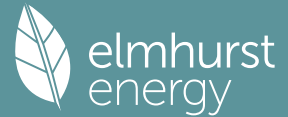


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Property Reference	4907-AU06-6316-039				Issued on Date	19/03/2025
Assessment Reference	Plot 039	Prop Type Ref		MF Flat-TC		
Property	FLAT 6, 38 Spey Road, Tilehurst, Reading, RG30 4NF					
SAP Rating	82 B	DER	5.18	TER	11.68	
Environmental	96 A	% DER < TER				55.65
CO ₂ Emissions (t/year)	0.28	DFEE	27.65	TFEE	27.58	
Compliance Check	See BREL	% DFEE < TFEE				-0.28
% DPER < TPER	12.72	DPER	53.62	TPER	61.44	
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)	2.4100 (2b)	151.5890 (1b) - (3b)
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	151.5890 (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	3.5300 (17)
Infiltration rate	0.1765 (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) = 0.1500 (21)

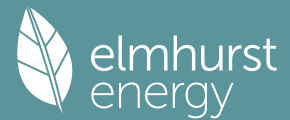
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.1913	0.1875	0.1838	0.1650	0.1613	0.1425	0.1425	0.1388	0.1500	0.1613	0.1688	0.1763 (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	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m ²)			63.6500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2965		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
Party Ceiling			62.9000			30.0000	1887.0000 (32b)
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) =		11886.5400 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							188.9752 (35)
List of Thermal Bridges							

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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	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448	59.3448
alpha	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563	4.9563
util living area	0.9828	0.9685	0.9379	0.8492	0.6907	0.5019	0.3680	0.4183	0.6574	0.8948	0.9683	0.9857 (86)
MIT	19.9511	20.1394	20.4005	20.7187	20.9171	20.9857	20.9975	20.9954	20.9505	20.6798	20.2580	19.9011 (87)
Th 2	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807 (88)
util rest of house	0.9790	0.9617	0.9247	0.8203	0.6429	0.4410	0.3003	0.3454	0.5922	0.8671	0.9603	0.9825 (89)
MIT 2	18.9609	19.1974	19.5209	19.8974	20.1098	20.1716	20.1796	20.1786	20.1450	19.8623	19.3493	18.8978 (90)
Living area fraction									fLA =	Living area /	(4) =	0.3930 (91)
MIT	19.3501	19.5676	19.8666	20.2202	20.4271	20.4915	20.5010	20.4996	20.4616	20.1836	19.7064	19.2921 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3501	19.5676	19.8666	20.2202	20.4271	20.4915	20.5010	20.4996	20.4616	20.1836	19.7064	19.2921 (93)

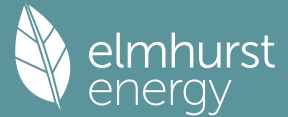
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9740	0.9555	0.9189	0.8219	0.6577	0.4644	0.3269	0.3740	0.6153	0.8672	0.9546	0.9780 (94)
Useful gains	458.0882	505.8134	528.9147	530.3490	457.6004	323.6124	216.4653	226.9742	338.6818	422.6481	436.7561	442.0394 (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	837.3522	816.0755	743.6880	629.8322	485.5545	327.7912	217.0455	228.0916	353.9434	533.2094	701.3931	839.6909 (97)
Space heating kWh	282.1724	208.4961	159.7913	71.6279	20.7979	0.0000	0.0000	0.0000	0.0000	82.2576	190.5386	295.8527 (98a)
Space heating requirement - total per year (kWh/year)												1311.5346
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	282.1724	208.4961	159.7913	71.6279	20.7979	0.0000	0.0000	0.0000	0.0000	82.2576	190.5386	295.8527 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1311.5346
Space heating per m2										(98c) / (4) =		20.8511 (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	282.1724	208.4961	159.7913	71.6279	20.7979	0.0000	0.0000	0.0000	0.0000	82.2576	190.5386	295.8527 (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)	282.1724	208.4961	159.7913	71.6279	20.7979	0.0000	0.0000	0.0000	0.0000	82.2576	190.5386	295.8527 (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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (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												1311.5346 (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)

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Space cooling fuel	0.0000	(221)
Electricity for pumps and fans: (MEVCentralised, Database: in-use factor = 1.4000, SFP = 0.2240)		
mechanical ventilation fans (SFP = 0.2240)	41.4262	(230a)
Total electricity for the above, kWh/year	41.4262	(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	2166.4297	(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	1311.5346	0.1563	204.9720 (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			298.4397 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			326.0240 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			5.1800 (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	1311.5346	1.5786	2070.3669 (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			3078.1486 (279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696 (281)
Energy for lighting	151.3051	1.5338	232.0768 (282)
Total Primary energy kWh/year			3372.8950 (286)
Dwelling Primary energy Rate (DPER)			53.6200 (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 (1b)	x 2.4100 (2b)	= 151.5890 (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) =	151.5890 (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) = 0.1319 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3819 (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) = 0.3246 (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	0.4139	0.4058	0.3977	0.3571	0.3490	0.3084	0.3084	0.3003	0.3246	0.3490	0.3652	0.3815 (22b)
Effective ac	0.5857	0.5823	0.5791	0.5638	0.5609	0.5476	0.5476	0.5451	0.5527	0.5609	0.5667	0.5728 (25)

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.0800	1.0000	2.0800			(26)
TER Opening Type			9.5500	1.1450	10.9351			(27)
EW Brick AAC018/019	59.3700	9.5500	49.8200	0.1800	8.9676			(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.1800	0.3960			(29a)
Total net area of external elements Aum(A, m2)			63.6500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	22.3787		(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000			(32)

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

198.9752 (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)	46.0200	0.0700	3.2214
E16 Corner (normal)	7.7400	0.0900	0.6966
E18 Party wall between dwellings	2.5800	0.0600	0.1548
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1800	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)	3.1600	0.0700	0.2212
E25 Staggered party wall between dwellings	2.5800	0.0600	0.1548

Thermal bridges (Sum(L x Psi) calculated using Appendix K)

6.2173 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 28.5960 (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	29.2976	29.1312	28.9681	28.2019	28.0586	27.3913	27.3913	27.2677	27.6483	28.0586	28.3486	28.6517	(38)
Average = Sum(39)m / 12 =	57.8936	57.7272	57.5641	56.7979	56.6546	55.9873	55.9873	55.8638	56.2444	56.6546	56.9446	57.2477	(39)

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.9204	0.9178	0.9152	0.9030	0.9007	0.8901	0.8901	0.8881	0.8942	0.9007	0.9053	0.9101	(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)
Hot water usage for mixer showers													
Hot water usage for baths													
Hot water usage for other uses													
Average daily hot water use (litres/day)													110.2677 (43)

Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	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													1831.5229

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	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	23.3325	(57)
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Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	(59)
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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)
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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)
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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)
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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)
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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)
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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)
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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)
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12Total per year (kWh/year)

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	0.0000	(64a)
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Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)

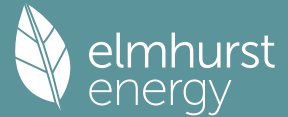
Heat gains from water heating, kWh/month

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	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	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)													

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	-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	133.8241 (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	458.8410 (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	60.0505	60.2236	60.3942	61.2089	61.3638	62.0951	62.0951	62.2325	61.8113	61.3638	61.0513	60.7280	
alpha	5.0034	5.0149	5.0263	5.0806	5.0909	5.1397	5.1397	5.1488	5.1208	5.0909	5.0701	5.0485	
util living area	0.9794	0.9653	0.9361	0.8500	0.6966	0.5039	0.3674	0.4116	0.6444	0.8809	0.9614	0.9822 (86)	
MIT	20.0126	20.1846	20.4262	20.7349	20.9214	20.9877	20.9980	20.9965	20.9597	20.7252	20.3355	19.9883 (87)	
Th 2	20.1502	20.1524	20.1546	20.1650	20.1669	20.1759	20.1759	20.1776	20.1724	20.1669	20.1630	20.1589 (88)	
util rest of house	0.9747	0.9575	0.9220	0.8201	0.6474	0.4422	0.2993	0.3393	0.5781	0.8499	0.9515	0.9781 (89)	
MIT 2	19.0115	19.2284	19.5285	19.9009	20.1007	20.1683	20.1751	20.1761	20.1444	19.8996	19.4279	18.9875 (90)	
Living area fraction									fLA = Living area / (4) =				0.3930 (91)
MIT	19.4050	19.6042	19.8813	20.2287	20.4232	20.4904	20.4985	20.4985	20.4648	20.2240	19.7846	19.3808 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.4050	19.6042	19.8813	20.2287	20.4232	20.4904	20.4985	20.4985	20.4648	20.2240	19.7846	19.3808 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9695	0.9515	0.9167	0.8226	0.6630	0.4660	0.3261	0.3677	0.6022	0.8522	0.9461	0.9733 (94)
Useful gains	500.0578	540.5847	554.9673	545.6342	466.6912	326.1012	217.7990	228.1043	345.2018	446.2681	474.2636	485.3953 (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	874.4817	848.8330	770.2822	643.4466	494.2106	329.7854	218.2680	228.9591	357.9839	545.2451	722.3209	869.0679 (97)
Space heating kWh	278.5713	207.1429	160.1943	70.4250	20.4745	0.0000	0.0000	0.0000	0.0000	73.6389	178.6012	285.4524 (98a)
Space heating requirement - total per year (kWh/year)												1274.5005
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	278.5713	207.1429	160.1943	70.4250	20.4745	0.0000	0.0000	0.0000	0.0000	73.6389	178.6012	285.4524 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1274.5005
Space heating per m2										(98c) / (4) =		20.2623 (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)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement	278.5713	207.1429	160.1943	70.4250	20.4745	0.0000	0.0000	0.0000	0.0000	73.6389	178.6012	285.4524 (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)	301.8108	224.4235	173.5583	76.3001	22.1825	0.0000	0.0000	0.0000	0.0000	79.7821	193.5008	309.2659 (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	84.6975	84.3081	83.5962	82.1961	80.6806	79.8000	79.8000	79.8000	79.8000	82.2519	83.9578	84.7749 (217)
Fuel for water heating, kWh/month	247.5833	220.0060	236.0639	212.2054	210.2763	192.3675	190.5585	197.7596	199.4974	214.8669	222.6341	244.8233 (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	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)												

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(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												1380.8239	(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												2588.6423	(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												3179.8435	(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	1380.8239	0.2100	289.9730	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2588.6423	0.2100	543.6149	(264)
Space and water heating			833.5879	(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			734.4226	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.6800	(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	1380.8239	1.1300	1560.3311	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2588.6423	1.1300	2925.1658	(278)
Space and water heating			4485.4968	(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			3864.6811	(286)
Target Primary Energy Rate (TPER)			61.4400	(287)

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

CALCULATION OF FABRIC ENERGY EFFICIENCY

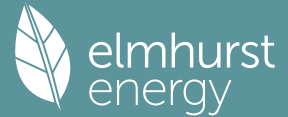
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (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) =	151.5890 (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)

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

Air changes per hour
20.0000 / (5) = 0.1319 (8)
Yes
Blower Door
3.5300 (17)
0.3084 (18)
2 (19)

Shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor (21) = (18) x (20) = 0.2622 (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	0.3343	0.3277	0.3212	0.2884	0.2818	0.2491	0.2491	0.2425	0.2622	0.2818	0.2949	0.3081 (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	0.5559	0.5537	0.5516	0.5416	0.5397	0.5310	0.5310	0.5294	0.5344	0.5397	0.5435	0.5474 (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	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m2)			63.6500				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 27.2965		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
Party Ceiling			62.9000			40.0000	2516.0000 (32b)
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)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K
List of Thermal Bridges

(28)...(30) + (32) + (32a)...(32e) = 12515.5400 (34)
198.9752 (35)

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)	46.0200	0.0390	1.7948
E16 Corner (normal)	7.7400	0.0410	0.3173
E18 Party wall between dwellings	2.5800	0.0390	0.1006
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1800	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)	3.1600	0.0330	0.1043
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980

Thermal bridges (Sum(L x Psi) calculated using Appendix K)
Point Thermal bridges
Total fabric heat loss

(36a) = 0.0000
(33) + (36) + (36a) = 30.6256 (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	27.8069	27.6984	27.5920	27.0924	26.9989	26.5637	26.5637	26.4832	26.7314	26.9989	27.1880	27.3857 (38)
Heat transfer coeff	58.4325	58.3240	58.2176	57.7180	57.6245	57.1893	57.1893	57.1088	57.3570	57.6245	57.8136	58.0113 (39)
Average = Sum(39)m / 12 =												57.7175

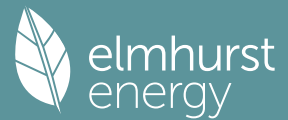
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	0.9290	0.9272	0.9256	0.9176	0.9161	0.9092	0.9092	0.9079	0.9119	0.9161	0.9191	0.9223 (40)
HLP (average)												0.9176
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												2.0623 (42)
Hot water usage for mixer showers												0.0000 (42a)
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000												
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)												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												
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 (46)
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)

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12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m = 791.3503 (64)										
Electric shower(s)	791 (64)										
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)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 535.6171 (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 m ²	Solar flux Table 6a W/m ²	Specific data or Table 6b	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
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	59.4966	59.6073	59.7163	60.2332	60.3309	60.7900	60.7900	60.8758	60.6123	60.3309	60.1336	59.9286
alpha	4.9664	4.9738	4.9811	5.0155	5.0221	5.0527	5.0527	5.0584	5.0408	5.0221	5.0089	4.9952
util living area	0.9905	0.9809	0.9588	0.8827	0.7311	0.5325	0.3908	0.4459	0.6994	0.9240	0.9808	0.9922 (86)
MIT	19.8238	20.0192	20.2982	20.6646	20.8977	20.9830	20.9971	20.9945	20.9386	20.6223	20.1661	19.7891 (87)
Th 2	20.1429	20.1444	20.1458	20.1526	20.1538	20.1597	20.1597	20.1608	20.1574	20.1538	20.1513	20.1486 (88)
util rest of house	0.9881	0.9763	0.9488	0.8565	0.6820	0.4671	0.3172	0.3666	0.6314	0.9007	0.9753	0.9902 (89)
MIT 2	19.0715	19.2654	19.5388	19.8874	20.0857	20.1514	20.1588	20.1589	20.1231	19.8576	19.4174	19.0416 (90)
Living area fraction									fLA = Living area / (4) =			0.3930 (91)
MIT	19.3671	19.5616	19.8372	20.1928	20.4048	20.4783	20.4882	20.4873	20.4436	20.1581	19.7116	19.3353 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3671	19.5616	19.8372	20.1928	20.4048	20.4783	20.4882	20.4873	20.4436	20.1581	19.7116	19.3353 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9854	0.9724	0.9445	0.8579	0.6972	0.4922	0.3461	0.3977	0.6555	0.9008	0.9717	0.9878	(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	880.4106	855.1247	776.4628	651.7990	501.6102	336.1734	222.3650	233.4202	363.8501	550.7808	729.1237	878.0210	(97)
Space heating kWh	340.6016	255.0593	199.7671	90.2816	26.8872	0.0000	0.0000	0.0000	0.0000	103.0856	229.7589	350.9006	(98a)
Space heating requirement - total per year (kWh/year)												1596.3419	
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	340.6016	255.0593	199.7671	90.2816	26.8872	0.0000	0.0000	0.0000	0.0000	103.0856	229.7589	350.9006	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1596.3419	
Space heating per m ²												25.3790	(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	537.5799	423.2012	434.0266	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9384	0.9693	0.9520	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	504.4582	410.2175	413.1781	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	746.9328	711.4670	646.7106	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	174.5817	224.1296	173.7482	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													

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0.0000	0.0000	0.0000	0.0000	0.0000	43.6454	56.0324	43.4370	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												143.1149 (107)
Energy for space heating												25.3790 (99)
Energy for space cooling												2.2753 (108)
Total												27.6543 (109)
Fabric Energy Efficiency (DFEE)												27.7 (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)	2.4100 (2b)	151.5890 (1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	151.5890 (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) = 0.1319 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3819 (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) = 0.3246 (21)

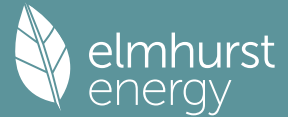
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750 (22a)
Adj infilt rate	0.4139	0.4058	0.3977	0.3571	0.3490	0.3084	0.3084	0.3003	0.3246	0.3490	0.3652	0.3815 (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	0.5857	0.5823	0.5791	0.5638	0.5609	0.5476	0.5476	0.5451	0.5527	0.5609	0.5667	0.5728 (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	59.3700	9.5500	49.8200	0.1800	8.9676		(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.1800	0.3960		(29a)
Total net area of external elements Aum(A, m ²)			63.6500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	22.3787		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							198.9752 (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)				46.0200	0.0700		3.2214
E16 Corner (normal)				7.7400	0.0900		0.6966
E18 Party wall between dwellings				2.5800	0.0600		0.1548
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1800	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)				3.1600	0.0700		0.2212
E25 Staggered party wall between dwellings				2.5800	0.0600		0.1548
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							6.2173 (36)
Point Thermal Bridges						(36a) =	0.0000
Total fabric heat loss						(33) + (36) + (36a) =	28.5960 (37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	29.2976	29.1312	28.9681	28.2019	28.0586	27.3913	27.3913	27.2677	27.6483	28.0586	28.3486	28.6517 (38)
Heat transfer coeff	57.8936	57.7272	57.5641	56.7979	56.6546	55.9873	55.9873	55.8638	56.2444	56.6546	56.9446	57.2477 (39)
Average = Sum(39)m / 12 =												56.7973

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HLP	0.9204	0.9178	0.9152	0.9030	0.9007	0.8901	0.8901	0.8881	0.8942	0.9007	0.9053	0.9101 (40)
HLP (average)												0.9030
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	76.8820	83.9939	95.6252	(45)
Energy content (annual)									Total = Sum	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												
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	(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												
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	(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)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63d)
Output from w/h												
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	791	(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)
												535.6171 (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												
(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	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	(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	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		
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)
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	60.0505	60.2236	60.3942	61.2089	61.3638	62.0951	62.0951	62.2325	61.8113	61.3638	61.0513	60.7280
alpha	5.0034	5.0149	5.0263	5.0806	5.0909	5.1397	5.1397	5.1488	5.1208	5.0909	5.0701	5.0485
util living area												
	0.9911	0.9829	0.9644	0.8984	0.7591	0.5585	0.4107	0.4648	0.7185	0.9307	0.9821	0.9926 (86)
MIT	19.8252	20.0095	20.2751	20.6403	20.8835	20.9805	20.9967	20.9939	20.9341	20.6155	20.1708	19.8001 (87)
Th 2	20.1502	20.1524	20.1546	20.1650	20.1669	20.1759	20.1759	20.1776	20.1724	20.1669	20.1630	20.1589 (88)
util rest of house												
	0.9889	0.9787	0.9555	0.8746	0.7115	0.4920	0.3351	0.3842	0.6516	0.9090	0.9769	0.9908 (89)
MIT 2	19.0786	19.2624	19.5242	19.8775	20.0881	20.1663	20.1749	20.1755	20.1352	19.8632	19.4316	19.0606 (90)
Living area fraction									fLA = Living area / (4) =			0.3930 (91)
MIT	19.3720	19.5560	19.8193	20.1773	20.4007	20.4863	20.4978	20.4972	20.4492	20.1588	19.7221	19.3512 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3720	19.5560	19.8193	20.1773	20.4007	20.4863	20.4978	20.4972	20.4492	20.1588	19.7221	19.3512 (93)

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8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9863	0.9750	0.9513	0.8750	0.7255	0.5175	0.3648	0.4158	0.6750	0.9087	0.9736	0.9885	(94)
Useful gains	415.5024	462.8528	489.4452	506.1960	451.7439	323.6515	217.4373	227.3731	335.8717	400.5408	401.6709	400.3787	(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	872.5731	846.0500	766.7133	640.5276	492.9336	329.5588	218.2297	228.8825	357.1043	541.5519	718.7596	867.3735	(97)
Space heating kWh	340.0606	257.5085	206.2875	96.7188	30.6452	0.0000	0.0000	0.0000	0.0000	104.9123	228.3038	347.4442	(98a)
Space heating requirement - total per year (kWh/year)												1611.8808	
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	340.0606	257.5085	206.2875	96.7188	30.6452	0.0000	0.0000	0.0000	0.0000	104.9123	228.3038	347.4442	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1611.8808	
Space heating per m2										(98c) / (4) =		25.6261	(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	526.2809	414.3062	424.5645	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9279	0.9638	0.9453	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	488.3298	399.3265	401.3546	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	146.5449	193.6322	150.6763	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	36.6362	48.4080	37.6691	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												122.7133	(107)
Energy for space heating												25.6261	(99)
Energy for space cooling												1.9509	(108)
Total												27.5770	(109)
Fabric Energy Efficiency (TFEE)												27.6	(109)

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

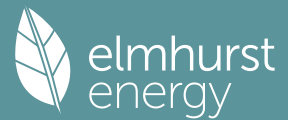
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000	2.4100	151.5890
Ground floor			
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	62.9000		
Dwelling volume			

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)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) = 0.0000 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	3.5300 (17)
Infiltration rate	0.1765 (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) = 0.1500 (21)
Wind speed	5.1000
Wind factor	1.2750
Adj infilt rate	0.1913
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

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3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			9.5500	1.2357	11.8013			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum(A, m2)			63.6500					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	27.2965		(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Floor			62.9000			70.0000	4403.0000	(32d)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
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) = 12515.5400 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 198.9752 (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)	46.0200	0.0390	1.7948	
E16 Corner (normal)	7.7400	0.0410	0.3173	
E18 Party wall between dwellings	2.5800	0.0390	0.1006	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	14.1800	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)	3.1600	0.0330	0.1043	
E25 Staggered party wall between dwellings	2.5800	0.0380	0.0980	

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 3.3291 (36)
 Point Thermal bridges 0.0000
 Total fabric heat loss (33) + (36) + (36a) = 30.6256 (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	(38)
Heat transfer coeff	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	
Average = Sum(39)m / 12 =	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	(39)
	55.6378												55.6378
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	(40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

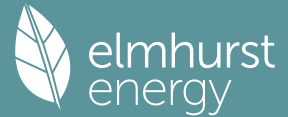
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.0623 (42)
Hot water usage for mixer showers													
Hot water usage for baths	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 other uses	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)
Average daily hot water use (litres/day)	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)
	110.2677												(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	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													
(66)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	123.7398	
Appliances gains (calculated in Appendix L, equation L13 or L13a), 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)
	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)

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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 (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 (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)	84.9046	82.7143	78.4946	69.2457	63.5807	57.6592	54.0220	57.0268	60.5496	67.1202	75.9863 (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 (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	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852
alpha	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657
util living area	0.9772	0.9628	0.9263	0.8354	0.6753	0.4929	0.3601	0.4079	0.6423	0.8799	0.9617	0.9813 (86)
MIT	20.0950	20.2491	20.4974	20.7681	20.9350	20.9892	20.9982	20.9967	20.9615	20.7365	20.3585	20.0418 (87)
Th 2	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807 (88)
util rest of house	0.9720	0.9547	0.9107	0.8044	0.6267	0.4325	0.2937	0.3365	0.5767	0.8490	0.9519	0.9770 (89)
MIT 2	19.1381	19.3305	19.6353	19.9512	20.1263	20.1740	20.1800	20.1792	20.1539	19.9243	19.4703	19.0714 (90)
Living area fraction	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (91)
MIT	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9669	0.9490	0.9063	0.8081	0.6428	0.4559	0.3198	0.3645	0.6007	0.8516	0.9467	0.9723 (94)
Ext temp.	504.1301	539.6944	561.3231	547.2128	463.8215	324.7011	216.6606	227.3399	342.2973	441.7597	468.5157	485.8833 (95)
Heat loss rate W	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000 (96)
Space heating kWh	846.4832	822.9688	749.6683	632.7261	486.5047	327.9482	217.0735	228.1438	354.4835	536.5429	707.6789	848.6305 (97)
Space heating requirement - total per year (kWh/year)	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (98a)
Solar heating kWh	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Solar heating contribution - total per year (kWh/year)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (98b)
Space heating kWh	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1176.2458
Space heating per m2										(98c) / (4) =		18.7003 (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	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (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)	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (231)

Full SAP Calculation Printout



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												1176.2458 (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)												41.4262 (230a)
Total electricity for the above, kWh/year												41.4262 (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												2031.1410 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1176.2458	16.4900	193.9629 (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	41.4262	16.4900	6.8312 (249)
Energy for lighting	151.3051	16.4900	24.9502 (250)
Additional standing charges			0.0000 (251)
Total energy cost			334.9351 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.1175 (257)
SAP value		81.8856
SAP rating (Section 12)		82 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1176.2458	0.1565	184.0308 (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			277.4984 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			305.0828 (272)
CO2 emissions per m2			4.8500 (273)
EI value			96.2112
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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (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) =	151.5890 (5)

Full SAP Calculation Printout



2. Ventilation rate

												m3 per hour	
Number of open chimneys												0 * 80 =	0.0000 (6a)
Number of open flues												0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire												0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler												0 * 20 =	0.0000 (6d)
Number of flues attached to other heater												0 * 35 =	0.0000 (6e)
Number of blocked chimneys												0 * 20 =	0.0000 (6f)
Number of intermittent extract fans												0 * 10 =	0.0000 (7a)
Number of passive vents												0 * 10 =	0.0000 (7b)
Number of flueless gas fires												0 * 40 =	0.0000 (7c)
												Air changes per hour	
Infiltration due to chimneys, flues and fans	= (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =										0.0000 / (5) =	0.0000 (8)	
Pressure test												Yes	
Pressure Test Method												Blower Door	
Measured/design AP50												3.5300 (17)	
Infiltration rate												0.1765 (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) =										0.1500 (21)		
Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind factor	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)	
Adj infilt rate	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)	
	0.1650	0.1538	0.1538	0.1463	0.1463	0.1275	0.1275	0.1238	0.1275	0.1425	0.1388	0.1500 (22b)	
Mechanical extract ventilation - centralised												0.5000 (23a)	
If mechanical ventilation												0.5000 (23b)	
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)													
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)	

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			9.5500	1.2357	11.8013			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum(A, m2)			63.6500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2965			(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Floor			62.9000			70.0000	4403.0000	(32d)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
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) =	12515.5400		(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							198.9752	(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)				46.0200	0.0390	1.7948		
E16 Corner (normal)				7.7400	0.0410	0.3173		
E18 Party wall between dwellings				2.5800	0.0390	0.1006		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1800	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)				3.1600	0.0330	0.1043		
E25 Staggered party wall between dwellings				2.5800	0.0380	0.0980		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.3291	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		30.6256	(37)

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)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	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)

elmhurst
energy

8. Space heating requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9593	0.9401	0.8849	0.7637	0.5713	0.3632	0.2281	0.2635	0.5226	0.8052	0.9314	0.9652 (94)
Useful gains	510.6318	539.7052	555.7055	531.1481	420.5594	271.6920	161.4275	172.4744	310.6277	430.6818	472.4009	491.3787 (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	818.7770	794.3264	710.6150	592.0412	432.4337	272.6366	161.4878	172.6045	316.4503	496.5976	674.8140	816.0015 (97)
Space heating kWh	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194 (98a)
Space heating requirement - total per year (kWh/year)												1004.5939
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	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194 (98c)

Full SAP Calculation Printout



Space heating requirement after solar contribution - total per year (kWh/year)
Space heating per m2

1004.5939
(98c) / (4) = 15.9713 (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	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(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)	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(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													(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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184	(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													1004.5939 (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)													41.4262 (230a)
Total electricity for the above, kWh/year													41.4262 (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													1859.4890 (238)

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

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1004.5939	26.0600	261.7972 (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	41.4262	26.0600	10.7957 (249)
Energy for lighting	151.3051	26.0600	39.4301 (250)
Additional standing charges			0.0000 (251)
Total energy cost			484.5828 (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	1004.5939	0.1571	157.8593 (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)

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Space and water heating			251.3269 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			278.9113 (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	1004.5939	1.5817	1588.9928 (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			2596.7745 (279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696 (281)
Energy for lighting	151.3051	1.5338	232.0768 (282)
Total Primary energy kWh/year			2891.5209 (286)

SAP 10 EPC IMPROVEMENTS

Plot 039

Current energy efficiency rating: B 82
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 (none)	Typical annual savings	Energy efficiency	Environmental impact
	Total Savings £0	0.00 kg/m²	

Potential energy efficiency rating: B 82
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	Potential	Saving
Electricity	£485	£485	£0
Space heating	£273	£273	£0
Water heating	£173	£173	£0
Lighting	£39	£39	£0
Total cost of fuels	£485	£485	£0
Total cost of uses	£485	£485	£0
Delivered energy	30 kWh/m²	30 kWh/m²	0 kWh/m²
Carbon dioxide emissions	0.3 tonnes	0.3 tonnes	0.0 tonnes
CO2 emissions per m²	4 kg/m²	4 kg/m²	0 kg/m²
Primary energy	46 kWh/m²	46 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

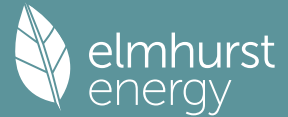
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling	62.9000 (1b)	x 2.4100 (2b)	= 151.5890 (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) =	151.5890 (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)

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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												3.5300	(17)	
Infiltration rate												0.1765	(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) =											0.1500	(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)	
	0.1913	0.1875	0.1838	0.1650	0.1613	0.1425	0.1425	0.1388	0.1500	0.1613	0.1688	0.1763	(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

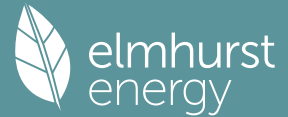
Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
Window			9.5500	1.2357	11.8013			(27)
Corridor Door			2.0800	1.0000	2.0800			(26)
EW Brick AAC018/019	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999	(29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600	(29a)
Total net area of external elements Aum(A, m2)			63.6500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2965			(33)
Main dwelling								
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500	(32)
Party Floor			62.9000			70.0000	4403.0000	(32d)
Party Ceiling			62.9000			40.0000	2516.0000	(32b)
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)								
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K								
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)				46.0200	0.0390	1.7948		
E16 Corner (normal)				7.7400	0.0410	0.3173		
E18 Party wall between dwellings				2.5800	0.0390	0.1006		
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				14.1800	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)				3.1600	0.0330	0.1043		
E25 Staggered party wall between dwellings				2.5800	0.0380	0.0980		
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							3.3291	(36)
Point Thermal bridges							(36a) =	0.0000
Total fabric heat loss							(33) + (36) + (36a) =	30.6256 (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	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	(38)	
Average = Sum(39)m / 12 =	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	(39)	
	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	(39)	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
HLP (average)	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	(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)
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 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	(45)	
Energy content (annual)														
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	26.9514	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	26.9514	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)	

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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)
	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	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852
alpha	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657
util living area	0.9772	0.9628	0.9263	0.8354	0.6753	0.4929	0.3601	0.4079	0.6423	0.8799	0.9617	0.9813 (86)
MIT	20.0950	20.2491	20.4974	20.7681	20.9350	20.9892	20.9982	20.9967	20.9615	20.7365	20.3585	20.0418 (87)
Th 2	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807 (88)
util rest of house	0.9720	0.9547	0.9107	0.8044	0.6267	0.4325	0.2937	0.3365	0.5767	0.8490	0.9519	0.9770 (89)
MIT 2	19.1381	19.3305	19.6353	19.9512	20.1263	20.1740	20.1800	20.1792	20.1539	19.9243	19.4703	19.0714 (90)
Living area fraction	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (91)
MIT	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (92)
Temperature adjustment	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (93)
adjusted MIT	19.5142	19.6915	19.9741	20.2722	20.4441	20.4943	20.5015	20.5005	20.4713	20.2435	19.8194	19.4528 (93)

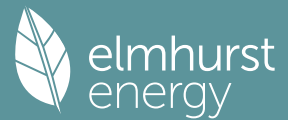
8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9669	0.9490	0.9063	0.8081	0.6428	0.4559	0.3198	0.3645	0.6007	0.8516	0.9467	0.9723 (94)
Useful gains	504.1301	539.6944	561.3231	547.2128	463.8215	324.7011	216.6606	227.3399	342.2973	441.7597	468.5157	485.8833 (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	846.4832	822.9688	749.6683	632.7261	486.5047	327.9482	217.0735	228.1438	354.4835	536.5429	707.6789	848.6305 (97)
Space heating kWh	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (98a)
Space heating requirement - total per year (kWh/year)												1176.2458
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	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1176.2458
Space heating per m2												18.7003 (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												

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Space heating efficiency (main heating system 1)	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (98)
Space heating fuel (main heating system)	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 efficiency (main heating system 2)	254.7107	190.3604	140.1288	61.5696	16.8764	0.0000	0.0000	0.0000	0.0000	70.5187	172.1975	269.8839 (211)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel used, main 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 (215)
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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184 (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												1176.2458 (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)												41.4262 (230a)
Total electricity for the above, kWh/year												41.4262 (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												2031.1410 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1	1176.2458	16.4900	193.9629 (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	41.4262	16.4900	6.8312 (249)
Energy for lighting	151.3051	16.4900	24.9502 (250)
Additional standing charges			0.0000 (251)
Total energy cost			334.9351 (255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)		1.1175 (257)
SAP value		81.8856
SAP rating (Section 12)		82 (258)
SAP band		B

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	1176.2458	0.1565	184.0308 (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			277.4984 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			305.0828 (272)
CO2 emissions per m2			4.8500 (273)
EI value			96.2112
EI rating			96 (274)
EI band			A

Full SAP Calculation Printout



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 2.4100 (2b)	= 151.5890 (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)	= 151.5890 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	0 * 10 = 0.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c)	Air changes per hour
Pressure Test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	3.5300 (17)
Number of sides sheltered	0.1765 (18)
	2 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.8500 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1500 (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	0.1650	0.1538	0.1538	0.1463	0.1463	0.1275	0.1275	0.1238	0.1275	0.1425	0.1388	0.1500 (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	59.3700	9.5500	49.8200	0.2600	12.9532	60.0000	2989.1999 (29a)
E-WM-30 Corridor Wall	4.2800	2.0800	2.2000	0.2100	0.4620	52.3000	115.0600 (29a)
Total net area of external elements Aum(A, m ²)			63.6500				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	27.2965		(33)
Main dwelling							
Party Wall			18.2900	0.0000	0.0000	45.0000	823.0500 (32)
Party Floor			62.9000			70.0000	4403.0000 (32d)
Party Ceiling			62.9000			40.0000	2516.0000 (32b)
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)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K
(28)...(30) + (32) + (32a)...(32e) = 12515.5400 (34)
198.9752 (35)

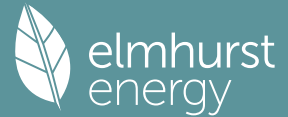
List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	5.4600	0.0370	0.2020
E2 Other lintels (including other steel lintels)	3.6400	0.0090	0.0328
E3 Sill	21.0500	0.0140	0.2947
E4 Jamb	46.0200	0.0390	1.7948
E7 Party floor between dwellings (in blocks of flats)	7.7400	0.0410	0.3173
E16 Corner (normal)	2.5800	0.0390	0.1006
E18 Party wall between dwellings	14.1800	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	1.0200	0.0270	0.0275
E2 Other lintels (including other steel lintels)	4.2000	0.0850	0.3570
E4 Jamb	3.1600	0.0330	0.1043
E7 Party floor between dwellings (in blocks of flats)	2.5800	0.0380	0.0980
E25 Staggered party wall between dwellings			3.3291 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000
Point Thermal bridges			(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 30.6256 (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	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122	25.0122 (38)
Heat transfer coeff	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378	55.6378 (39)
Average = Sum(39)m / 12 =												55.6378

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HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	0.8845	(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)
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	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)
Energy content (annual)										Total = Sum(45)m =	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	(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)	
													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	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)

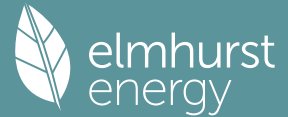
6. Solar gains

[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	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	80.5729	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	507.2134	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	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852	62.4852
alpha	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657	5.1657
util living area												
	0.9713	0.9555	0.9071	0.7928	0.6050	0.3995	0.2671	0.3056	0.5652	0.8372	0.9491	0.9760 (86)
MIT	20.1832	20.3233	20.5848	20.8332	20.9646	20.9965	20.9997	20.9993	20.9805	20.8139	20.4544	20.1397 (87)
Th 2	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807	20.1807 (88)
util rest of house												
	0.9647	0.9458	0.8877	0.7562	0.5521	0.3398	0.2028	0.2363	0.4963	0.7976	0.9361	0.9704 (89)
MIT 2	19.2491	19.4229	19.7403	20.0223	20.1535	20.1789	20.1806	20.1805	20.1686	20.0094	19.5884	19.1951 (90)
Living area fraction												
									fLA = Living area / (4) =			
MIT	19.6162	19.7767	20.0722	20.3410	20.4723	20.5002	20.5025	20.5023	20.4877	20.3255	19.9287	19.5663 (92)

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Temperature adjustment												0.0000
adjusted MIT	19.6162	19.7767	20.0722	20.3410	20.4723	20.5002	20.5025	20.5023	20.4877	20.3255	19.9287	19.5663 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9593	0.9401	0.8849	0.7637	0.5713	0.3632	0.2281	0.2635	0.5226	0.8052	0.9314	0.9652	(94)
Useful gains	510.6318	539.7052	555.7055	531.1481	420.5594	271.6920	161.4275	172.4744	310.6277	430.6818	472.4009	491.3787	(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	818.7770	794.3264	710.6150	592.0412	432.4337	272.6366	161.4878	172.6045	316.4503	496.5976	674.8140	816.0015	(97)
Space heating kWh	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(98a)
Space heating requirement - total per year (kWh/year)												1004.5939	
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	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1004.5939	
Space heating per m2										(98c) / (4) =		15.9713	(99)

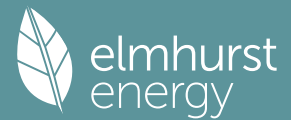
9a. Energy requirements - Individual heating systems, including micro-CHP

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	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(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)	229.2600	171.1054	115.2527	43.8431	8.8345	0.0000	0.0000	0.0000	0.0000	49.0413	145.7374	241.5194	(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	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	324.5200	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	3.5184	3.1779	3.5184	3.4049	3.5184	3.4049	3.5184	3.5184	3.4049	3.5184	3.4049	3.5184	(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												1004.5939	(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)												41.4262	(230a)
Total electricity for the above, kWh/year												41.4262	(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												1859.4890	(238)

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

Fuel	Fuel price	Fuel cost
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	kWh/year	p/kWh	£/year
Space heating - main system 1	1004.5939	26.0600	261.7972 (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	41.4262	26.0600	10.7957 (249)
Energy for lighting	151.3051	26.0600	39.4301 (250)
Additional standing charges			0.0000 (251)
Total energy cost			484.5828 (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	1004.5939	0.1571	157.8593 (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			251.3269 (265)
Pumps, fans and electric keep-hot	41.4262	0.1387	5.7463 (267)
Energy for lighting	151.3051	0.1443	21.8380 (268)
Total CO2, kg/year			278.9113 (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	1004.5939	1.5817	1588.9928 (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			2596.7745 (279)
Pumps, fans and electric keep-hot	41.4262	1.5128	62.6696 (281)
Energy for lighting	151.3051	1.5338	232.0768 (282)
Total Primary energy kWh/year			2891.5209 (286)