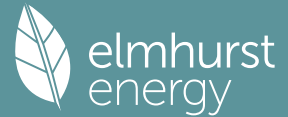


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Property Reference	4907-AU06-6316-047				Issued on Date	19/03/2025
Assessment Reference	Plot 047	Prop Type Ref	TF Flat-TC			
Property	Flat 9, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	79 C	DER	5.91	TER	13.11	
Environmental	96 A	% DER < TER				54.92
CO ₂ Emissions (t/year)	0.32	DFEE	32.42	TFEE	34.05	
Compliance Check	See BREL	% DFEE < TFEE				4.78
% DPER < TPER	11.59	DPER	61.13	TPER	69.14	
Assessor Details	Mr. Paul Frearson				Assessor ID	AA61-0001
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	62.9000 (1b)	2.4600 (2b)	154.7340 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		154.7340 (4)
Dwelling volume			154.7340 (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	3.4800	(17)
Infiltration rate	0.1740	(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) =	0.1479 (21)

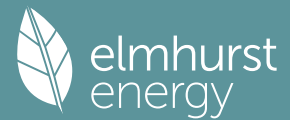
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1886	0.1849	0.1812	0.1627	0.1590	0.1405	0.1405	0.1368	0.1479	0.1590	0.1664	0.1738 (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 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			9.5500	1.2357	11.8013		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999 (29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000 (29a)
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000 (30)
Total net area of external elements Aum(A, m ²)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	32.1953	(33)
Main dwelling							
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	10350.7299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K		164.5585 (35)
List of Thermal Bridges		

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.4600	0.0370	0.2020
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	21.0500	0.0140	0.2947
E7 Party floor between dwellings (in blocks of flats)	22.9900	0.0390	0.8966
E16 Corner (normal)	7.3800	0.0410	0.3026
E18 Party wall between dwellings	2.4600	0.0390	0.0959
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	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)	1.6700	0.0330	0.0551
E25 Staggered party wall between dwellings	2.4600	0.0380	0.0935
E10 Eaves (insulation at ceiling level)	14.6700	0.0360	0.5281
E12 Gable (insulation at ceiling level)	1.6700	0.0280	0.0468
E12 Gable (insulation at ceiling level)	8.3200	0.0330	0.2746
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.0330	0.2340
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.4411 (36)
Point Thermal bridges			0.0000 (36a) =
Total fabric heat loss			35.6365 (37) (33) + (36) + (36a) =

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	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311
Average = Sum(39)m / 12 =	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.0623 (42)											
Hot water usage for mixer showers	58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728
Hot water usage for baths	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224
Hot water usage for other uses	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503
Average daily hot water use (litres/day)	28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455
Energy conte	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360
Energy content (annual)	Total = Sum(45)m = 1831.5229											1831.5229
Distribution loss (46)m = 0.15 x (45)m	28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004
Water storage loss:												200.0000
Store volume												1.6100
a) If manufacturer declared loss factor is known (kWh/day):												0.5400
Temperature factor from Table 2b												0.8694
Enter (49) or (54) in (55)												0.8694
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
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
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Total heat required for water heating calculated for each month	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
Output from w/h	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874
12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 2148.8539											2149
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
Heat gains from water heating, kWh/month	63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892

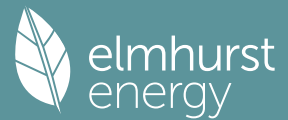
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.8356	106.1038	95.8356	99.0302	95.8356	99.0302	95.8356	95.8356	99.0302	95.8356	99.0302	95.8356
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116
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
Losses e.g. evaporation (negative values) (Table 5)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221
Total internal gains	414.8723	424.8200	405.6201	389.5344	368.0120	353.3838	338.6013	339.7362	351.1656	364.5730	389.2964	405.7390

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	

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Southeast			1.9100		36.7938		0.4600		0.0000		0.7700	24.8918 (77)
Northwest			7.6400		11.2829		0.4600		0.0000		0.7700	30.5326 (81)

Solar gains	55.4245	104.5501	169.9882	255.7761	327.7037	343.4622	323.5900	267.1573	199.2592	122.8133	68.2326	46.2367 (83)
Total gains	470.2968	529.3700	575.6083	645.3105	695.7157	696.8459	662.1913	606.8935	550.4249	487.3863	457.5291	451.9757 (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	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053
alpha	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337
util living area												
	0.9777	0.9629	0.9341	0.8561	0.7170	0.5378	0.4005	0.4531	0.6866	0.8957	0.9628	0.9809 (86)
MIT	19.6276	19.8392	20.1466	20.5415	20.8288	20.9592	20.9905	20.9843	20.8922	20.5123	19.9989	19.5724 (87)
Th 2	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063 (88)
util rest of house												
	0.9732	0.9556	0.9209	0.8287	0.6690	0.4707	0.3218	0.3695	0.6197	0.8691	0.9542	0.9770 (89)
MIT 2	18.5100	18.7761	19.1589	19.6339	19.9534	20.0787	20.1020	20.0987	20.0240	19.6113	18.9807	18.4404 (90)
Living area fraction												
MIT	18.9492	19.1939	19.5471	19.9906	20.2975	20.4247	20.4512	20.4468	20.3652	19.9654	19.3809	18.8853 (92)
Temperature adjustment												0.0000
adjusted MIT	18.9492	19.1939	19.5471	19.9906	20.2975	20.4247	20.4512	20.4468	20.3652	19.9654	19.3809	18.8853 (93)

8. Space heating requirement												

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9657	0.9463	0.9112	0.8248	0.6798	0.4952	0.3525	0.4019	0.6401	0.8643	0.9454	0.9701 (94)
Useful gains	454.1502	500.9628	524.4928	532.2454	472.9260	345.0481	233.4405	243.8959	352.3526	421.2413	432.5325	438.4467 (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												
	896.0587	874.3262	798.0578	678.3844	525.8855	356.2850	235.5680	247.5301	383.2262	572.8582	751.1905	898.2624 (97)
Space heating kWh												
	328.7800	250.9002	203.5324	105.2200	39.4018	0.0000	0.0000	0.0000	0.0000	112.8030	229.4338	342.1029 (98a)
Space heating requirement - total per year (kWh/year)												1612.1740
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												
	328.7800	250.9002	203.5324	105.2200	39.4018	0.0000	0.0000	0.0000	0.0000	112.8030	229.4338	342.1029 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1612.1740
Space heating per m2										(98c) / (4) =		25.6307 (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	328.7800	250.9002	203.5324	105.2200	39.4018	0.0000	0.0000	0.0000	0.0000	112.8030	229.4338	342.1029 (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)												
	328.7800	250.9002	203.5324	105.2200	39.4018	0.0000	0.0000	0.0000	0.0000	112.8030	229.4338	342.1029 (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												
	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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												
	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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												
	3.5914	3.2438	3.5914	3.4755	3.5914	3.4755	3.5914	3.5914	3.4755	3.5914	3.4755	3.5914 (231)
Lighting												
	18.7477	15.0401	13.5420	9.9214	7.6636	6.2612	6.9910	9.0872	11.8033	15.4866	17.4921	19.2688 (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												1612.1740 (211)

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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	662.1638	(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)	42.2857	(230a)
Total electricity for the above, kWh/year	42.2857	(231)
Electricity for lighting (calculated in Appendix L)	151.3051	(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	2467.9286	(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	1612.1740	0.1556	250.8716	(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)	662.1638	0.1412	93.4677	(264)
Space and water heating			344.3393	(265)
Pumps, fans and electric keep-hot	42.2857	0.1387	5.8655	(267)
Energy for lighting	151.3051	0.1443	21.8380	(268)
Total CO2, kg/year			372.0428	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.9100	(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	1612.1740	1.5761	2540.9519	(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)	662.1638	1.5220	1007.7817	(278)
Space and water heating			3548.7336	(279)
Pumps, fans and electric keep-hot	42.2857	1.5128	63.9698	(281)
Energy for lighting	151.3051	1.5338	232.0768	(282)
Total Primary energy kWh/year			3844.7802	(286)
Dwelling Primary energy Rate (DPER)			61.1300	(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	62.9000	2.4600	154.7340	(1b) - (3b)
Ground floor				
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000			(4)
Dwelling volume			154.7340	(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) =	0.1293 (8)
Pressure test			Yes
Pressure Test Method			Blower Door
Measured/design AP50			5.0000 (17)
Infiltration rate			0.3793 (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) =		0.3224 (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)

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Adj infilt rate	0.4110	0.4030	0.3949	0.3546	0.3465	0.3062	0.3062	0.2982	0.3224	0.3465	0.3627	0.3788 (22b)
Effective ac	0.5845	0.5812	0.5780	0.5629	0.5600	0.5469	0.5469	0.5445	0.5520	0.5600	0.5658	0.5717 (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							
TER Opaque door			2.0800	1.0000	2.0800		(26)
TER Opening Type			9.5500	1.1450	10.9351		(27)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.1800	8.4690		(29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.1800	0.3600		(29a)
PR 500mm MW044	62.9000		62.9000	0.1100	6.9190		(30)
Total net area of external elements Aum(A, m2)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26) ... (30) + (32) =		28.7631		(33)
Main dwelling							
Party Wall			17.4400	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							164.5585 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.4600	0.0500	0.2730
E3 Sill	3.6400	0.0500	0.1820
E4 Jamb	21.0500	0.0500	1.0525
E7 Party floor between dwellings (in blocks of flats)	22.9900	0.0700	1.6093
E16 Corner (normal)	7.3800	0.0900	0.6642
E18 Party wall between dwellings	2.4600	0.0600	0.1476
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	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)	1.6700	0.0700	0.1169
E25 Staggered party wall between dwellings	2.4600	0.0600	0.1476
E10 Eaves (insulation at ceiling level)	14.6700	0.0600	0.8802
E12 Gable (insulation at ceiling level)	1.6700	0.0600	0.1002
E12 Gable (insulation at ceiling level)	8.3200	0.0600	0.4992
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.1200	0.8508
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			6.7845 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 35.5476 (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	29.8442	29.6767	29.5126	28.7415	28.5972	27.9256	27.9256	27.8012	28.1843	28.5972	28.8891	29.1942 (38)
Average = Sum(39)m / 12 =	65.3918	65.2243	65.0602	64.2891	64.1448	63.4732	63.4732	63.3489	63.7319	64.1448	64.4367	64.7418 (39)
												64.2884
HLP	1.0396	1.0370	1.0343	1.0221	1.0198	1.0091	1.0091	1.0071	1.0132	1.0198	1.0244	1.0293 (40)
HLP (average)												1.0221
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

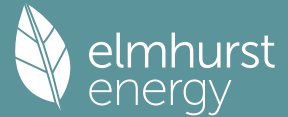
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728 (42a)	
Hot water usage for baths												
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)	
Hot water usage for other uses												
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)	
Average daily hot water use (litres/day)												110.2677 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)	
Energy content (annual)	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1831.5229
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004 (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 (61)	
Total heat required for water heating calculated for each month												
236.5770	209.2557	222.2340	195.0375	188.8626	169.9478	167.4742	174.1976	176.2069	196.7826	209.6335	233.9309 (62)	
WWHRS	-26.8800	-23.7729	-24.8936	-20.6129	-19.2105	-16.4386	-15.4085	-16.3854	-17.0080	-20.0505	-22.7148	-26.3822 (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												
209.6970	185.4828	197.3404	174.4246	169.6521	153.5093	152.0657	157.8122	159.1989	176.7320	186.9187	207.5487 (64)	
12Total per year (kWh/year)												2130.3824 (64)
Electric shower(s)												2130 (64)
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												
100.4450	89.2526	95.6759	85.9304	84.5799	77.5881	77.4683	79.7038	79.6692	87.2133	90.7836	99.5651 (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
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(66)m	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.8356	106.1038	95.8356	99.0302	95.8356	99.0302	95.8356	95.8356	99.0302	95.8356	99.0302	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	135.0067	132.8164	128.5967	119.3478	113.6827	107.7612	104.1241	107.1288	110.6517	117.2222	126.0883	(72)
Total internal gains	467.9744	477.9220	458.7222	442.6364	421.1140	403.4858	388.7033	389.8382	401.2677	417.6750	442.3985	(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	
Southeast				1.9100	36.7938	0.6300	0.7000		0.7700		21.4773 (77)	
Northwest				7.6400	11.2829	0.6300	0.7000		0.7700		26.3444 (81)	
Solar gains	47.8217	90.2085	146.6702	220.6903	282.7513	296.3481	279.2019	230.5103	171.9261	105.9665	58.8729	39.8942 (83)
Total gains	515.7961	568.1305	605.3924	663.3267	703.8653	699.8339	667.9053	620.3485	573.1937	523.6416	501.2714	498.7353 (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	43.9688	44.0818	44.1930	44.7230	44.8236	45.2979	45.2979	45.3868	45.1140	44.8236	44.6206	44.4103
alpha	3.9313	3.9388	3.9462	3.9815	3.9882	4.0199	4.0199	4.0258	4.0076	3.9882	3.9747	3.9607
util living area	0.9716	0.9571	0.9300	0.8574	0.7286	0.5512	0.4107	0.4576	0.6831	0.8832	0.9536	0.9748 (86)
MIT	19.5811	19.7833	20.0854	20.4955	20.7980	20.9504	20.9880	20.9817	20.8835	20.5062	19.9931	19.5518 (87)
Th 2	20.0505	20.0527	20.0548	20.0650	20.0669	20.0757	20.0757	20.0774	20.0723	20.0669	20.0630	20.0590 (88)
util rest of house	0.9659	0.9486	0.9159	0.8295	0.6797	0.4812	0.3277	0.3709	0.6144	0.8540	0.9430	0.9697 (89)
MIT 2	18.4121	18.6670	19.0445	19.5463	19.8863	20.0421	20.0704	20.0686	19.9841	19.5712	18.9413	18.3810 (90)
Living area fraction									fLA = Living area / (4) =			0.3930 (91)
MIT	18.8715	19.1057	19.4536	19.9194	20.2446	20.3991	20.4310	20.4274	20.3376	19.9386	19.3547	18.8411 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8715	19.1057	19.4536	19.9194	20.2446	20.3991	20.4310	20.4274	20.3376	19.9386	19.3547	18.8411 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	493.5271	532.9819	547.9990	547.0127	485.3464	354.3587	240.4877	250.8847	364.0702	444.7878	467.6999	479.3596 (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	952.8573	926.5591	842.7627	708.4252	548.0929	368.0884	243.1674	255.1336	397.5318	599.0243	789.6510	947.8937 (97)
Space heating kWh	341.7416	264.4839	219.3041	116.2170	46.6834	0.0000	0.0000	0.0000	0.0000	114.7519	231.8048	348.5894 (98a)
Space heating requirement - total per year (kWh/year)												1683.5762
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	341.7416	264.4839	219.3041	116.2170	46.6834	0.0000	0.0000	0.0000	0.0000	114.7519	231.8048	348.5894 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1683.5762
Space heating per m2										(98c) / (4) =		26.7659 (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
341.7416	264.4839	219.3041	116.2170	46.6834	0.0000	0.0000	0.0000	0.0000	0.0000	114.7519	231.8048	348.5894 (98)
Space heating efficiency (main heating system 1)	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 fuel (main heating system)	370.2509	286.5481	237.5993	125.9122	50.5779	0.0000	0.0000	0.0000	0.0000	124.3249	251.1428	377.6700 (211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement	209.6970	185.4828	197.3404	174.4246	169.6521	153.5093	152.0657	157.8122	159.1989	176.7320	186.9187	207.5487 (64)
Efficiency of water heater (217)m	85.1482	84.8551	84.2970	83.1706	81.5843	79.8000	79.8000	79.8000	79.8000	83.1164	84.5436	79.8000 (216)
Fuel for water heating, kWh/month	246.2730	218.5878	234.1013	209.7190	207.9470	192.3675	190.5585	197.7596	199.4974	212.6321	221.0916	243.5635 (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)

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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	19.9128	15.9748	14.3835	10.5380	8.1398	6.6503	7.4254	9.6518	12.5368	16.4489	18.5790	20.4662	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-21.5002	-31.3416	-46.5678	-54.1884	-60.0301	-56.6295	-55.9554	-52.0489	-45.4038	-36.6720	-24.0076	-18.4712	(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	-9.1991	-19.6293	-39.5295	-60.1225	-80.2232	-80.8559	-79.8853	-67.2888	-48.8746	-28.2969	-12.3561	-7.2524	(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												1824.0262	(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												2574.0983	(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)												160.7073	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-1036.3301	(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												3608.5017	(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	1824.0262	0.2100	383.0455	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2574.0983	0.2100	540.5606	(264)
Space and water heating			923.6061	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	160.7073	0.1443	23.1950	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.8164	0.1339	-67.3156	
PV Unit electricity exported	-533.5137	0.1255	-66.9739	
Total			-134.2895	(269)
Total CO2, kg/year			824.4409	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			13.1100	(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	1824.0262	1.1300	2061.1496	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2574.0983	1.1300	2908.7310	(278)
Space and water heating			4969.8806	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	160.7073	1.5338	246.4983	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-502.8164	1.4947	-751.5834	
PV Unit electricity exported	-533.5137	0.4608	-245.8314	
Total			-997.4148	(283)
Total Primary energy kWh/year			4349.0649	(286)
Target Primary Energy Rate (TPER)			69.1400	(287)

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

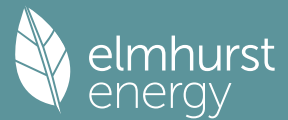
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.9000	(1b) x 2.4600 (2b)	= 154.7340	(1b) - (3b)
Ground floor				(4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000			
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 154.7340	(5)

2. Ventilation rate

m3 per hour

Full SAP Calculation Printout



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)

Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 20.0000 / (5) = 0.1293 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 3.4800 (17)
Infiltration rate 0.3033 (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) = 0.2578 (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	0.3287	0.3222	0.3158	0.2835	0.2771	0.2449	0.2449	0.2384	0.2578	0.2771	0.2900	0.3029 (22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5540	0.5519	0.5499	0.5402	0.5384	0.5300	0.5300	0.5284	0.5332	0.5384	0.5420	0.5459 (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			9.5500	1.2357	11.8013		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999 (29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000 (29a)
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000 (30)
Total net area of external elements Aum(A, m2)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)					32.1953		(32)
(26)...(30) + (32) =							
Main dwelling							
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 10350.7299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.5585 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.4600	0.0370	0.2020
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	21.0500	0.0140	0.2947
E7 Party floor between dwellings (in blocks of flats)	22.9900	0.0390	0.8966
E16 Corner (normal)	7.3800	0.0410	0.3026
E18 Party wall between dwellings	2.4600	0.0390	0.0959
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	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)	1.6700	0.0330	0.0551
E25 Staggered party wall between dwellings	2.4600	0.0380	0.0935
E10 Eaves (insulation at ceiling level)	14.6700	0.0360	0.5281
E12 Gable (insulation at ceiling level)	1.6700	0.0280	0.0468
E12 Gable (insulation at ceiling level)	8.3200	0.0330	0.2746
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.0330	0.2340

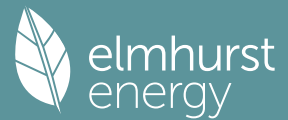
Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.4411 (36)
Point Thermal bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 35.6365 (37)

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 28.2888 28.1817 28.0767 27.5837 27.4915 27.0621 27.0621 26.9826 27.2275 27.4915 27.6781 27.8732 (38)
Heat transfer coeff 63.9253 63.8182 63.7132 63.2202 63.1280 62.6986 62.6986 62.6190 62.8640 63.1280 63.3146 63.5096 (39)
Average = Sum(39)m / 12 = 63.2198
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
HLP 1.0163 1.0146 1.0129 1.0051 1.0036 0.9968 0.9968 0.9955 0.9994 1.0036 1.0066 1.0097 (40)
HLP (average) 1.0051
Days in mont 31 28 31 30 31 30 31 31 30 31 30 31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.0623 (42)
Hot water usage for mixer showers 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (42a)
Hot water usage for baths 25.4083 25.0310 24.4996 23.5198 22.7862 21.9727 21.5332 22.0609 22.6355 23.5059 24.5059 25.3224 (42b)
Hot water usage for other uses 35.7503 34.4503 33.1503 31.8503 30.5503 29.2503 29.2503 30.5503 31.8503 33.1503 34.4503 35.7503 (42c)
Average daily hot water use (litres/day) 56.0578 (43)
Jan Feb Mar Apr May Jun Jul Aug Sep Oct Nov Dec
Daily hot water use 61.1586 59.4813 57.6499 55.3701 53.3364 51.2229 50.7835 52.6112 54.4857 56.6562 58.9562 61.0727 (44)
Energy conte 96.8603 84.7006 88.6057 75.7989 71.8011 62.9846 61.4182 65.1436 67.1864 76.8820 83.9939 95.6252 (45)
Energy content (annual) Total = Sum(45)m = 931.0004
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

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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 (56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	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)
WWHRS	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (62)
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 (63a)
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 (63b)
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 (63c)
Output from w/h	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)
12Total per year (kWh/year)	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (64)
Electric shower(s)	47.0875	41.9553	45.8136	43.7194	44.5397	42.4866	43.9028	44.5397	43.7194	45.8136	44.9521	47.0875 (64a)
Heat gains from water heating, kWh/month	32.3547	28.4877	30.2821	27.0371	26.3927	24.0059	24.0271	24.9780	25.2069	27.7908	29.0867	32.0922 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	791.3503 (64)											791 (64)

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	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.8356	106.1038	95.8356	99.0302	95.8356	99.0302	95.8356	95.8356	99.0302	95.8356	99.0302	95.8356	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	(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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	43.4875	42.3924	40.7018	37.5515	35.4740	33.3415	32.2945	33.5725	35.0096	37.3532	40.3982	43.1347	(72)
Total internal gains	373.4552	384.4981	367.8273	357.8402	339.9053	329.0661	316.8738	316.2819	325.6256	334.8061	353.7084	365.1516	(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	
Southeast					1.9100	36.7938	0.4600	0.0000	0.7700		24.8918 (77)	
Northwest					7.6400	11.2829	0.4600	0.0000	0.7700		30.5326 (81)	
Solar gains	55.4245	104.5501	169.9882	255.7761	327.7037	343.4622	323.5900	267.1573	199.2592	122.8133	68.2326	46.2367 (83)
Total gains	428.8796	489.0481	537.8155	613.6163	667.6090	672.5282	640.4638	583.4393	524.8849	457.6194	421.9411	411.3883 (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	44.9776	45.0530	45.1273	45.4792	45.5456	45.8576	45.8576	45.9158	45.7369	45.5456	45.4114	45.2719	
alpha	3.9985	4.0035	4.0085	4.0319	4.0364	4.0572	4.0572	4.0611	4.0491	4.0364	4.0274	4.0181	
util living area	0.9842	0.9725	0.9488	0.8786	0.7469	0.5647	0.4226	0.4791	0.7192	0.9157	0.9724	0.9865 (86)	
MIT	19.4408	19.6662	20.0001	20.4529	20.7856	20.9478	20.9873	20.9793	20.8634	20.4244	19.8622	19.4002 (87)	
Th 2	20.0698	20.0712	20.0726	20.0791	20.0803	20.0860	20.0860	20.0871	20.0838	20.0803	20.0778	20.0753 (88)	
util rest of house	0.9809	0.9668	0.9379	0.8535	0.6992	0.4944	0.3384	0.3901	0.6519	0.8925	0.9656	0.9837 (89)	
MIT 2	18.6507	18.8739	19.2013	19.6357	19.9295	20.0582	20.0815	20.0791	20.0014	19.6197	19.0746	18.6147 (90)	
Living area fraction	18.9612	19.1853	19.5153	19.9569	20.2660	20.4078	20.4375	20.4329	fLA = Living area / (4) =				0.3930 (91)
MIT	18.9612	19.1853	19.5153	19.9569	20.2660	20.4078	20.4375	20.4329	20.3402	19.9360	19.3841	18.9234 (92)	
Temperature adjustment												0.0000	
adjusted MIT	18.9612	19.1853	19.5153	19.9569	20.2660	20.4078	20.4375	20.4329	20.3402	19.9360	19.3841	18.9234 (93)	

8. Space heating requirement

Utilisation	0.9757	0.9599	0.9301	0.8498	0.7095	0.5199	0.3712	0.4245	0.6720	0.8882	0.9591	0.9790	(94)
Useful gains	418.4579	469.4476	500.1954	521.4375	473.6448	349.6333	237.7566	247.6888	352.7049	406.4747	404.7018	402.7438	(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	937.2229	911.6606	829.2436	699.0165	540.7533	364.1421	240.6060	252.5356	392.2815	589.3602	777.7634	935.0783	(97)
Space heating kWh	385.9611	297.1671	244.8119	127.8569	49.9287	0.0000	0.0000	0.0000	0.0000	136.0668	268.6043	396.0569	(98a)
Space heating requirement - total per year (kWh/year)	1906.4537											1906.4537	
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	
Space heating kWh	385.9611	297.1671	244.8119	127.8569	49.9287	0.0000	0.0000	0.0000	0.0000	136.0668	268.6043	396.0569	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	1906.4537											1906.4537	
Space heating per m ²	(98c) / (4) =											30.3093	(99)

8c. Space cooling requirement

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

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	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													
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	589.3665	463.9694	475.9048	0.0000	0.0000	0.0000	0.0000	(100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.8845	0.9306	0.9036	0.0000	0.0000	0.0000	0.0000	(101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	521.2763	431.7785	430.0079	0.0000	0.0000	0.0000	0.0000	(102)
Space cooling kWh						746.9328	711.4670	646.7106	0.0000	0.0000	0.0000	0.0000	(103)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	162.4727	208.0883	161.2268	0.0000	0.0000	0.0000	0.0000	(104)
Intermittency factor (Table 10b)									fc = cooled area / (4) =				1.0000 (105)
Space cooling kWh	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 requirement	0.0000	0.0000	0.0000	0.0000	0.0000	40.6182	52.0221	40.3067	0.0000	0.0000	0.0000	0.0000	(107)
Energy for space heating													132.9469 (107)
Energy for space cooling													30.3093 (99)
Total													2.1136 (108)
Fabric Energy Efficiency (DFEE)													32.4229 (109)
													32.4 (109)

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)	
Main dwelling				
Ground floor	62.9000 (1b)	x 2.4600 (2b)	= 154.7340 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	154.7340 (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	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) =	0.1293 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3793	(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) =	0.3224 (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	0.4110	0.4030	0.3949	0.3546	0.3465	0.3062	0.3062	0.2982	0.3224	0.3465	0.3627	0.3788	(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	0.5845	0.5812	0.5780	0.5629	0.5600	0.5469	0.5469	0.5445	0.5520	0.5600	0.5658	0.5717	(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								
TER Opaque door			2.0800	1.0000	2.0800			(26)
TER Opening Type			9.5500	1.1450	10.9351			(27)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.1800	8.4690			(29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.1800	0.3600			(29a)
PR 500mm MW044	62.9000		62.9000	0.1100	6.9190			(30)
Total net area of external elements Aum(A, m ²)			123.5800					(31)
Fabric heat loss, W/K = Sum (A x U)								(32)
Main dwelling								(33)
Party Wall			17.4400	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K								164.5585 (35)
List of Thermal Bridges								
K1 Element				Length	Psi-value		Total	
E2 Other lintels (including other steel lintels)				5.4600	0.0500		0.2730	
E3 Sill				3.6400	0.0500		0.1820	
E4 Jamb				21.0500	0.0500		1.0525	
E7 Party floor between dwellings (in blocks of flats)				22.9900	0.0700		1.6093	
E16 Corner (normal)				7.3800	0.0900		0.6642	
E18 Party wall between dwellings				2.4600	0.0600		0.1476	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				7.0900	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	

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E7 Party floor between dwellings (in blocks of flats)	1.6700	0.0700	0.1169									
E25 Staggered party wall between dwellings	2.4600	0.0600	0.1476									
E10 Eaves (insulation at ceiling level)	14.6700	0.0600	0.8802									
E12 Gable (insulation at ceiling level)	1.6700	0.0600	0.1002									
E12 Gable (insulation at ceiling level)	8.3200	0.0600	0.4992									
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.1200	0.8508									
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				6.7845 (36)								
Point Thermal bridges				0.0000								
Total fabric heat loss		(33) + (36) + (36a) =		35.5476 (37)								
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 29.8442	Feb 29.6767	Mar 29.5126	Apr 28.7415	May 28.5972	Jun 27.9256	Jul 27.9256	Aug 27.8012	Sep 28.1843	Oct 28.5972	Nov 28.8891	Dec 29.1942 (38)
Heat transfer coeff	65.3918	65.2243	65.0602	64.2891	64.1448	63.4732	63.4732	63.3489	63.7319	64.1448	64.4367	64.7418 (39)
Average = Sum(39)m / 12 =												64.2884
HLP	Jan 1.0396	Feb 1.0370	Mar 1.0343	Apr 1.0221	May 1.0198	Jun 1.0091	Jul 1.0091	Aug 1.0071	Sep 1.0132	Oct 1.0198	Nov 1.0244	Dec 1.0293 (40)
HLP (average)												1.0221
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												0.0000 (42a)
Hot water usage for baths	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)
Hot water usage for other uses	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)
Average daily hot water use (litres/day)												56.0578 (43)
Daily hot water use	Jan 61.1586	Feb 59.4813	Mar 57.6499	Apr 55.3701	May 53.3364	Jun 51.2229	Jul 50.7835	Aug 52.6112	Sep 54.4857	Oct 56.6562	Nov 58.9562	Dec 61.0727 (44)
Energy conte	96.8603	84.7006	88.6057	75.7989	71.8011	62.9846	61.4182	65.1436	67.1864	76.8820	83.9939	95.6252 (45)
Energy content (annual)										Total = Sum(45)m =		931.0004
Distribution loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Water storage loss:												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	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	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (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	82.3313	71.9955	75.3149	64.4291	61.0309	53.5369	52.2055	55.3721	57.1084	65.3497	71.3948	81.2814 (64)
12Total per year (kWh/year)								Total per year (kWh/year) = Sum(64)m =				791.3503 (64)
Electric shower(s)	47.0875	41.9553	45.8136	43.7194	44.5397	42.4866	43.9028	44.5397	43.7194	45.8136	44.9521	47.0875 (64a)
Heat gains from water heating, kWh/month	32.3547	28.4877	30.2821	27.0371	26.3927	24.0059	24.0271	24.9780	25.2069	27.7908	29.0867	32.0922 (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	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165	103.1165 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	95.8356	106.1038	95.8356	99.0302	95.8356	99.0302	95.8356	95.8356	99.0302	95.8356	99.0302	95.8356 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	180.1971	182.0670	177.3549	167.3236	154.6607	142.7595	134.8087	132.9388	137.6509	147.6822	160.3451	172.2463 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116	33.3116 (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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Water heating gains (Table 5)	43.4875	42.3924	40.7018	37.5515	35.4740	33.3415	32.2945	33.5725	35.0096	37.3532	40.3982	43.1347 (72)
Total internal gains	373.4552	384.4981	367.8273	357.8402	339.9053	329.0661	316.8738	316.2819	325.6256	334.8061	353.7084	365.1516 (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	
Southeast					1.9100	36.7938		0.6300	0.7000	0.7700	21.4773 (77)	
Northwest					7.6400	11.2829		0.6300	0.7000	0.7700	26.3444 (81)	
Solar gains	47.8217	90.2085	146.6702	220.6903	282.7513	296.3481	279.2019	230.5103	171.9261	105.9665	58.8729	39.8942 (83)
Total gains	421.2768	474.7066	514.4975	578.5305	622.6566	625.4142	596.0757	546.7923	497.5517	440.7726	412.5813	405.0458 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
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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	43.9688	44.0818	44.1930	44.7230	44.8236	45.2979	45.2979	45.3868	45.1140	44.8236	44.6206	44.4103
alpha	3.9313	3.9388	3.9462	3.9815	3.9882	4.0199	4.0199	4.0258	4.0076	3.9882	3.9747	3.9607
util living area	0.9853	0.9755	0.9563	0.8978	0.7820	0.6042	0.4564	0.5123	0.7481	0.9256	0.9747	0.9874 (86)
MIT	19.3745	19.5894	19.9146	20.3764	20.7355	20.9313	20.9826	20.9727	20.8367	20.3746	19.8103	19.3441 (87)
Th 2	20.0505	20.0527	20.0548	20.0650	20.0669	20.0757	20.0757	20.0774	20.0723	20.0669	20.0630	20.0590 (88)
util rest of house	0.9822	0.9703	0.9466	0.8752	0.7362	0.5312	0.3658	0.4181	0.6818	0.9042	0.9684	0.9846 (89)
MIT 2	18.5708	18.7846	19.1054	19.5549	19.8780	20.0386	20.0695	20.0668	19.9722	19.5632	19.0125	18.5472 (90)
Living area fraction									FLA = Living area /	(4) =		0.3930 (91)
MIT	18.8867	19.1009	19.4234	19.8777	20.2150	20.3894	20.4283	20.4228	20.3120	19.8821	19.3261	18.8604 (92)
Temperature adjustment												0.0000
adjusted MIT	18.8867	19.1009	19.4234	19.8777	20.2150	20.3894	20.4283	20.4228	20.3120	19.8821	19.3261	18.8604 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9771	0.9636	0.9387	0.8700	0.7441	0.5569	0.4010	0.4543	0.7003	0.8992	0.9621	0.9800 (94)
Useful gains	411.6384	457.4376	482.9766	503.3289	463.2953	348.2684	239.0487	248.4076	348.4147	396.3597	396.9283	396.9644 (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	953.8478	926.2411	840.7993	705.7495	546.1908	367.4733	242.9975	254.8413	395.9022	595.3973	787.8059	949.1393 (97)
Space heating kWh	403.4038	315.0360	266.2201	145.7428	61.6742	0.0000	0.0000	0.0000	0.0000	148.0840	281.4319	410.8181 (98a)
Space heating requirement - total per year (kWh/year)												2032.4109
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	403.4038	315.0360	266.2201	145.7428	61.6742	0.0000	0.0000	0.0000	0.0000	148.0840	281.4319	410.8181 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2032.4109
Space heating per m2										(98c) / (4) =		32.3118 (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	596.6483	469.7019	481.4513	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8553	0.9101	0.8802	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	510.3049	427.4828	423.7743	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	691.8644	659.5848	603.8765	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	130.7228	172.6839	133.9960	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	32.6807	43.1710	33.4990	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												109.3507 (107)
Energy for space heating												32.3118 (99)
Energy for space cooling												1.7385 (108)
Total												34.0503 (109)
Fabric Energy Efficiency (TFEE)												34.1 (109)

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

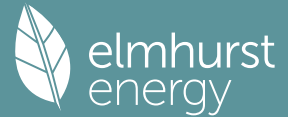
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000	2.4600	154.7340
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		154.7340 (1b) - (3b)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 154.7340 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans	(6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(7a)+(7b)+(7c) = 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.4800 (17)

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Infiltration rate												0.1740	(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) =	0.1479 (21)
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Adj infilt rate	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
	0.1886	0.1849	0.1812	0.1627	0.1590	0.1405	0.1405	0.1368	0.1479	0.1590	0.1664	0.1738	(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)

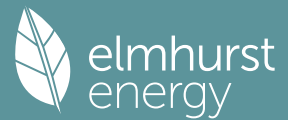
3. Heat losses and heat loss parameter

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			9.5500	1.2357	11.8013			(27)					
Corridor Door			2.0800	1.0000	2.0800			(26)					
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999	(29a)					
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000	(29a)					
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000	(30)					
Total net area of external elements Aum(A, m2)			123.5800					(31)					
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	32.1953		(33)					
Main dwelling													
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000	(32)					
Party Floor			62.9000			70.0000	4403.0000	(32d)					
GF Timber			167.9200			9.0000	1511.2800	(32c)					
Masonry Walls			4.0500			39.0000	157.9500	(32c)					
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =	10350.7299 (34)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								164.5585 (35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value	Total							
E2 Other lintels (including other steel lintels)				5.4600	0.0370	0.2020							
E3 Sill				3.6400	0.0090	0.0328							
E4 Jamb				21.0500	0.0140	0.2947							
E7 Party floor between dwellings (in blocks of flats)				22.9900	0.0390	0.8966							
E16 Corner (normal)				7.3800	0.0410	0.3026							
E18 Party wall between dwellings				2.4600	0.0390	0.0959							
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				7.0900	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)				1.6700	0.0330	0.0551							
E25 Staggered party wall between dwellings				2.4600	0.0380	0.0935							
E10 Eaves (insulation at ceiling level)				14.6700	0.0360	0.5281							
E12 Gable (insulation at ceiling level)				1.6700	0.0280	0.0468							
E12 Gable (insulation at ceiling level)				8.3200	0.0330	0.2746							
P4 Party wall - Roof (insulation at ceiling level)				7.0900	0.0330	0.2340							
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.4411	(36)					
Point Thermal bridges							(36a) =	0.0000					
Total fabric heat loss							(33) + (36) + (36a) =	35.6365 (37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 25.5311	Feb 25.5311	Mar 25.5311	Apr 25.5311	May 25.5311	Jun 25.5311	Jul 25.5311	Aug 25.5311	Sep 25.5311	Oct 25.5311	Nov 25.5311	Dec 25.5311	(38)
Heat transfer coeff	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	(39)
Average = Sum(39)m / 12 =												61.1676	
HLP	Jan 0.9725	Feb 0.9725	Mar 0.9725	Apr 0.9725	May 0.9725	Jun 0.9725	Jul 0.9725	Aug 0.9725	Sep 0.9725	Oct 0.9725	Nov 0.9725	Dec 0.9725	(40)
HLP (average)												0.9725	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												
58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728 (42a)	
Hot water usage for baths												
25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)	
Hot water usage for other uses												
35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)	
Average daily hot water use (litres/day)												110.2677 (43)
Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use												
119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455 (44)	
Energy content (annual)												
189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360 (45)	
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1831.5229
28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004 (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 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month												
216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (62)	
WWHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)	
PV diverter	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 (63c)	

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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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (64)
	Total per year (kWh/year) = Sum(64)m =											2148.8539 (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	63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892 (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	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.4188	19.0240	15.4713	11.7128	8.7555	7.3917	7.9870	10.3818	13.9345	17.6930	20.6504	22.0141	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	(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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	(71)
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221	(72)
Total internal gains	465.9572	464.1629	449.3577	421.3781	393.8560	368.8077	353.8989	356.5076	370.6161	395.9173	426.6405	453.5031	(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	
Southeast					1.9100	36.7938	0.4600	0.0000			0.7700	24.8918 (77)	
Northwest					7.6400	11.2829	0.4600	0.0000			0.7700	30.5326 (81)	
Solar gains	55.4245	104.5501	169.9882	255.7761	327.7037	343.4622	323.5900	267.1573	199.2592	122.8133	68.2326	46.2367 (83)	
Total gains	521.3817	568.7130	619.3459	677.1542	721.5596	712.2698	677.4890	623.6650	569.8753	518.7307	494.8731	499.7398 (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	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	
alpha	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	
util living area	0.9686	0.9536	0.9188	0.8393	0.6998	0.5278	0.3919	0.4418	0.6700	0.8777	0.9524	0.9732	(86)
MIT	19.7380	19.9188	20.2233	20.5802	20.8439	20.9620	20.9912	20.9857	20.9016	20.5581	20.0742	19.6775	(87)
Th 2	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	(88)
util rest of house	0.9626	0.9447	0.9034	0.8101	0.6514	0.4613	0.3147	0.3600	0.6030	0.8483	0.9418	0.9680	(89)
MIT 2	18.6485	18.8746	19.2511	19.6771	19.9678	20.0806	20.1024	20.0994	20.0319	19.6628	19.0733	18.5725	(90)
Living area fraction										FLA = Living area / (4) =		0.3930	(91)
MIT	19.0767	19.2850	19.6332	20.0320	20.3121	20.4270	20.4517	20.4477	20.3737	20.0147	19.4666	19.0068	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0767	19.2850	19.6332	20.0320	20.3121	20.4270	20.4517	20.4477	20.3737	20.0147	19.4666	19.0068	(93)

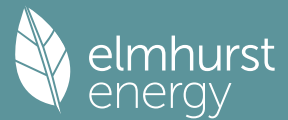
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	497.2543	531.6579	553.6613	546.7568	478.4371	345.9448	233.6385	244.2835	355.6062	438.2460	461.4739	479.6128	(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	903.8538	879.8942	803.3256	680.9176	526.7822	356.4227	235.5986	247.5898	383.7459	575.8717	756.4372	905.6944	(97)
Space heating kWh	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048	(98a)
Space heating requirement - total per year (kWh/year)												1486.6115	
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	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1486.6115	
Space heating per m2												(98c) / (4) =	23.6345 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000 (201)
Fraction of space heat from main system(s)													1.0000 (202)
Fraction of main heating from main system 2													0.0000 (203)
Fraction of total heating from main system 1													1.0000 (204)
Fraction of total heating from main system 2													0.0000 (205)
Efficiency of main space heating system 1 (in %)													100.0000 (206)
Efficiency of main space heating system 2 (in %)													0.0000 (207)
Efficiency of secondary/supplementary heating system, %													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048	(98)

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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)	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048	(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 requirement	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(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	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321	(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	3.5914	3.2438	3.5914	3.4755	3.5914	3.4755	3.5914	3.5914	3.4755	3.5914	3.4755	3.5914	(231)
Lighting	18.7477	15.0401	13.5420	9.9214	7.6636	6.2612	6.9910	9.0872	11.8033	15.4866	17.4921	19.2688	(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												1486.6115	(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												662.1638	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans: (MEV)Centralised, Database: in-use factor = 1.4000, SFP = 0.2240)													
mechanical ventilation fans (SFP = 0.2240)												42.2857	(230a)
Total electricity for the above, kWh/year												42.2857	(231)
Electricity for lighting (calculated in Appendix L)												151.3051	(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												2342.3661	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1486.6115	16.4900	245.1422	(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)	662.1638	16.4900	109.1908	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	42.2857	16.4900	6.9729	(249)
Energy for lighting	151.3051	16.4900	24.9502	(250)
Additional standing charges			0.0000	(251)
Total energy cost			386.2562	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)		1.2887	(257)
SAP value	$[(255) \times (256)] / [(4) + 45.0] =$	79.1099	
SAP rating (Section 12)		79	(258)
SAP band		C	

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	1486.6115	0.1557	231.3981	(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)	662.1638	0.1412	93.4677	(264)
Space and water heating			324.8658	(265)
Pumps, fans and electric keep-hot	42.2857	0.1387	5.8655	(267)
Energy for lighting	151.3051	0.1443	21.8380	(268)
Total CO2, kg/year			352.5693	(272)
CO2 emissions per m2			5.6100	(273)
EI value			95.6215	
EI rating			96	(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

1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.9000 (1b)	x 2.4600 (2b)	= 154.7340 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 154.7340 (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	3.4800 (17)
Infiltration rate	0.1740 (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) = 0.1479 (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	0.1627	0.1516	0.1516	0.1442	0.1442	0.1257	0.1257	0.1220	0.1257	0.1405	0.1368	0.1479 (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 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			9.5500	1.2357	11.8013		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999 (29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000 (29a)
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000 (30)
Total net area of external elements Aum(A, m ²)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	32.1953		(33)
Main dwelling							
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 10350.7299 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 164.5585 (35)

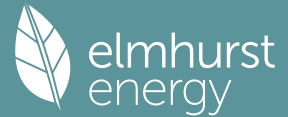
List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.4600	0.0370	0.2020
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	21.0500	0.0140	0.2947
E7 Party floor between dwellings (in blocks of flats)	22.9900	0.0390	0.8966
E16 Corner (normal)	7.3800	0.0410	0.3026
E18 Party wall between dwellings	2.4600	0.0390	0.0959
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	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)	1.6700	0.0330	0.0551
E25 Staggered party wall between dwellings	2.4600	0.0380	0.0935
E10 Eaves (insulation at ceiling level)	14.6700	0.0360	0.5281
E12 Gable (insulation at ceiling level)	1.6700	0.0280	0.0468
E12 Gable (insulation at ceiling level)	8.3200	0.0330	0.2746
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.0330	0.2340
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.4411 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 35.6365 (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	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311 (38)

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	Dec
tau	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053
alpha	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337
util living area	0.9623	0.9463	0.9016	0.8027	0.6356	0.4330	0.2925	0.3340	0.5980	0.8408	0.9401	0.9673 (86)
MIT	19.8453	20.0109	20.3359	20.6752	20.9027	20.9844	20.9977	20.9960	20.9419	20.6642	20.1922	19.7970 (87)
Th 2	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063 (88)
util rest of house	0.9549	0.9359	0.8828	0.7680	0.5807	0.3647	0.2163	0.2523	0.5248	0.8034	0.9265	0.9607 (89)

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MIT 2	18.7836	18.9898	19.3885	19.7853	20.0263	20.0975	20.1057	20.1050	20.0667	19.7841	19.2197	18.7235 (90)
Living area fraction									FLA = Living area / (4) =			0.3930 (91)
MIT	19.2009	19.3911	19.7608	20.1350	20.3707	20.4461	20.4563	20.4552	20.4106	20.1299	19.6019	19.1454 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2009	19.3911	19.7608	20.1350	20.3707	20.4461	20.4563	20.4552	20.4106	20.1299	19.6019	19.1454 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9455	0.9260	0.8745	0.7692	0.5975	0.3910	0.2463	0.2844	0.5506	0.8045	0.9174	0.9519	(94)
Useful gains	503.2925	531.5928	549.1922	534.9575	439.8521	292.4886	174.3047	186.1270	327.2584	430.3388	465.3013	484.5773	(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	874.7487	849.6844	762.2000	638.2843	469.1991	296.4214	174.7101	186.8789	343.1887	533.9897	721.8933	871.3563	(97)
Space heating kWh	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635	(98a)
Space heating requirement - total per year (kWh/year)												1294.4541	
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	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1294.4541	
Space heating per m2											(98c) / (4) =	20.5796	(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	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (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)	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5914	3.2438	3.5914	3.4755	3.5914	3.4755	3.5914	3.5914	3.4755	3.5914	3.4755	3.5914 (231)	
Lighting	18.7477	15.0401	13.5420	9.9214	7.6636	6.2612	6.9910	9.0872	11.8033	15.4866	17.4921	19.2688 (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												1294.4541 (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												662.1638 (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)													42.2857 (230a)
Total electricity for the above, kWh/year													42.2857 (231)
Electricity for lighting (calculated in Appendix L)													151.3051 (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													2150.2087 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1294.4541	26.0600	337.3348 (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)	662.1638	26.0600	172.5599 (247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000 (247a)
Pumps, fans and electric keep-hot	42.2857	26.0600	11.0197 (249)
Energy for lighting	151.3051	26.0600	39.4301 (250)
Additional standing charges			0.0000 (251)
Total energy cost			560.3444 (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	1294.4541	0.1563	202.3061 (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)	662.1638	0.1412	93.4677 (264)
Space and water heating			295.7738 (265)
Pumps, fans and electric keep-hot	42.2857	0.1387	5.8655 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			323.4773 (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	1294.4541	1.5786	2043.4254 (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)	662.1638	1.5220	1007.7817 (278)
Space and water heating			3051.2071 (279)
Pumps, fans and electric keep-hot	42.2857	1.5128	63.9698 (281)
Energy for lighting	151.3051	1.5338	232.0768 (282)
Total Primary energy kWh/year			3347.2537 (286)

SAP 10 EPC IMPROVEMENTS

Plot 047

Current energy efficiency rating: C 79
Current environmental impact rating: A 96

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

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

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

Potential energy efficiency rating: C 79
Potential environmental impact rating: A 96

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 £560	Potential £560	Saving £0
Electricity			
Space heating	£348	£348	£0
Water heating	£173	£173	£0
Lighting	£39	£39	£0
Total cost of fuels	£560	£560	£0
Total cost of uses	£560	£560	£0
Delivered energy	34 kWh/m²	34 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	5 kg/m²	5 kg/m²	0 kg/m²
Primary energy	53 kWh/m²	53 kWh/m²	0 kWh/m²

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

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1. Overall dwelling characteristics

Main dwelling	Area (m ²)	Storey height (m)	Volume (m ³)
Ground floor	62.9000 (1b)	x 2.4600 (2b)	= 154.7340 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 154.7340 (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 0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.4800 (17)
Infiltration rate	0.1740 (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) = 0.1479 (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	0.1886	0.1849	0.1812	0.1627	0.1590	0.1405	0.1405	0.1368	0.1479	0.1590	0.1664	0.1738 (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			9.5500	1.2357	11.8013		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999 (29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000 (29a)
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000 (30)
Total net area of external elements Aum(A, m ²)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.1953		(33)
Main dwelling							
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
GF Timber			167.9200			9.0000	1511.2800 (32c)
Masonry Walls			4.0500			39.0000	157.9500 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 10350.7299 (34)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 164.5585 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	5.4600	0.0370	0.2020
E3 Sill	3.6400	0.0090	0.0328
E4 Jamb	21.0500	0.0140	0.2947
E7 Party floor between dwellings (in blocks of flats)	22.9900	0.0390	0.8966
E16 Corner (normal)	7.3800	0.0410	0.3026
E18 Party wall between dwellings	2.4600	0.0390	0.0959
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	7.0900	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)	1.6700	0.0330	0.0551
E25 Staggered party wall between dwellings	2.4600	0.0380	0.0935
E10 Eaves (insulation at ceiling level)	14.6700	0.0360	0.5281
E12 Gable (insulation at ceiling level)	1.6700	0.0280	0.0468
E12 Gable (insulation at ceiling level)	8.3200	0.0330	0.2746
P4 Party wall - Roof (insulation at ceiling level)	7.0900	0.0330	0.2340
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			3.4411 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 35.6365 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311	25.5311 (38)
Heat transfer coeff	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676	61.1676 (39)
Average = Sum(39)m / 12 =												61.1676

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725	0.9725 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.0623 (42)
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Hot water usage for mixer showers	58.7981	57.9145	56.6268	54.1632	52.3452	50.3177	49.1652	50.4431	51.8439	54.0208	56.5373	58.5728 (42a)
Hot water usage for baths	25.4083	25.0310	24.4996	23.5198	22.7862	21.9727	21.5332	22.0609	22.6355	23.5059	24.5059	25.3224 (42b)
Hot water usage for other uses	35.7503	34.4503	33.1503	31.8503	30.5503	29.2503	29.2503	30.5503	31.8503	33.1503	34.4503	35.7503 (42c)
Average daily hot water use (litres/day)												110.2677 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Daily hot water use	119.9567	117.3957	114.2767	109.5333	105.6816	101.5406	99.9487	103.0543	106.3296	110.6770	115.4935	119.6455	(44)	
Energy content (annual)	189.9821	167.1700	175.6391	149.9457	142.2677	124.8560	120.8793	127.6027	131.1150	150.1877	164.5417	187.3360	(45)	
Distribution loss (46)m = 0.15 x (45)m	28.4973	25.0755	26.3459	22.4918	21.3402	18.7284	18.1319	19.1404	19.6673	22.5281	24.6812	28.1004	(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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874	(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	63.1691	55.5840	58.4000	49.8569	47.3040	41.5146	40.1924	42.4279	43.5957	49.9374	54.7101	62.2892	(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	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.4188	19.0240	15.4713	11.7128	8.7555	7.3917	7.9870	10.3818	13.9345	17.6930	20.6504	22.0141 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363 (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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221 (72)
Total internal gains	465.9572	464.1629	449.3577	421.3781	393.8560	368.8077	353.8989	356.5076	370.6161	395.9173	426.6405	453.5031 (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	
Southeast				1.9100	36.7938	0.4600	0.0000		0.7700		24.8918 (77)	
Northwest				7.6400	11.2829	0.4600	0.0000		0.7700		30.5326 (81)	
Solar gains	55.4245	104.5501	169.9882	255.7761	327.7037	343.4622	323.5900	267.1573	199.2592	122.8133	68.2326	46.2367 (83)
Total gains	521.3817	568.7130	619.3459	677.1542	721.5596	712.2698	677.4890	623.6650	569.8753	518.7307	494.8731	499.7398 (84)

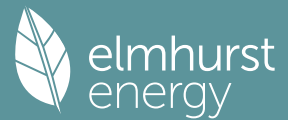
7. Mean internal temperature (heating season)

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	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	
alpha	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	
util living area	0.9686	0.9536	0.9188	0.8393	0.6998	0.5278	0.3919	0.4418	0.6700	0.8777	0.9524	0.9732 (86)	
MIT	19.7380	19.9188	20.2233	20.5802	20.8439	20.9620	20.9912	20.9857	20.9016	20.5581	20.0742	19.6775 (87)	
Th 2	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063 (88)	
util rest of house	0.9626	0.9447	0.9034	0.8101	0.6514	0.4613	0.3147	0.3600	0.6030	0.8483	0.9418	0.9680 (89)	
MIT 2	18.6485	18.8746	19.2511	19.6771	19.9678	20.0806	20.1024	20.0994	20.0319	19.6628	19.0733	18.5725 (90)	
Living area fraction									fLA = Living area / (4) =				0.3930 (91)
MIT	19.0767	19.2850	19.6332	20.0320	20.3121	20.4270	20.4517	20.4477	20.3737	20.0147	19.4666	19.0068 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.0767	19.2850	19.6332	20.0320	20.3121	20.4270	20.4517	20.4477	20.3737	20.0147	19.4666	19.0068 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9537	0.9348	0.8939	0.8074	0.6631	0.4857	0.3449	0.3917	0.6240	0.8448	0.9325	0.9597 (94)
Useful gains	497.2543	531.6579	553.6613	546.7568	478.4371	345.9448	233.6385	244.2835	355.6062	438.2460	461.4739	479.6128 (95)

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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	903.8538	879.8942	803.3256	680.9176	526.7822	356.4227	235.5986	247.5898	383.7459	575.8717	756.4372	905.6944 (97)
Space heating kWh	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048 (98a)
Space heating requirement - total per year (kWh/year)												1486.6115
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	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1486.6115
Space heating per m2										(98c) / (4) =		23.6345 (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	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048 (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)	302.5100	234.0148	185.7502	96.5958	35.9687	0.0000	0.0000	0.0000	0.0000	102.3935	212.3736	317.0048 (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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5914	3.2438	3.5914	3.4755	3.5914	3.4755	3.5914	3.4755	3.5914	3.4755	3.5914	3.5914 (231)
Lighting	18.7477	15.0401	13.5420	9.9214	7.6636	6.2612	6.9910	9.0872	11.8033	15.4866	17.4921	19.2688 (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												1486.6115 (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												662.1638 (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)												42.2857 (230a)
Total electricity for the above, kWh/year												42.2857 (231)
Electricity for lighting (calculated in Appendix L)												151.3051 (232)

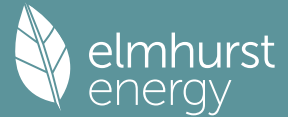
Energy saving/generation technologies (Appendices M ,N and Q)

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		2342.3661 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1486.6115	16.4900	245.1422 (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)	662.1638	16.4900	109.1908 (247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000 (247a)
Pumps, fans and electric keep-hot	42.2857	16.4900	6.9729 (249)
Energy for lighting	151.3051	16.4900	24.9502 (250)
Additional standing charges			0.0000 (251)
Total energy cost			386.2562 (255)

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11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):	0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] = 1.2887 (257)
SAP value	79.1099
SAP rating (Section 12)	79 (258)
SAP band	C

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

	Energy kWh/year	Emission factor kg CO ₂ /kWh	Emissions kg CO ₂ /year
Space heating - main system 1	1486.6115	0.1557	231.3981 (261)
Space heating - main system 2	0.0000	0.0000	0.0000 (262)
Total CO ₂ associated with community systems			0.0000 (273)
Water heating (other fuel)	662.1638	0.1412	93.4677 (264)
Space and water heating			324.8658 (265)
Pumps, fans and electric keep-hot	42.2857	0.1387	5.8655 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO ₂ , kg/year			352.5693 (272)
CO ₂ emissions per m ²			5.6100 (273)
EI value			95.6215
EI rating			96 (274)
EI band			A

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

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling	62.9000 (1b)	x 2.4600 (2b)	= 154.7340 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	154.7340 (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	3.4800 (17)
Infiltration rate	0.1740 (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) = 0.1479 (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	0.1627	0.1516	0.1516	0.1442	0.1442	0.1257	0.1257	0.1220	0.1257	0.1405	0.1368	0.1479 (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)

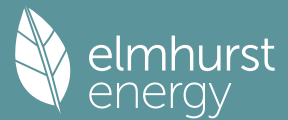
3. Heat losses and heat loss parameter

Element	Gross 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			9.5500	1.2357	11.8013		(27)
Corridor Door			2.0800	1.0000	2.0800		(26)
EW Brick AAC018/019	56.6000	9.5500	47.0500	0.2600	12.2330	60.0000	2822.9999 (29a)
E-WM-30 Corridor Wall	4.0800	2.0800	2.0000	0.2100	0.4200	52.3000	104.6000 (29a)
PR 500mm MW044	62.9000		62.9000	0.0900	5.6610	9.0000	566.1000 (30)
Total net area of external elements Aum(A, m ²)			123.5800				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		32.1953		(33)
Main dwelling							
Party Wall			17.4400	0.0000	0.0000	45.0000	784.8000 (32)

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	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.4188	19.0240	15.4713	11.7128	8.7555	7.3917	7.9870	10.3818	13.9345	17.6930	20.6504	22.0141 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	268.9509	271.7418	264.7089	249.7366	230.8369	213.0738	201.2070	198.4162	205.4491	220.4213	239.3210	257.0841 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363	49.4363 (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)	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932	-82.4932 (71)
Water heating gains (Table 5)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863	83.7221 (72)
Total internal gains	465.9572	464.1629	449.3577	421.3781	393.8560	368.8077	353.8989	356.5076	370.6161	395.9173	426.6405	453.5031 (73)

Full SAP Calculation Printout



6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W
Southeast					1.9100	42.9509	0.4600	0.0000		0.7700	29.0572 (77)
Northwest					7.6400	13.7758	0.4600	0.0000		0.7700	37.2784 (81)
Solar gains	66.3357	109.9333	178.6603	274.0778	342.2739	379.2420	353.8873	297.9534	223.7359	138.9827	55.5766 (83)
Total gains	532.2929	574.0962	628.0181	695.4559	736.1298	748.0496	707.7863	654.4611	594.3520	534.9001	509.0797 (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	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053	47.0053
alpha	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337	4.1337
util living area	0.9623	0.9463	0.9016	0.8027	0.6356	0.4330	0.2925	0.3340	0.5980	0.8408	0.9401	0.9673 (86)
MIT	19.8453	20.0109	20.3359	20.6752	20.9027	20.9844	20.9977	20.9960	20.9419	20.6642	20.1922	19.7970 (87)
Th 2	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063	20.1063 (88)
util rest of house	0.9549	0.9359	0.8828	0.7680	0.5807	0.3647	0.2163	0.2523	0.5248	0.8034	0.9265	0.9607 (89)
MIT 2	18.7836	18.9898	19.3885	19.7853	20.0263	20.0975	20.1057	20.1050	20.0667	19.7841	19.2197	18.7235 (90)
Living area fraction									fLA = Living area / (4) =			0.3930 (91)
MIT	19.2009	19.3911	19.7608	20.1350	20.3707	20.4461	20.4563	20.4552	20.4106	20.1299	19.6019	19.1454 (92)
Temperature adjustment												0.0000
adjusted MIT	19.2009	19.3911	19.7608	20.1350	20.3707	20.4461	20.4563	20.4552	20.4106	20.1299	19.6019	19.1454 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9455	0.9260	0.8745	0.7692	0.5975	0.3910	0.2463	0.2844	0.5506	0.8045	0.9174	0.9519 (94)
Useful gains	503.2925	531.5928	549.1922	534.9575	439.8521	292.4886	174.3047	186.1270	327.2584	430.3388	465.3013	484.5773 (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	874.7487	849.6844	762.2000	638.2843	469.1991	296.4214	174.7101	186.8789	343.1887	533.9897	721.8933	871.3563 (97)
Space heating kWh	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (98a)
Space heating requirement - total per year (kWh/year)												1294.4541
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	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1294.4541
Space heating per m2										(98c) / (4) =		20.5796 (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	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (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)	276.3634	213.7575	158.4778	74.3953	21.8342	0.0000	0.0000	0.0000	0.0000	77.1163	184.7462	287.7635 (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	216.9335	191.5132	202.5905	176.0277	169.2191	150.9380	147.8307	154.5541	157.1970	177.1391	190.6237	214.2874 (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	66.8475	59.0143	62.4277	54.2425	52.1444	46.5111	45.5537	47.6255	48.4399	54.5849	58.7402	66.0321 (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	3.5914	3.2438	3.5914	3.4755	3.5914	3.4755	3.5914	3.5914	3.4755	3.5914	3.4755	3.5914 (231)
Lighting	18.7477	15.0401	13.5420	9.9214	7.6636	6.2612	6.9910	9.0872	11.8033	15.4866	17.4921	19.2688 (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)

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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												1294.4541	(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												662.1638	(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)												42.2857	(230a)
Total electricity for the above, kWh/year												42.2857	(231)
Electricity for lighting (calculated in Appendix L)												151.3051	(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												2150.2087	(238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	1294.4541	26.0600	337.3348	(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)	662.1638	26.0600	172.5599	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	42.2857	26.0600	11.0197	(249)
Energy for lighting	151.3051	26.0600	39.4301	(250)
Additional standing charges			0.0000	(251)
Total energy cost			560.3444	(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	1294.4541	0.1563	202.3061	(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)	662.1638	0.1412	93.4677	(264)
Space and water heating			295.7738	(265)
Pumps, fans and electric keep-hot	42.2857	0.1387	5.8655	(267)
Energy for lighting	151.3051	0.1443	21.8380	(268)
Total CO2, kg/year			323.4773	(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	1294.4541	1.5786	2043.4254	(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)	662.1638	1.5220	1007.7817	(278)
Space and water heating			3051.2071	(279)
Pumps, fans and electric keep-hot	42.2857	1.5128	63.9698	(281)
Energy for lighting	151.3051	1.5338	232.0768	(282)
Total Primary energy kWh/year			3347.2537	(286)