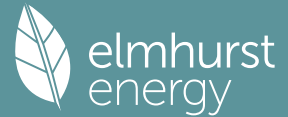


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Property Reference	4907-AU06-6316-041				Issued on Date	19/03/2025
Assessment Reference	Plot 041_ As Built	Prop Type Ref		MF Flat-TC		
Property	FLAT 4, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	86 B	DER	4.14	TER	10.49	
Environmental	97 A	% DER < TER				60.53
CO ₂ Emissions (t/year)	0.22	DFEE	19.29	TFEE	21.42	
Compliance Check	See BREL	% DFEE < TFEE				9.96
% DPER < TPER	21.92	DPER	43.05	TPER	55.14	
Assessor Details	Mr. Silvio Junges				Assessor ID	P637-0001
Client	Bellway Homes, Thames Valley					

SAP 10 WORKSHEET FOR New Build (As Built) (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	62.5100 (1b)	2.4100 (2b)	150.6491 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	150.6491 (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	1.6600 (17)
Infiltration rate	0.0830 (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) = 0.0705 (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	0.0900	0.0882	0.0864	0.0776	0.0758	0.0670	0.0670	0.0653	0.0705	0.0758	0.0794	0.0829 (22b)
Mechanical extract ventilation - centralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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							
Window			7.6400	1.2357	9.4411		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000 (29a)
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940 (29a)
Total net area of external elements Aum(A, m ²)			30.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6095		(33)
Main dwelling							
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000 (32)
Party Floor			62.5100			70.0000	4375.7000 (32d)
Party Ceiling			62.5100			30.0000	1875.3000 (32b)
GF Timber			134.3400			9.0000	1209.0600 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

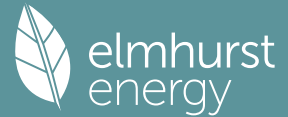
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	11128.1040 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		178.0212 (35)
List of Thermal Bridges		

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	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.9350	110.6423	99.9350	103.2661	99.9350	103.2661	99.9350	99.9350	103.2661	99.9350	103.2661	99.9350 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668 (72)
Total internal gains	417.5852	427.9687	408.3679	392.5008	370.9270	356.5174	341.6520	342.7877	354.3178	367.5146	392.2797	408.4982 (73)

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Solar gains	30.5326	62.1501	111.9746	183.8945	247.1903	263.5310	246.5279	196.5349	136.4428	75.9523	38.4180	24.9345 (83)
Total gains	448.1179	490.1188	520.3425	576.3953	618.1173	620.0484	588.1799	539.3226	490.7606	443.4669	430.6977	433.4326 (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	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	68.6193	
alpha	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	5.5746	
util living area	0.9767	0.9605	0.9262	0.8232	0.6507	0.4615	0.3365	0.3831	0.6142	0.8702	0.9576	0.9804 (86)	
MIT	20.2228	20.3713	20.5769	20.8257	20.9586	20.9946	20.9992	20.9985	20.9768	20.7959	20.4720	20.1802 (87)	
Th 2	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226 (88)	
util rest of house	0.9722	0.9532	0.9128	0.7960	0.6100	0.4139	0.2849	0.3272	0.5601	0.8426	0.9485	0.9765 (89)	
MIT 2	19.4156	19.6012	19.8544	20.1458	20.2866	20.3190	20.3223	20.3219	20.3054	20.1187	19.7294	19.3621 (90)	
Living area fraction									fLA = Living area / (4) =				0.3943 (91)
MIT	19.7339	19.9049	20.1393	20.4139	20.5516	20.5854	20.5892	20.5887	20.5702	20.3858	20.0222	19.6847 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.7339	19.9049	20.1393	20.4139	20.5516	20.5854	20.5892	20.5887	20.5702	20.3858	20.0222	19.6847 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9675	0.9479	0.9088	0.7998	0.6240	0.4325	0.3052	0.3492	0.5803	0.8454	0.9437	0.9721 (94)
Useful gains	433.5402	464.5819	472.8805	461.0223	385.7259	268.1561	179.5376	188.3386	284.7644	374.8877	406.4622	421.3385 (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	695.2631	675.9348	614.4209	518.6758	398.7447	269.6306	179.7057	188.6906	291.4654	440.8264	582.1169	697.5485 (97)
Space heating kWh	194.7218	142.0292	105.3061	41.5106	9.6860	0.0000	0.0000	0.0000	0.0000	49.0584	126.4714	205.5003 (98a)
Space heating requirement - total per year (kWh/year)												874.2837
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	194.7218	142.0292	105.3061	41.5106	9.6860	0.0000	0.0000	0.0000	0.0000	49.0584	126.4714	205.5003 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												874.2837
Space heating per m2										(98c) / (4) =		13.9863 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	194.7218	142.0292	105.3061	41.5106	9.6860	0.0000	0.0000	0.0000	0.0000	49.0584	126.4714	205.5003 (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)	194.7218	142.0292	105.3061	41.5106	9.6860	0.0000	0.0000	0.0000	0.0000	49.0584	126.4714	205.5003 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (231)
Lighting	19.5497	15.6835	14.1212	10.3458	7.9914	6.5290	7.2900	9.4759	12.3082	16.1490	18.2403	20.0930 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity) (233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity) (234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity) (235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation) (235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												874.2837 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												0.0000 (215)
Efficiency of water heater												324.5200
Water heating fuel used												660.4428 (219)
Space cooling fuel												0.0000 (221)

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Electricity for pumps and fans:	
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)	
mechanical ventilation fans (SFP = 0.2240)	41.1694 (230a)
Total electricity for the above, kWh/year	41.1694 (231)
Electricity for lighting (calculated in Appendix L)	157.7771 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	0.0000 (233)
Wind generation	0.0000 (234)
Hydro-electric generation (Appendix N)	0.0000 (235a)
Electricity generated - Micro CHP (Appendix N)	0.0000 (235)
Appendix Q - special features	
Energy saved or generated	-0.0000 (236)
Energy used	0.0000 (237)
Total delivered energy for all uses	1733.6730 (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	874.2837	0.1568	137.0564 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	660.4428	0.1412	93.2240 (264)
Space and water heating			230.2804 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	157.7771	0.1443	22.7721 (268)
Total CO2, kg/year			258.7632 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1400 (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	874.2837	1.5804	1381.6798 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	660.4428	1.5219	1005.1598 (278)
Space and water heating			2386.8395 (279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810 (281)
Energy for lighting	157.7771	1.5338	242.0038 (282)
Total Primary energy kWh/year			2691.1243 (286)
Dwelling Primary energy Rate (DPER)			43.0500 (287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022) CALCULATION OF TARGET EMISSIONS

1. Overall dwelling characteristics

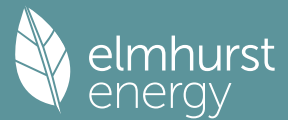
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	150.6491 (5)

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) = 0.1328 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3828 (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) = 0.3253 (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	0.4148	0.4067	0.3985	0.3579	0.3497	0.3091	0.3091	0.3009	0.3253	0.3497	0.3660	0.3823 (22b)
Effective ac	0.5860	0.5827	0.5794	0.5640	0.5612	0.5478	0.5478	0.5453	0.5529	0.5612	0.5670	0.5731 (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													
TER Opaque door			2.0800	1.0000	2.0800			(26)					
TER Opening Type			7.6400	1.1450	8.7481			(27)					
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.1800	2.8278			(29a)					
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.1800	0.8604			(29a)					
Total net area of external elements Aum(A, m2)			30.2100					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5163			(33)					
Main dwelling													
Party Wall			51.5000	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.6400	0.0500		0.1820						
E4 Jamb				16.6700	0.0500		0.8335						
E7 Party floor between dwellings (in blocks of flats)				17.5200	0.0700		1.2264						
E16 Corner (normal)				5.1600	0.0900		0.4644						
E18 Party wall between dwellings				5.1600	0.0600		0.3096						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.8500	0.0000		0.0000						
E2 Other lintels (including other steel lintels)				1.0200	0.0500		0.0510						
E4 Jamb				4.2000	0.0500		0.2100						
E7 Party floor between dwellings (in blocks of flats)				5.3200	0.0700		0.3724						
E25 Staggered party wall between dwellings				5.1600	0.0600		0.3096						
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400		1.3608						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								5.3197 (36)					
Point Thermal bridges						(36a) =		0.0000					
Total fabric heat loss						(33) + (36) + (36a) =		19.8360 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 29.1343	Feb 28.9682	Mar 28.8054	Apr 28.0407	May 27.8977	Jun 27.2317	Jul 27.2317	Aug 27.1083	Sep 27.4882	Oct 27.8977	Nov 28.1871	Dec 28.4897	(38)
Heat transfer coeff	48.9703	48.8042	48.6414	47.8767	47.7337	47.0677	47.0677	46.9443	47.3242	47.7337	48.0231	48.3257	(39)
Average = Sum(39)m / 12 =												47.8760	
HLP	Jan 0.7834	Feb 0.7807	Mar 0.7781	Apr 0.7659	May 0.7636	Jun 0.7530	Jul 0.7530	Aug 0.7510	Sep 0.7571	Oct 0.7636	Nov 0.7682	Dec 0.7731	(40)
HLP (average)												0.7659	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

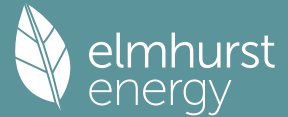
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0516 (42)
Hot water usage for mixer showers	58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	(42a)
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	(42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	(42c)
Average daily hot water use (litres/day)													109.9314 (43)
Daily hot water use	Jan 119.5909	Feb 117.0378	Mar 113.9283	Apr 109.1993	May 105.3593	Jun 101.2310	Jul 99.6440	Aug 102.7400	Sep 106.0054	Oct 110.3395	Nov 115.1413	Dec 119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)										Total = Sum(45)m =		1825.9381	
Distribution loss (46)m = 0.15 x (45)m	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.3938 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.7527 (55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(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	235.9977	208.7459	221.6984	194.5803	188.4288	169.5671	167.1056	173.8085	175.8070	196.3246	209.1318	233.3597	(62)
WWHRS	-26.7981	-23.7004	-24.8177	-20.5501	-19.1519	-16.3884	-15.3616	-16.3355	-16.9561	-19.9894	-22.6456	-26.3018	(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	209.1996	185.0455	196.8807	174.0302	169.2769	153.1787	151.7441	157.4730	158.8509	176.3352	186.4862	207.0578	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2125.5589	(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	100.2524	89.0831	95.4978	85.7784	84.4357	77.4615	77.3457	79.5744	79.5363	87.0610	90.6167	99.3752	(65)

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

Metabolic gains (Table 5), Watts	Jan 102.5820	Feb 102.5820	Mar 102.5820	Apr 102.5820	May 102.5820	Jun 102.5820	Jul 102.5820	Aug 102.5820	Sep 102.5820	Oct 102.5820	Nov 102.5820	Dec 102.5820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.9350	110.6423	99.9350	103.2661	99.9350	103.2661	99.9350	99.9350	103.2661	99.9350	103.2661	99.9350	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	(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)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	(71)

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Water heating gains (Table 5)	134.7478	132.5641	128.3573	119.1366	113.4889	107.5854	103.9593	106.9549	110.4671	117.0175	125.8566	133.5688 (72)
Total internal gains	470.6873	481.0708	461.4699	445.6028	424.0290	406.6194	391.7540	392.8898	404.4198	420.6167	445.3818	461.6002 (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
-----				7.6400	11.2829	0.6300		0.7000		0.7700		26.3444 (75)
Solar gains	26.3444	53.6247	96.6146	158.6690	213.2822	227.3814	212.7107	169.5754	117.7264	65.5336	33.1480	21.5141 (83)
Total gains	497.0316	534.6955	558.0845	604.2718	637.3113	634.0008	604.4647	562.4652	522.1463	486.1503	478.5298	483.1143 (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)												
tau	66.6686	66.8954	67.1193	68.1913	68.3957	69.3635	69.3635	69.5457	68.9875	68.3957	67.9835	67.5579
alpha	5.4446	5.4597	5.4746	5.5461	5.5597	5.6242	5.6242	5.6364	5.5992	5.5597	5.5322	5.5039
util living area	0.9728	0.9574	0.9258	0.8288	0.6653	0.4713	0.3421	0.3828	0.6077	0.8563	0.9493	0.9759 (86)
MIT	20.2225	20.3626	20.5606	20.8167	20.9535	20.9943	20.9992	20.9986	20.9783	20.8126	20.5021	20.2062 (87)
Th 2	20.2677	20.2701	20.2723	20.2830	20.2850	20.2943	20.2943	20.2960	20.2907	20.2850	20.2809	20.2767 (88)
util rest of house	0.9673	0.9490	0.9114	0.8003	0.6221	0.4208	0.2875	0.3248	0.5512	0.8254	0.9381	0.9710 (89)
MIT 2	19.3689	19.5453	19.7904	20.0990	20.2451	20.2906	20.2939	20.2953	20.2752	20.1020	19.7295	19.3556 (90)
Living area fraction									fLA = Living area / (4) =			0.3943 (91)
MIT	19.7055	19.8676	20.0941	20.3820	20.5244	20.5681	20.5721	20.5727	20.5524	20.3822	20.0342	19.6910 (92)
Temperature adjustment												0.0000
adjusted MIT	19.7055	19.8676	20.0941	20.3820	20.5244	20.5681	20.5721	20.5727	20.5524	20.3822	20.0342	19.6910 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9623	0.9437	0.9075	0.8045	0.6369	0.4405	0.3090	0.3477	0.5724	0.8300	0.9337	0.9662 (94)
Ext temp.	478.2723	504.5940	506.4694	486.1205	405.9250	279.2904	186.7801	195.5482	298.8808	403.4856	446.8037	466.7878 (95)
Heat loss rate W	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)
Space heating	754.4103	730.4804	661.2373	549.7205	421.2233	280.9047	186.9558	195.8827	305.3570	466.9416	621.1385	748.6146 (97)
Space heating requirement - total per year (kWh/year)	205.4467	151.7957	115.1473	45.7920	11.3819	0.0000	0.0000	0.0000	0.0000	47.2113	125.5210	209.6791 (98a)
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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	205.4467	151.7957	115.1473	45.7920	11.3819	0.0000	0.0000	0.0000	0.0000	47.2113	125.5210	209.6791 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												911.9750
Space heating per m ²										(98c) / (4) =		14.5893 (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 %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating efficiency (main heating system 1)	205.4467	151.7957	115.1473	45.7920	11.3819	0.0000	0.0000	0.0000	0.0000	47.2113	125.5210	209.6791 (98)
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000 (210)
Space heating efficiency (main heating system 2)	222.5858	164.4590	124.7534	49.6121	12.3315	0.0000	0.0000	0.0000	0.0000	51.1498	135.9924	227.1713 (211)
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 (212)
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 (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	209.1996	185.0455	196.8807	174.0302	169.2769	153.1787	151.7441	157.4730	158.8509	176.3352	186.4862	207.0578 (64)
Efficiency of water heater												79.8000 (216)
Fuel for water heating, kWh/month	84.0192	83.6192	82.9006	81.5211	80.3128	79.8000	79.8000	79.8000	79.8000	81.5454	83.1921	84.0880 (217)
Space cooling fuel requirement	248.9903	221.2955	237.4900	213.4786	210.7719	191.9532	190.1555	197.3346	199.0613	216.2416	224.1635	246.2394 (219)
(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	7.3041	6.5973	7.3041	7.0685	7.3041	7.0685	7.3041	7.3041	7.0685	7.3041	7.0685	7.3041 (231)
Lighting	20.7645	16.6581	14.9987	10.9887	8.4880	6.9348	7.7430	10.0647	13.0730	17.1525	19.3738	21.3416 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-21.3871	-31.1841	-46.3405	-53.9283	-59.7426	-56.3584	-55.6939	-51.8135	-45.2011	-36.5003	-23.8865	-18.3737 (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)												

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(233b)m	-9.1219	-19.4707	-39.2230	-59.6738	-79.6410	-80.2745	-79.3045	-66.7843	-48.4927	-28.0658	-12.2517	-7.1904	(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												988.0553	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2597.1755	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
Total electricity for the above, kWh/year												86.0000	(231)
Electricity for lighting (calculated in Appendix L)												167.5815	(232)
Energy saving/generation technologies (Appendices M, N and Q)													
PV generation												-1029.9044	(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												2808.9079	(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	988.0553	0.2100	207.4916	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2597.1755	0.2100	545.4069	(264)
Space and water heating			752.8985	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	167.5815	0.1443	24.1872	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-500.4100	0.1339	-66.9919	
PV Unit electricity exported	-529.4944	0.1255	-66.4655	
Total			-133.4574	(269)
Total CO2, kg/year			655.5575	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.4900	(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	988.0553	1.1300	1116.5025	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2597.1755	1.1300	2934.8083	(278)
Space and water heating			4051.3108	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	167.5815	1.5338	257.0421	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-500.4100	1.4947	-747.9806	
PV Unit electricity exported	-529.4944	0.4608	-243.9652	
Total			-991.9458	(283)
Total Primary energy kWh/year			3446.5080	(286)
Target Primary Energy Rate (TPER)			55.1400	(287)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)

CALCULATION OF FABRIC ENERGY EFFICIENCY

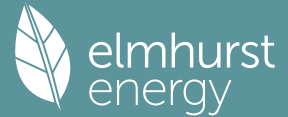
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.5100	x	150.6491	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	150.6491	(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)

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Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1328 (8)

Pressure test
 Pressure Test Method
 Measured/design AP50
 Infiltration rate
 Number of sides sheltered

Blower Door
 1.6600 (17)
 0.2158 (18)
 2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
 Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.1834 (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	0.2338	0.2292	0.2247	0.2017	0.1971	0.1742	0.1742	0.1696	0.1834	0.1971	0.2063	0.2155 (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	0.5273	0.5263	0.5252	0.5203	0.5194	0.5152	0.5152	0.5144	0.5168	0.5194	0.5213	0.5232 (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							
Window			7.6400	1.2357	9.4411		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000 (29a)
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940 (29a)
Total net area of external elements Aum(A, m2)			30.2100				(31)
Fabric heat loss, W/K = Sum (A x U)					16.6095		(33)
Main dwelling							
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000 (32)
Party Floor			62.5100			70.0000	4375.7000 (32d)
Party Ceiling			62.5100			40.0000	2500.4000 (32b)
GF Timber			134.3400			9.0000	1209.0600 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 11753.2040 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	3.6400	0.0370	0.1347
E4 Jamb	16.6700	0.0140	0.2334
E7 Party floor between dwellings (in blocks of flats)	17.5200	0.0390	0.6833
E16 Corner (normal)	5.1600	0.0410	0.2116
E18 Party wall between dwellings	5.1600	0.0390	0.2012
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	33.8500	0.0000	0.0000
E2 Other lintels (including other steel lintels)	1.0200	0.0270	0.0275
E4 Jamb	4.2000	0.0850	0.3570
E7 Party floor between dwellings (in blocks of flats)	5.3200	0.0330	0.1756
E25 Staggered party wall between dwellings	5.1600	0.0380	0.1961
P8 Party Wall - Exposed floor (inverted)	5.6700	0.2400	1.3608
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.5811 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 20.1906 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	26.2162	26.1634	26.1117	25.8687	25.8232	25.6116	25.6116	25.5724	25.6931	25.8232	25.9152	26.0114 (38)
Heat transfer coeff	46.4068	46.3540	46.3023	46.0593	46.0138	45.8022	45.8022	45.7630	45.8837	46.0138	46.1058	46.2019 (39)
Average = Sum(39)m / 12 =												46.0591

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.7424	0.7415	0.7407	0.7368	0.7361	0.7327	0.7327	0.7321	0.7340	0.7361	0.7376	0.7391 (40)
HLP (average)												0.7368
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.0516 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)
Average daily hot water use (litres/day)												55.8868 (43)
Daily hot water use	60.9721	59.2999	57.4740	55.2012	53.1738	51.0667	50.6286	52.4507	54.3195	56.4834	58.7764	60.8865 (44)
Energy conte	96.5649	84.4422	88.3355	75.5677	71.5821	62.7925	61.2309	64.9449	66.9814	76.6474	83.7377	95.3335 (45)
Energy content (annual)												Total = Sum(45)m = 928.1607
Distribution loss (46)m = 0.15 x (45)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 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (64)
Total per year (kWh/year) = Sum(64)m =												788.9366 (64)
12Total per year (kWh/year)												789 (64)

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Electric shower(s)	46.9439	41.8274	45.6739	43.5861	44.4040	42.3571	43.7690	44.4040	43.5861	45.6739	44.8151	46.9439 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												533.9844 (64a)
Heat gains from water heating, kWh/month	32.2560	28.4008	30.1898	26.9547	26.3122	23.9327	23.9538	24.9018	25.1301	27.7061	28.9980	31.9943 (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	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.9350	110.6423	99.9350	103.2661	99.9350	103.2661	99.9350	99.9350	103.2661	99.9350	103.2661	99.9350	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	(71)
Water heating gains (Table 5)	43.3549	42.2631	40.5777	37.4370	35.3658	33.2398	32.1960	33.4701	34.9029	37.2393	40.2750	43.0031	(72)
Total internal gains	376.2944	387.7698	370.6902	360.9032	342.9060	332.2738	319.9907	319.4050	328.8557	337.8385	356.8002	368.0345	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c			Access factor Table 6d	Gains W	

Northeast					7.6400	11.2829	0.4600	0.0000			0.7700	30.5326 (75)	

Solar gains	30.5326	62.1501	111.9746	183.8945	247.1903	263.5310	246.5279	196.5349	136.4428	75.9523	38.4180	24.9345 (83)	
Total gains	406.8270	449.9198	482.6649	544.7977	590.0963	595.8048	566.5186	515.9399	465.2985	413.7908	395.2182	392.9690 (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)													
tau	70.3514	70.4314	70.5101	70.8821	70.9521	71.2799	71.2799	Aug	Sep	Oct	Nov	Dec	
alpha	5.6901	5.6954	5.7007	5.7255	5.7301	5.7520	5.7520	71.3410	71.1533	70.9521	70.8106	70.6632	
util living area	0.9877	0.9770	0.9519	0.8608	0.6895	0.4877	0.3551	0.4066	0.6547	0.9058	0.9749	0.9898	(86)
MIT	20.1231	20.2791	20.5018	20.7921	20.9504	20.9940	20.9992	20.9983	20.9718	20.7558	20.3987	20.0893	(87)
Th 2	20.3035	20.3043	20.3050	20.3084	20.3091	20.3120	20.3120	20.3126	20.3109	20.3091	20.3078	20.3064	(88)
util rest of house	0.9850	0.9721	0.9418	0.8355	0.6472	0.4369	0.2999	0.3465	0.5977	0.8820	0.9687	0.9875	(89)
MIT 2	19.5000	19.6540	19.8709	20.1430	20.2755	20.3090	20.3117	20.3119	20.2947	20.1165	19.7758	19.4690	(90)
Living area fraction									FLA = Living area / (4) =			0.3943	(91)
MIT	19.7457	19.9005	20.1197	20.3990	20.5416	20.5791	20.5828	20.5826	20.5617	20.3686	20.0214	19.7136	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.7457	19.9005	20.1197	20.3990	20.5416	20.5791	20.5828	20.5826	20.5617	20.3686	20.0214	19.7136	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	399.6554	435.8499	453.0697	457.1040	390.4991	272.1554	182.2399	191.0084	287.9993	365.8940	381.6408	387.1293	(94)
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	716.7856	695.3310	630.6221	529.6348	406.8382	273.8565	182.4226	191.4087	296.4877	449.4923	595.7527	716.7576	(97)
Space heating kWh	235.9449	174.3713	132.0990	52.2222	12.1563	0.0000	0.0000	0.0000	0.0000	62.1972	154.1605	245.2434	(98a)
Space heating requirement - total per year (kWh/year)												1068.3946	
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	235.9449	174.3713	132.0990	52.2222	12.1563	0.0000	0.0000	0.0000	0.0000	62.1972	154.1605	245.2434	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1068.3946	
Space heating per m ²										(98c) / (4) =		17.0916	(99)

8c. Space cooling requirement

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

Ext. temp.	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9668	0.9857	0.9752	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	416.2647	334.1021	339.1694	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	652.3315	620.3149	563.2127	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	169.9681	212.9423	166.6882	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	42.4920	53.2356	41.6721	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												137.3997	(107)
Energy for space heating												17.0916	(99)

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Energy for space cooling 2.1980 (108)
 Total 19.2896 (109)
 Fabric Energy Efficiency (DFEE) 19.3 (109)

SAP 10 WORKSHEET FOR New Build (As Built) (Version 10.2, February 2022)
 CALCULATION OF TARGET FABRIC ENERGY EFFICIENCY

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 150.6491 (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	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) =	0.1328 (8)
Pressure test		Yes	
Pressure Test Method		Blower Door	
Measured/design AP50		5.0000	(17)
Infiltration rate		0.3828	(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) =		0.3253 (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	0.4148	0.4067	0.3985	0.3579	0.3497	0.3091	0.3091	0.3009	0.3253	0.3497	0.3660	0.3823
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000
Effective ac	0.5860	0.5827	0.5794	0.5640	0.5612	0.5478	0.5478	0.5453	0.5529	0.5612	0.5670	0.5731

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							
TER Opaque door			2.0800	1.0000	2.0800		(26)
TER Opening Type			7.6400	1.1450	8.7481		(27)
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.1800	2.8278		(29a)
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.1800	0.8604		(29a)
Total net area of external elements Aum(A, m ²)			30.2100				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	14.5163		(33)
Main dwelling							
Party Wall			51.5000	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.0212 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				3.6400	0.0500	0.1820	
E4 Jamb				16.6700	0.0500	0.8335	
E7 Party floor between dwellings (in blocks of flats)				17.5200	0.0700	1.2264	
E16 Corner (normal)				5.1600	0.0900	0.4644	
E18 Party wall between dwellings				5.1600	0.0600	0.3096	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.8500	0.0000	0.0000	
E2 Other lintels (including other steel lintels)				1.0200	0.0500	0.0510	
E4 Jamb				4.2000	0.0500	0.2100	
E7 Party floor between dwellings (in blocks of flats)				5.3200	0.0700	0.3724	
E25 Staggered party wall between dwellings				5.1600	0.0600	0.3096	
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400	1.3608	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							5.3197 (36)
Point Thermal bridges							0.0000
Total fabric heat loss						(33) + (36) + (36a) =	19.8360 (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
	29.1343	28.9682	28.8054	28.0407	27.8977	27.2317	27.2317	27.1083	27.4882	27.8977	28.1871	28.4897
Heat transfer coeff	48.9703	48.8042	48.6414	47.8767	47.7337	47.0677	47.0677	46.9443	47.3242	47.7337	48.0231	48.3257
Average = Sum(39)m / 12 =												47.8760
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.7834	0.7807	0.7781	0.7659	0.7636	0.7530	0.7530	0.7510	0.7571	0.7636	0.7682	0.7731
HLP (average)												0.7659
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

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4. Water heating energy requirements (kWh/year)												
Assumed occupancy	2.0516 (42)											
Hot water usage for mixer showers	0.0000 (42a)											
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)
Average daily hot water use (litres/day)	55.8868 (43)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	60.9721	59.2999	57.4740	55.2012	53.1738	51.0667	50.6286	52.4507	54.3195	56.4834	58.7764	60.8865 (44)
Energy content (annual)	96.5649	84.4422	88.3355	75.5677	71.5821	62.7925	61.2309	64.9449	66.9814	76.6474	83.7377	95.3335 (45)
Distribution loss (46)m = 0.15 x (45)m	Total = Sum(45)m = 928.1607											
Water 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 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (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	82.0802	71.7759	75.0852	64.2325	60.8448	53.3736	52.0463	55.2032	56.9342	65.1503	71.1770	81.0334 (64)
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 788.9366 (64)											
Electric shower(s)	46.9439	41.8274	45.6739	43.5861	44.4040	42.3571	43.7690	44.4040	43.5861	45.6739	44.8151	46.9439 (64a)
Heat gains from water heating, kWh/month	32.2560	28.4008	30.1898	26.9547	26.3122	23.9327	23.9538	24.9018	25.1301	27.7061	28.9980	31.9943 (65)

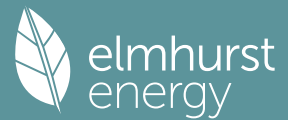
5. Internal gains (see Table 5 and 5a)												
Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820	102.5820 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	99.9350	110.6423	99.9350	103.2661	99.9350	103.2661	99.9350	99.9350	103.2661	99.9350	103.2661	99.9350 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	179.2299	181.0898	176.4030	166.4255	153.8306	141.9932	134.0851	132.2253	136.9120	146.8896	159.4844	171.3218 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582	33.2582 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)	43.3549	42.2631	40.5777	37.4370	35.3658	33.2398	32.1960	33.4701	34.9029	37.2393	40.2750	43.0031 (72)
Total internal gains	376.2944	387.7698	370.6902	360.9032	342.9060	332.2738	319.9907	319.4050	328.8557	337.8385	356.8002	368.0345 (73)

6. Solar gains												
[Jan]	Area m2	Solar flux Table 6a W/m2	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W						
Northeast	7.6400	11.2829	0.6300	0.7000	0.7700	26.3444 (75)						
Solar gains	26.3444	53.6247	96.6146	158.6690	213.2822	227.3814	212.7107	169.5754	117.7264	65.5336	33.1480	21.5141 (83)
Total gains	402.6387	441.3945	467.3049	519.5722	556.1883	559.6552	532.7014	488.9804	446.5821	403.3721	389.9482	389.5487 (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	66.6686	66.8954	67.1193	68.1913	68.3957	69.3635	69.3635	69.5457	68.9875	68.3957	67.9835	67.5579
alpha	5.4446	5.4597	5.4746	5.5461	5.5597	5.6242	5.6242	5.6364	5.5992	5.5597	5.5322	5.5039
util living area	0.9892	0.9807	0.9619	0.8893	0.7386	0.5305	0.3876	0.4391	0.6922	0.9205	0.9781	0.9908 (86)
MIT	20.0242	20.1787	20.4042	20.7261	20.9225	20.9898	20.9985	20.9972	20.9592	20.7075	20.3320	20.0068 (87)
Th 2	20.2677	20.2701	20.2723	20.2830	20.2850	20.2943	20.2943	20.2960	20.2907	20.2850	20.2809	20.2767 (88)
util rest of house	0.9867	0.9765	0.9534	0.8667	0.6958	0.4749	0.3260	0.3731	0.6333	0.8990	0.9725	0.9887 (89)
MIT 2	19.3730	19.5273	19.7497	20.0618	20.2316	20.2890	20.2938	20.2950	20.2670	20.0520	19.6885	19.3631 (90)
Living area fraction	19.6298	19.7842	20.0078	20.3238	20.5041	20.5654	20.5717	20.5719	20.5399	20.3105	19.9422	0.3943 (91)
Temperature adjustment	19.6298	19.7842	20.0078	20.3238	20.5041	20.5654	20.5717	20.5719	20.5399	20.3105	19.9422	0.0000 (92)
adjusted MIT	19.6298	19.7842	20.0078	20.3238	20.5041	20.5654	20.5717	20.5719	20.5399	20.3105	19.9422	19.6169 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9841	0.9731	0.9498	0.8681	0.7094	0.4965	0.3503	0.3991	0.6547	0.8998	0.9693	0.9864	(94)
Useful gains	396.2418	429.5087	443.8288	451.0449	394.5370	277.8554	186.6020	195.1678	292.3755	362.9666	377.9962	384.2314	(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	750.7044	726.4095	657.0382	546.9335	420.2517	280.7767	186.9382	195.8453	304.7653	463.5172	616.7231	745.0334	(97)
Space heating kWh	263.7201	199.5173	158.6278	69.0398	19.1317	0.0000	0.0000	0.0000	0.0000	74.8096	171.8834	268.4367	(98a)
Space heating requirement - total per year (kWh/year)												1225.1664	
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	263.7201	199.5173	158.6278	69.0398	19.1317	0.0000	0.0000	0.0000	0.0000	74.8096	171.8834	268.4367	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1225.1664	
Space heating per m2												19.5995	(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	442.4361	348.3008	356.7770	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9488	0.9766	0.9626	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	419.7838	340.1662	343.4462	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	610.0787	580.7883	531.7017	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	137.0124	179.0229	140.0620	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	34.2531	44.7557	35.0155	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												114.0243	(107)
Energy for space heating												19.5995	(99)
Energy for space cooling												1.8241	(108)
Total												21.4236	(109)
Fabric Energy Efficiency (TFEE)												21.4	(109)

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

1. Overall dwelling characteristics

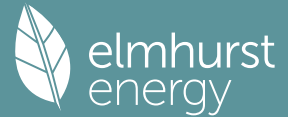
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.5100	2.4100	150.6491
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		
Dwelling volume			150.6491

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
Infiltration due to chimneys, flues and fans	0.0000 / (5) =	0.0000 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	1.6600	(17)
Infiltration rate	0.0830	(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) =	0.0705 (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	0.0900	0.0882	0.0864	0.0776	0.0758	0.0670	0.0670	0.0653	0.0705	0.0758	0.0794	0.0829	(22b)
Mechanical extract ventilation - centralised													
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(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													
Window			7.6400	1.2357	9.4411			(27)					
Corridor Door			2.0800	1.0000	2.0800			(26)					
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000	(29a)					
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940	(29a)					
Total net area of external elements Aum(A, m2)			30.2100					(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		16.6095			(33)					
Main dwelling													
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000	(32)					
Party Floor			62.5100			70.0000	4375.7000	(32d)					
Party Ceiling			62.5100			40.0000	2500.4000	(32b)					
GF Timber			134.3400			9.0000	1209.0600	(32c)					
Masonry Walls			4.0500			39.0000	157.9500	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11753.2040	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				3.6400	0.0370		0.1347						
E4 Jamb				16.6700	0.0140		0.2334						
E7 Party floor between dwellings (in blocks of flats)				17.5200	0.0390		0.6833						
E16 Corner (normal)				5.1600	0.0410		0.2116						
E18 Party wall between dwellings				5.1600	0.0390		0.2012						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.8500	0.0000		0.0000						
E2 Other lintels (including other steel lintels)				1.0200	0.0270		0.0275						
E4 Jamb				4.2000	0.0850		0.3570						
E7 Party floor between dwellings (in blocks of flats)				5.3200	0.0330		0.1756						
E25 Staggered party wall between dwellings				5.1600	0.0380		0.1961						
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400		1.3608						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)								3.5811 (36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	20.1906	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 24.8571	Feb 24.8571	Mar 24.8571	Apr 24.8571	May 24.8571	Jun 24.8571	Jul 24.8571	Aug 24.8571	Sep 24.8571	Oct 24.8571	Nov 24.8571	Dec 24.8571	(38)
Heat transfer coeff	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	(39)
Average = Sum(39)m / 12 =													45.0477
HLP	Jan 0.7206	Feb 0.7206	Mar 0.7206	Apr 0.7206	May 0.7206	Jun 0.7206	Jul 0.7206	Aug 0.7206	Sep 0.7206	Oct 0.7206	Nov 0.7206	Dec 0.7206	(40)
HLP (average)													0.7206
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

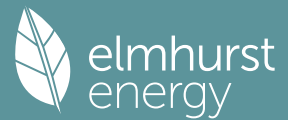
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0516 (42)
Hot water usage for mixer showers	58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	(42a)
Hot water usage for baths	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	(42b)
Hot water usage for other uses	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	(42c)
Average daily hot water use (litres/day)													109.9314 (43)
Daily hot water use	Jan 119.5909	Feb 117.0378	Mar 113.9283	Apr 109.1993	May 105.3593	Jun 101.2310	Jul 99.6440	Aug 102.7400	Sep 106.0054	Oct 110.3395	Nov 115.1413	Dec 119.2807	(44)
Energy conte	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648	(45)
Energy content (annual)										Total = Sum(45)m =			1825.9381
Distribution loss (46)m = 0.15 x (45)m	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147	(46)
Water storage loss:													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(64)
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993	(65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													0.0000 (64a)

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

Metabolic gains (Table 5), Watts													
(66)m	Jan 123.0984	Feb 123.0984	Mar 123.0984	Apr 123.0984	May 123.0984	Jun 123.0984	Jul 123.0984	Aug 123.0984	Sep 123.0984	Oct 123.0984	Nov 123.0984	Dec 123.0984	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3350	19.8377	16.1331	12.2138	9.1300	7.7079	8.3287	10.8259	14.5305	18.4498	21.5337	22.9557	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

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Water heating gains (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Total internal gains	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668 (72)
	464.8823	462.9773	448.0707	420.0389	392.5090	367.5158	352.7073	355.4242	369.6361	394.9978	425.7190	452.5210 (73)

6. Solar gains

[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
Northeast	7.6400		11.2829		0.4600		0.0000		0.7700		30.5326 (75)	
Solar gains	30.5326	62.1501	111.9746	183.8945	247.1903	263.5310	246.5279	196.5349	136.4428	75.9523	38.4180	24.9345 (83)
Total gains	495.4150	525.1274	560.0454	603.9334	639.6993	631.0468	599.2352	551.9591	506.0790	470.9501	464.1369	477.4555 (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	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738
alpha	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316
util living area	0.9683	0.9528	0.9106	0.8065	0.6346	0.4543	0.3304	0.3746	0.5999	0.8514	0.9482	0.9737 (86)
MIT	20.3560	20.4686	20.6616	20.8630	20.9694	20.9961	20.9995	20.9990	20.9829	20.8404	20.5603	20.3103 (87)
Th 2	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226 (88)
util rest of house	0.9622	0.9440	0.8948	0.7775	0.5938	0.4072	0.2797	0.3199	0.5459	0.8209	0.9370	0.9685 (89)
MIT 2	19.5795	19.7192	19.9541	20.1862	20.2966	20.3201	20.3224	20.3222	20.3103	20.1669	19.8353	19.5227 (90)
Living area fraction	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212	19.8333 (91)
MIT	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212	19.8333 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212	19.8333 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9575	0.9394	0.8925	0.7834	0.6084	0.4256	0.2997	0.3415	0.5663	0.8262	0.9332	0.9641 (94)
Useful gains	474.3824	493.3233	499.8543	473.0923	389.2104	268.5982	179.6018	188.4695	286.6173	389.0996	433.1409	460.3092 (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	702.0992	680.8830	618.6457	520.4397	399.2064	269.6872	179.7139	188.7073	291.7078	442.9311	586.5741	704.2430 (97)
Space heating kWh	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719	181.4868 (98a)
Space heating requirement - total per year (kWh/year)												757.3787
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	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719	181.4868 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												757.3787
Space heating per m2										(98c) / (4) =		12.1161 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Fraction of main heating from main system 2												0.0000 (203)
Fraction of total heating from main system 1												1.0000 (204)
Fraction of total heating from main system 2												0.0000 (205)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719	181.4868 (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)	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719	181.4868 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Space heating fuel used, main system 2												0.0000 (213)
Water heating												
Water heating requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (64)
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200 (216)
Fuel for water heating, kWh/month	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561 (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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966 (231)
Lighting	19.5497	15.6835	14.1212	10.3458	7.9914	6.5290	7.2900	9.4759	12.3082	16.1490	18.2403	20.0930 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)												
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)

1. Overall dwelling characteristics				
	Area (m ²)	Storey height (m)		Volume (m ³)
Main dwelling	62.5100	x	2.4100	150.6491
Ground floor	(1b)		(2b)	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	62.5100			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)		150.6491 (5)

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2. Ventilation rate

											m3 per hour				
Number of open chimneys	0 * 80 =											0.0000 (6a)			
Number of open flues	0 * 20 =											0.0000 (6b)			
Number of chimneys / flues attached to closed fire	0 * 10 =											0.0000 (6c)			
Number of flues attached to solid fuel boiler	0 * 20 =											0.0000 (6d)			
Number of flues attached to other heater	0 * 35 =											0.0000 (6e)			
Number of blocked chimneys	0 * 20 =											0.0000 (6f)			
Number of intermittent extract fans	0 * 10 =											0.0000 (7a)			
Number of passive vents	0 * 10 =											0.0000 (7b)			
Number of flueless gas fires	0 * 40 =											0.0000 (7c)			
											Air changes per hour				
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =											0.0000 / (5) =		0.0000 (8)	
Pressure test												Yes			
Pressure Test Method												Blower Door			
Measured/design AP50												1.6600		(17)	
Infiltration rate												0.0830		(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) =		0.0705 (21)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)		
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)		
Adj infilt rate	0.0776	0.0723	0.0723	0.0688	0.0688	0.0600	0.0600	0.0582	0.0600	0.0670	0.0653	0.0705	(22b)		
Mechanical extract ventilation - centralised													0.5000	(23a)	
If mechanical ventilation													0.5000	(23b)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)															
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)		

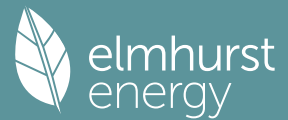
3. Heat losses and heat loss parameter

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												
Window			7.6400	1.2357	9.4411			(27)				
Corridor Door			2.0800	1.0000	2.0800			(26)				
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000	(29a)				
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940	(29a)				
Total net area of external elements Aum(A, m2)			30.2100					(31)				
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6095			(33)				
Main dwelling												
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000	(32)				
Party Floor			62.5100			70.0000	4375.7000	(32d)				
Party Ceiling			62.5100			40.0000	2500.4000	(32b)				
GF Timber			134.3400			9.0000	1209.0600	(32c)				
Masonry Walls			4.0500			39.0000	157.9500	(32c)				
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			11753.2040	(34)				
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212	(35)				
List of Thermal Bridges												
K1 Element				Length	Psi-value	Total						
E2 Other lintels (including other steel lintels)				3.6400	0.0370	0.1347						
E4 Jamb				16.6700	0.0140	0.2334						
E7 Party floor between dwellings (in blocks of flats)				17.5200	0.0390	0.6833						
E16 Corner (normal)				5.1600	0.0410	0.2116						
E18 Party wall between dwellings				5.1600	0.0390	0.2012						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.8500	0.0000	0.0000						
E2 Other lintels (including other steel lintels)				1.0200	0.0270	0.0275						
E4 Jamb				4.2000	0.0850	0.3570						
E7 Party floor between dwellings (in blocks of flats)				5.3200	0.0330	0.1756						
E25 Staggered party wall between dwellings				5.1600	0.0380	0.1961						
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400	1.3608						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5811	(36)				
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	20.1906	(37)				
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 24.8571	Feb 24.8571	Mar 24.8571	Apr 24.8571	May 24.8571	Jun 24.8571	Jul 24.8571	Aug 24.8571	Sep 24.8571	Oct 24.8571	Nov 24.8571	Dec 24.8571 (38)
Heat transfer coeff	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477 (39)
Average = Sum(39)m / 12 =												45.0477
HLP	Jan 0.7206	Feb 0.7206	Mar 0.7206	Apr 0.7206	May 0.7206	Jun 0.7206	Jul 0.7206	Aug 0.7206	Sep 0.7206	Oct 0.7206	Nov 0.7206	Dec 0.7206 (40)
HLP (average)												0.7206
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0516 (42)
Hot water usage for mixer showers												
Hot water usage for baths	58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942 (42a)
Hot water usage for other uses	25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)
Average daily hot water use (litres/day)	35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)
												109.9314 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807 (44)
Energy content (annual)	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1825.9381
Water storage loss:	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147 (46)

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Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6100 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8694 (55)
Total storage loss													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(56)
If cylinder contains dedicated solar storage													
	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514	(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													
	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(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													
	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(64)
													(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)
													(64a)
Heat gains from water heating, kWh/month													
	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993	(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	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	22.3350	19.8377	16.1331	12.2138	9.1300	7.7079	8.3287	10.8259	14.5305	18.4498	21.5337	22.9557	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	(69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													
	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	(71)
Water heating gains (Table 5)													
	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668	(72)
Total internal gains													
	464.8823	462.9773	448.0707	420.0389	392.5090	367.5158	352.7073	355.4242	369.6361	394.9978	425.7190	452.5210	(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				
Northeast			7.6400	13.7758		0.4600	0.0000		0.7700		37.2784	(75)	
Solar gains	37.2784	66.6945	119.8032	199.5854	260.4541	293.0530	271.7225	221.6095	155.6618	87.6716	46.2940	30.5591	(83)
Total gains	502.1608	529.6718	567.8739	619.6243	652.9631	660.5688	624.4298	577.0337	523.2980	482.6694	472.0130	483.0801	(84)

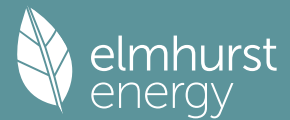
7. Mean internal temperature (heating season)

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	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	
alpha	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	
util living area													
	0.9608	0.9432	0.8867	0.7585	0.5629	0.3676	0.2452	0.2809	0.5253	0.8029	0.9324	0.9667	(86)
MIT	20.4263	20.5306	20.7315	20.9077	20.9850	20.9989	20.9999	20.9998	20.9921	20.8939	20.6349	20.3898	(87)
Th 2	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	(88)
util rest of house													
	0.9532	0.9326	0.8671	0.7253	0.5199	0.3218	0.1964	0.2281	0.4704	0.7656	0.9180	0.9601	(89)
MIT 2	19.6674	19.7958	20.0370	20.2343	20.3109	20.3220	20.3226	20.3226	20.3175	20.2244	19.9260	19.6224	(90)
Living area fraction													
MIT	19.9667	20.0856	20.3108	20.4998	20.5767	20.5890	20.5897	20.5896	20.5835	20.4884	20.2056	19.9250	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.9667	20.0856	20.3108	20.4998	20.5767	20.5890	20.5897	20.5896	20.5835	20.4884	20.2056	19.9250	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9485	0.9284	0.8668	0.7342	0.5362	0.3398	0.2157	0.2490	0.4918	0.7752	0.9152	0.9555	(94)
Useful gains	476.3194	491.7488	492.2112	454.9558	350.1319	224.4652	134.6652	143.6535	258.3170	374.1717	431.9912	461.5845	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	678.7186	657.0472	586.1086	486.5082	354.8277	224.7412	134.6790	143.6860	260.5352	409.4113	558.8427	676.8412	(97)
Space heating kWh													
	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(98a)
Space heating requirement - total per year (kWh/year)												635.4389	
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													
	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												635.4389	
Space heating per m2												10.1654	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Fraction of main heating from main system 2												0.0000	(203)
Fraction of total heating from main system 1												1.0000	(204)
Fraction of total heating from main system 2												0.0000	(205)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(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)	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(64)
Efficiency of water heater													
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(216)
Fuel for water heating, kWh/month	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561	(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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966	(231)
Lighting	19.5497	15.6835	14.1212	10.3458	7.9914	6.5290	7.2900	9.4759	12.3082	16.1490	18.2403	20.0930	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												635.4389	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												660.4428	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)													
mechanical ventilation fans (SFP = 0.2240)												41.1694	(230a)
Total electricity for the above, kWh/year												41.1694	(231)
Electricity for lighting (calculated in Appendix L)												157.7771	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1494.8283	(238)

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	635.4389	26.0600	165.5954	(240)
Space heating - main system 2	0.0000	26.0600	0.0000	(241)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	660.4428	26.0600	172.1114	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	41.1694	26.0600	10.7287	(249)
Energy for lighting	157.7771	26.0600	41.1167	(250)
Additional standing charges			0.0000	(251)
Total energy cost			389.5522	(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	635.4389	0.1577	100.1782	(261)
Space heating - main system 2	0.0000	0.0000	0.0000	(262)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	660.4428	0.1412	93.2240	(264)
Space and water heating			193.4022	(265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107	(267)
Energy for lighting	157.7771	0.1443	22.7721	(268)
Total CO2, kg/year			221.8850	(272)

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

	Energy kWh/year	Primary energy factor kg CO ₂ /kWh	Primary energy kWh/year
Space heating - main system 1	635.4389	1.5836	1006.2930 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO ₂ associated with community systems			0.0000 (473)
Water heating (other fuel)	660.4428	1.5219	1005.1598 (278)
Space and water heating			2011.4528 (279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810 (281)
Energy for lighting	157.7771	1.5338	242.0038 (282)
Total Primary energy kWh/year			2315.7376 (286)

SAP 10 EPC IMPROVEMENTS

Plot 041_ As Built

Current energy efficiency rating: B 86
Current environmental impact rating: A 97

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

Recommended measures:	SAP change	Cost change	CO ₂ change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m ²	

Potential energy efficiency rating: B 86
Potential environmental impact rating: A 97

Fuel prices for cost data on this page from database revision number 567 TEST (07 Mar 2025)
Recommendation texts revision number 6.1 (11 Jun 2019)

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

	Current	Potential	Saving
Electricity	£390	£390	£0
Space heating	£176	£176	£0
Water heating	£172	£172	£0
Lighting	£41	£41	£0
Total cost of fuels	£390	£390	£0
Total cost of uses	£389	£389	£0
Delivered energy	24 kWh/m ²	24 kWh/m ²	0 kWh/m ²
Carbon dioxide emissions	0.2 tonnes	0.2 tonnes	0.0 tonnes
CO ₂ emissions per m ²	4 kg/m ²	4 kg/m ²	0 kg/m ²
Primary energy	37 kWh/m ²	37 kWh/m ²	0 kWh/m ²

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Ground floor			(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 150.6491 (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) =	Air changes per hour
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	1.6600 (17)
	0.0830 (18)

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Number of sides sheltered

2 (19)

Shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$

Infiltration rate adjusted to include shelter factor

$$(21) = (18) \times (20) = 0.0705 \quad (21)$$

	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	0.0900	0.0882	0.0864	0.0776	0.0758	0.0670	0.0670	0.0653	0.0705	0.0758	0.0794	0.0829	(22b)
Mechanical extract ventilation - centralised													
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	(25)

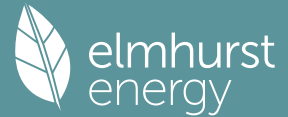
3. Heat losses and heat loss parameter

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								
Window			7.6400	1.2357	9.4411			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000	(29a)
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940	(29a)
Total net area of external elements Aum(A, m2)			30.2100					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6095			(33)
Main dwelling								
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000	(32)
Party Floor			62.5100			70.0000	4375.7000	(32d)
Party Ceiling			62.5100			40.0000	2500.4000	(32b)
GF Timber			134.3400			9.0000	1209.0600	(32c)
Masonry Walls			4.0500			39.0000	157.9500	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		11753.2040	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212	(35)
List of Thermal Bridges								
K1 Element					Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)					3.6400	0.0370	0.1347	
E4 Jamb					16.6700	0.0140	0.2334	
E7 Party floor between dwellings (in blocks of flats)					17.5200	0.0390	0.6833	
E16 Corner (normal)					5.1600	0.0410	0.2116	
E18 Party wall between dwellings					5.1600	0.0390	0.2012	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)					33.8500	0.0000	0.0000	
E2 Other lintels (including other steel lintels)					1.0200	0.0270	0.0275	
E4 Jamb					4.2000	0.0850	0.3570	
E7 Party floor between dwellings (in blocks of flats)					5.3200	0.0330	0.1756	
E25 Staggered party wall between dwellings					5.1600	0.0380	0.1961	
P8 Party Wall - Exposed floor (inverted)					5.6700	0.2400	1.3608	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5811	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss						(33) + (36) + (36a) =	20.1906	(37)

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0516 (42)
Hot water usage for mixer showers												
58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942 (42a)	
Hot water usage for baths												
25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456 (42b)	
Hot water usage for other uses												
35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408 (42c)	
Average daily hot water use (litres/day)												109.9314 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807 (44)	
Energy content (annual)												
189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648 (45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1825.9381
28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147 (46)	
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)	
If cylinder contains dedicated solar storage												
26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (57)	
Primary loss												0.0000 (59)
Combi loss												0.0000 (61)
Total heat required for water heating calculated for each month												
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (62)	
WWHRS												0.0000 (63a)
PV diverter												0.0000 (63b)
Solar input												0.0000 (63c)
FGHRS												0.0000 (63d)
Output from w/h												
216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (64)	
Total per year (kWh/year) = Sum(64)m =												2143.2691 (64)
Electric shower(s)												

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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 =											
Heat gains from water heating, kWh/month	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433
											62.0993 (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
(66)m	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3350	19.8377	16.1331	12.2138	9.1300	7.7079	8.3287	10.8259	14.5305	18.4498	21.5337
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Losses e.g. evaporation (negative values) (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656
Water heating gains (Table 5)	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545
Total internal gains	464.8823	462.9773	448.0707	420.0389	392.5090	367.5158	352.7073	355.4242	369.6361	394.9978	425.7190
											452.5210 (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					
Northeast			7.6400	11.2829	0.4600	0.0000	0.7700	30.5326 (75)				
Solar gains	30.5326	62.1501	111.9746	183.8945	247.1903	263.5310	246.5279	196.5349	136.4428	75.9523	38.4180	24.9345 (83)
Total gains	495.4150	525.1274	560.0454	603.9334	639.6993	631.0468	599.2352	551.9591	506.0790	470.9501	464.1369	477.4555 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)											
Utilisation factor for gains for living area, nil,m (see Table 9a)											
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
tau	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738
alpha	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316
util living area	0.9683	0.9528	0.9106	0.8065	0.6346	0.4543	0.3304	0.3746	0.5999	0.8514	0.9482
											0.9737 (86)
MIT	20.3560	20.4686	20.6616	20.8630	20.9694	20.9961	20.9995	20.9990	20.9829	20.8404	20.5603
Th 2	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226
util rest of house	0.9622	0.9440	0.8948	0.7775	0.5938	0.4072	0.2797	0.3199	0.5459	0.8209	0.9370
MIT 2	19.5795	19.7192	19.9541	20.1862	20.2966	20.3201	20.3224	20.3222	20.3103	20.1669	19.8353
Living area fraction	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212
MIT	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212
Temperature adjustment											0.0000
adjusted MIT	19.8857	20.0147	20.2331	20.4531	20.5619	20.5867	20.5894	20.5891	20.5755	20.4325	20.1212
											19.8333 (93)

8. Space heating requirement

Utilisation	0.9575	0.9394	0.8925	0.7834	0.6084	0.4256	0.2997	0.3415	0.5663	0.8262	0.9332
Useful gains	474.3824	493.3233	499.8543	473.0923	389.2104	268.5982	179.6018	188.4695	286.6173	389.0996	433.1409
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000
Heat loss rate W	702.0992	680.8830	618.6457	520.4397	399.2064	269.6872	179.7139	188.7073	291.7078	442.9311	586.5741
Space heating kWh	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719
Space heating requirement - total per year (kWh/year)											181.4868
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
Solar heating contribution - total per year (kWh/year)											0.0000
Space heating kWh	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719
Space heating requirement after solar contribution - total per year (kWh/year)											181.4868
Space heating per m2										(98c) / (4) =	12.1161
											(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)											
Fraction of space heat from main system(s)											0.0000 (201)
Fraction of main heating from main system 2											1.0000 (202)
Fraction of total heating from main system 1											0.0000 (203)
Fraction of total heating from main system 2											1.0000 (204)
Efficiency of main space heating system 1 (in %)											0.0000 (205)
Efficiency of main space heating system 2 (in %)											100.0000 (206)
Efficiency of secondary/supplementary heating system, %											0.0000 (207)
											0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov
Space heating requirement	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719
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
Space heating fuel (main heating system)	169.4213	126.0401	88.3808	34.0902	7.4370	0.0000	0.0000	0.0000	0.0000	40.0507	110.4719
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)
Space heating fuel used, main system 2												0.0000	(213)
Water heating													
Water heating requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(64)
Efficiency of water heater												324.5200	(216)
(217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(217)
Fuel for water heating, kWh/month	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561	(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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.4966	3.3838	3.4966	3.3838	3.4966	(231)
Lighting	19.5497	15.6835	14.1212	10.3458	7.9914	6.5290	7.2900	9.4759	12.3082	16.1490	18.2403	20.0930	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235a)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235c)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235c)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)													
(234b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)													
(235b)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)													
(235d)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(235d)
Annual totals kWh/year													
Space heating fuel - main system 1												757.3787	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												324.5200	
Water heating fuel used												660.4428	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)													
mechanical ventilation fans (SFP = 0.2240)												41.1694	(230a)
Total electricity for the above, kWh/year												41.1694	(231)
Electricity for lighting (calculated in Appendix L)												157.7771	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												0.0000	(233)
Wind generation												0.0000	(234)
Hydro-electric generation (Appendix N)												0.0000	(235a)
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)
Appendix Q - special features													
Energy saved or generated												-0.0000	(236)
Energy used												0.0000	(237)
Total delivered energy for all uses												1616.7680	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	757.3787	16.4900	124.8917 (240)
Space heating - main system 2	0.0000	16.4900	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	660.4428	16.4900	108.9070 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	41.1694	16.4900	6.7888 (249)
Energy for lighting	157.7771	16.4900	26.0174 (250)
Additional standing charges			0.0000 (251)
Total energy cost			266.6050 (255)

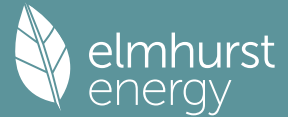
11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		0.8927 (257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	85.5288
SAP rating (Section 12)		86 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	757.3787	0.1570	118.8714 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	660.4428	0.1412	93.2240 (264)
Space and water heating			212.0954 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	157.7771	0.1443	22.7721 (268)
Total CO2, kg/year			240.5783 (272)
CO2 emissions per m2			3.8500 (273)
EI value			97.0014
EI rating			97 (274)
EI band			A

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

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.5100 (1b)	x 2.4100 (2b)	= 150.6491 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.5100		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 150.6491 (5)

2. Ventilation rate

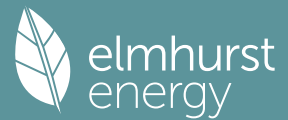
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
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	1.6600 (17)
Infiltration rate	0.0830 (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) = 0.0705 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000 (22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000 (22a)
Adj infilt rate	0.0776	0.0723	0.0723	0.0688	0.0688	0.0600	0.0600	0.0582	0.0600	0.0670	0.0653	0.0705 (22b)
Mechanical extract ventilation - centralised												
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)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (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													
Window			7.6400	1.2357	9.4411			(27)					
Corridor Door			2.0800	1.0000	2.0800			(26)					
EW Brick AAC018/019	23.3500	7.6400	15.7100	0.2600	4.0846	60.0000	942.6000	(29a)					
E-WM-30 Corridor Wall	6.8600	2.0800	4.7800	0.2100	1.0038	52.3000	249.9940	(29a)					
Total net area of external elements Aum(A, m2)			30.2100					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	16.6095			(33)					
Main dwelling													
Party Wall			51.5000	0.0000	0.0000	45.0000	2317.5000	(32)					
Party Floor			62.5100			70.0000	4375.7000	(32d)					
Party Ceiling			62.5100			40.0000	2500.4000	(32b)					
GF Timber			134.3400			9.0000	1209.0600	(32c)					
Masonry Walls			4.0500			39.0000	157.9500	(32c)					
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	11753.2040	(34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							188.0212	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				3.6400	0.0370	0.1347							
E4 Jamb				16.6700	0.0140	0.2334							
E7 Party floor between dwellings (in blocks of flats)				17.5200	0.0390	0.6833							
E16 Corner (normal)				5.1600	0.0410	0.2116							
E18 Party wall between dwellings				5.1600	0.0390	0.2012							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				33.8500	0.0000	0.0000							
E2 Other lintels (including other steel lintels)				1.0200	0.0270	0.0275							
E4 Jamb				4.2000	0.0850	0.3570							
E7 Party floor between dwellings (in blocks of flats)				5.3200	0.0330	0.1756							
E25 Staggered party wall between dwellings				5.1600	0.0380	0.1961							
P8 Party Wall - Exposed floor (inverted)				5.6700	0.2400	1.3608							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.5811	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	20.1906	(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	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	24.8571	(38)
Average = Sum(39)m / 12 =	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	45.0477	(39)
												45.0477	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	0.7206	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

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4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0516 (42)
Hot water usage for mixer showers												
58.6188	57.7379	56.4542	53.9981	52.1856	50.1643	49.0153	50.2893	51.6858	53.8561	56.3650	58.3942	(42a)
Hot water usage for baths												
25.3312	24.9550	24.4253	23.4485	22.7170	21.9060	21.4679	21.9940	22.5668	23.4346	24.4315	25.2456	(42b)
Hot water usage for other uses												
35.6408	34.3448	33.0488	31.7527	30.4567	29.1607	29.1607	30.4567	31.7527	33.0488	34.3448	35.6408	(42c)
Average daily hot water use (litres/day)												109.9314 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	119.5909	117.0378	113.9283	109.1993	105.3593	101.2310	99.6440	102.7400	106.0054	110.3395	115.1413	119.2807 (44)
Energy content (annual)	189.4028	166.6602	175.1035	149.4884	141.8339	124.4753	120.5107	127.2136	130.7152	149.7297	164.0399	186.7648 (45)
Distribution loss (46)m = 0.15 x (45)m	28.4104	24.9990	26.2655	22.4233	21.2751	18.6713	18.0766	19.0820	19.6073	22.4595	24.6060	28.0147 (46)
Water storage loss:												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8694 (55)
Total storage loss	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (56)
If cylinder contains dedicated solar storage	26.9514	24.3432	26.9514	26.0820	26.9514	26.0820	26.9514	26.9514	26.0820	26.9514	26.0820	26.9514 (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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162 (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	62.9764	55.4145	58.2219	49.7049	47.1598	41.3880	40.0698	42.2985	43.4628	49.7851	54.5433	62.0993 (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	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984	123.0984 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	22.3350	19.8377	16.1331	12.2138	9.1300	7.7079	8.3287	10.8259	14.5305	18.4498	21.5337	22.9557 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	267.5073	270.2832	263.2881	248.3962	229.5979	211.9302	200.1271	197.3512	204.3463	219.2382	238.0365	255.7042 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615	49.3615 (69)
Pumps, fans	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Losses e.g. evaporation (negative values) (Table 5)	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656	-82.0656 (71)
Water heating gains (Table 5)	84.6457	82.4621	78.2553	69.0346	63.3868	57.4834	53.8573	56.8529	60.3650	66.9155	75.7545	83.4668 (72)
Total internal gains	464.8823	462.9773	448.0707	420.0389	392.5090	367.5158	352.7073	355.4242	369.6361	394.9978	425.7190	452.5210 (73)

6. Solar gains

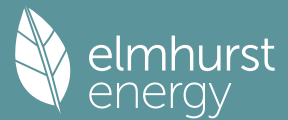
[Jan]	Area		Solar flux		g		FF		Access		Gains	
	m2		Table 6a		Specific data		Specific data		factor		W	
			W/m2		or Table 6b		or Table 6c		Table 6d			
Northeast	7.6400		13.7758		0.4600		0.0000		0.7700		37.2784 (75)	
Solar gains	37.2784	66.6945	119.8032	199.5854	260.4541	293.0530	271.7225	221.6095	155.6618	87.6716	46.2940	30.5591 (83)
Total gains	502.1608	529.6718	567.8739	619.6243	652.9631	660.5688	624.4298	577.0337	525.2980	482.6694	472.0130	483.0801 (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)												
tau	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738	72.4738
alpha	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316	5.8316
util living area	0.9608	0.9432	0.8867	0.7585	0.5629	0.3676	0.2452	0.2809	0.5253	0.8029	0.9324	0.9667 (86)
MIT	20.4263	20.5306	20.7315	20.9077	20.9850	20.9989	20.9999	20.9998	20.9921	20.8939	20.6349	20.3898 (87)
Th 2	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226	20.3226 (88)
util rest of house	0.9532	0.9326	0.8671	0.7253	0.5199	0.3218	0.1964	0.2281	0.4704	0.7656	0.9180	0.9601 (89)
MIT 2	19.6674	19.7958	20.0370	20.2343	20.3109	20.3220	20.3226	20.3226	20.3175	20.2244	19.9260	19.6224 (90)
Living area fraction	19.9667	20.0856	20.3108	20.4998	20.5767	20.5890	20.5897	20.5896	20.5835	20.4884	20.2056	0.3943 (91)
Temperature adjustment	19.9667	20.0856	20.3108	20.4998	20.5767	20.5890	20.5897	20.5896	20.5835	20.4884	20.2056	19.9250 (92)
adjusted MIT	19.9667	20.0856	20.3108	20.4998	20.5767	20.5890	20.5897	20.5896	20.5835	20.4884	20.2056	19.9250 (93)

8. Space heating requirement

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9485	0.9284	0.8668	0.7342	0.5362	0.3398	0.2157	0.2490	0.4918	0.7752	0.9152	0.9555	(94)
Useful gains	476.3194	491.7488	492.2112	454.9558	350.1319	224.4652	134.6652	143.6535	258.3170	374.1717	431.9912	461.5845	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	678.7186	657.0472	586.1086	486.5082	354.8277	224.7412	134.6790	143.6860	260.5352	409.4113	558.8427	676.8412	(97)
Space heating kWh	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(98a)
Space heating requirement - total per year (kWh/year)												635.4389	
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	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												635.4389	
Space heating per m2										(98c) / (4) =		10.1654	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Fraction of main heating from main system 2													0.0000	(203)
Fraction of total heating from main system 1													1.0000	(204)
Fraction of total heating from main system 2													0.0000	(205)
Efficiency of main space heating system 1 (in %)													100.0000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec			
Space heating requirement	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(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)	150.5850	111.0805	69.8597	22.7177	3.4937	0.0000	0.0000	0.0000	0.0000	26.2182	91.3331	160.1510	(211)	
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)	
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)	
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)	
Space heating fuel used, main system 2												0.0000	(213)	
Water heating														
Water heating requirement	216.3542	191.0034	202.0549	175.5704	168.7853	150.5573	147.4621	154.1650	156.7972	176.6811	190.1219	213.7162	(64)	
Efficiency of water heater (217)m	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	(216)	
Fuel for water heating, kWh/month	66.6690	58.8572	62.2627	54.1016	52.0108	46.3938	45.4401	47.5056	48.3167	54.4438	58.5856	65.8561	(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	3.4966	3.1582	3.4966	3.3838	3.4966	3.3838	3.4966	3.3838	3.4966	3.3838	3.4966	3.3838	(231)	
Lighting	19.5497	15.6835	14.1212	10.3458	7.9914	6.5290	7.2900	9.4759	12.3082	16.1490	18.2403	20.0930	(232)	
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	(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												635.4389	(211)	
Space heating fuel - main system 2												0.0000	(213)	
Space heating fuel - secondary												0.0000	(215)	
Efficiency of water heater												324.5200		
Water heating fuel used												660.4428	(219)	
Space cooling fuel												0.0000	(221)	
Electricity for pumps and fans:														
(MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)														
mechanical ventilation fans (SFP = 0.2240)												41.1694	(230a)	
Total electricity for the above, kWh/year												41.1694	(231)	
Electricity for lighting (calculated in Appendix L)												157.7771	(232)	
Energy saving/generation technologies (Appendices M ,N and Q)														
PV generation												0.0000	(233)	
Wind generation												0.0000	(234)	
Hydro-electric generation (Appendix N)												0.0000	(235a)	
Electricity generated - Micro CHP (Appendix N)												0.0000	(235)	
Appendix Q - special features														
Energy saved or generated												-0.0000	(236)	
Energy used												0.0000	(237)	
Total delivered energy for all uses												1494.8283	(238)	

10a. Fuel costs - using BEDF prices (567)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	635.4389	26.0600	165.5954 (240)
Space heating - main system 2	0.0000	26.0600	0.0000 (241)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	660.4428	26.0600	172.1114 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	41.1694	26.0600	10.7287 (249)
Energy for lighting	157.7771	26.0600	41.1167 (250)

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Additional standing charges
Total energy cost

0.0000 (251)
389.5522 (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	635.4389	0.1577	100.1782 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	660.4428	0.1412	93.2240 (264)
Space and water heating			193.4022 (265)
Pumps, fans and electric keep-hot	41.1694	0.1387	5.7107 (267)
Energy for lighting	157.7771	0.1443	22.7721 (268)
Total CO2, kg/year			221.8850 (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	635.4389	1.5836	1006.2930 (275)
Space heating - main system 2	0.0000	0.0000	0.0000 (276)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	660.4428	1.5219	1005.1598 (278)
Space and water heating			2011.4528 (279)
Pumps, fans and electric keep-hot	41.1694	1.5128	62.2810 (281)
Energy for lighting	157.7771	1.5338	242.0038 (282)
Total Primary energy kWh/year			2315.7376 (286)