2640	138.1749	201.9255	238.9628	262.5163	249.2806	215.7699		172.5455	114.8685	71.5595		48.1294 (83)
Total gains	435.3315	467.4428	503.4656	546.9705	564.2662	566.9497	543.2594	511.9577		479.0944	442.7066	421.4789		417.2678 (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	37.2238	37.4380	37.5460	38.2073	38.2073	38.5468	38.4330	38.6613	38.4330	38.2073	38.2073	37.7639
alpha	3.4816	3.4959	3.5031	3.5472	3.5472	3.5698	3.5622	3.5774	3.5622	3.5472	3.5472	3.5176
util living area												
0.9663	0.9558	0.9258	0.8568	0.7324	0.5379	0.3445	0.3838	0.6691	0.8685	0.9454	0.9698	(86)
MIT	19.1768	19.3565	19.7837	20.3032	20.7093	20.9316	20.9903	20.9857	20.8432	20.3800	19.7405	19.1626 (87)

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Th 2	20.2645	20.2687	20.2708	20.2834	20.2834	20.2897	20.2876	20.2918	20.2876	20.2834	20.2834	20.2750 (88)
util rest of house	0.9616	0.9497	0.9151	0.8361	0.6938	0.4784	0.2701	0.3073	0.6138	0.8449	0.9367	0.9655 (89)
MIT 2	18.7711	18.9311	19.3044	19.7568	20.0866	20.2533	20.2846	20.2869	20.1945	19.8274	19.2797	18.7666 (90)
Living area fraction									fLA = Living area / (4) =			0.4293 (91)
MIT	18.9453	19.1137	19.5101	19.9913	20.3539	20.5444	20.5875	20.5869	20.4730	20.0646	19.4775	18.9366 (92)
Temperature adjustment												-0.1000
adjusted MIT	18.8453	19.0137	19.4101	19.8913	20.2539	20.4444	20.4875	20.4869	20.3730	19.9646	19.3775	18.8366 (93)

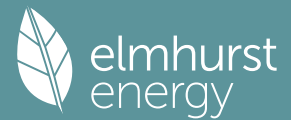
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9499	0.9366	0.9001	0.8234	0.6921	0.4918	0.2913	0.3287	0.6208	0.8329	0.9231	0.9547	(94)
Useful gains	413.5305	437.7916	453.1749	450.3749	390.5478	278.8136	158.2325	168.2674	297.4427	368.7302	389.0610	398.3503	(95)
Ext temp.	5.0000	5.4000	7.2000	9.6000	12.6000	15.5000	17.8000	17.6000	14.8000	11.4000	7.9000	5.0000	(96)
Heat loss rate W	849.3307	830.3474	742.5979	615.0652	457.4388	292.9028	159.6761	170.5088	331.1146	511.8675	685.9577	836.6593	(97)
Space heating kWh	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019	(98a)
Space heating requirement - total per year (kWh/year)												1618.0692	
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	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1618.0692	
Space heating per m2											(98c) / (4) =	38.8026	(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 %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	324.2353	263.7975	215.3307	118.5771	49.7669	0.0000	0.0000	0.0000	0.0000	106.4941	213.7656	326.1019	(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	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263	(64)
Efficiency of water heater	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(216)
Fuel for water heating, kWh/month	138.6308	90.1697	31.4453	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	41.1224	105.8366	144.5263	(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	13.2040	11.9262	13.2040	12.7781	13.2040	12.7781	13.2040	13.2040	12.7781	13.2040	12.7781	13.2040	(231)
Lighting	14.7758	11.8537	10.6730	7.8195	6.0400	4.9347	5.5099	7.1619	9.3026	12.2056	13.7862	15.1865	(232)
Electricity generated by PVs (Appendix M) (negative quantity)	-72.1520	-93.3497	-125.2257	-119.0108	-99.1253	-69.4061	-68.8840	-69.1123	-68.1680	-95.6122	-78.4190	-61.7280	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)	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)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												1618.0692	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												100.0000	
Water heating fuel used												551.7311	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(BalancedWithHeatRecovery, Database: in-use factor = 1.2500, SFP = 0.9375)													
mechanical ventilation fans (SFP = 0.9375)												114.4665	(230a)
central heating pump												41.0000	(230c)
Total electricity for the above, kWh/year												155.4665	(231)
Electricity for lighting (calculated in Appendix L)												119.2493	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1020.1930	(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												1424.3232	(238)

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10a. Fuel costs - using BEDF prices (571)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1618.0692	26.0600	421.6688 (240)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	551.7311	26.0600	143.7811 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	155.4665	26.0600	40.5146 (249)
Energy for lighting	119.2493	26.0600	31.0764 (250)
Additional standing charges			0.0000 (251)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	26.0600	-265.8623
PV Unit electricity exported	0.0000	5.8100	0.0000
Total			-265.8623 (252)
Total energy cost			371.1786 (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	1618.0692	0.1554	251.4457 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	551.7311	0.1576	86.9669 (264)
Space and water heating			338.4126 (265)
Pumps, fans and electric keep-hot	155.4665	0.1387	21.5651 (267)
Energy for lighting	119.2493	0.1443	17.2114 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	0.1401	-142.8974
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-142.8974 (269)
Total CO2, kg/year			234.2916 (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	1618.0692	1.5753	2549.0008 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	551.7311	1.5834	873.5948 (278)
Space and water heating			3422.5956 (279)
Pumps, fans and electric keep-hot	155.4665	1.5128	235.1897 (281)
Energy for lighting	119.2493	1.5338	182.9086 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1020.1930	1.5180	-1548.6941
PV Unit electricity exported	0.0000	0.0000	0.0000
Total			-1548.6941 (283)
Total Primary energy kWh/year			2291.9998 (286)