

Full SAP Calculation Printout



Plot Reference	Unit 1			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.18	TER	11.99
Environmental	96 A	% DER < TER			65.14
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	29.38	DPER	44.29	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

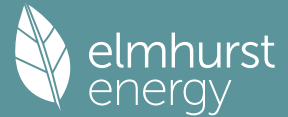
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

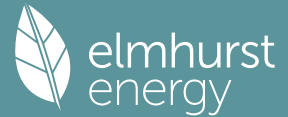
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)	
Space heating requirement - total per year (kWh/year)												2275.1765	
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765	
Space heating per m2										(98c) / (4) =		27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												609.9016 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2379.5646	(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	609.9016	0.1566	95.4839	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1593.1073	0.1410	224.5564	(264)
Space and water heating			320.0403	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	176.5557	0.1443	25.4824	(268)
Total CO2, kg/year			345.5227	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1800	(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	609.9016	1.5796	963.3749	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400	(278)
Space and water heating			3386.8149	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	176.5557	1.5338	270.8071	(282)
Total Primary energy kWh/year			3657.6219	(286)
Dwelling Primary energy Rate (DPER)			44.2900	(287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830	(1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660	(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	3 * 10 =	30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3845	(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) =	0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(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			2.2100	1.0000	2.2100			(26)
TER Opening Type			12.7700	1.1450	14.6221			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.4011			(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)

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

266.6986 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385	
E3 Sill	5.0100	0.0500	0.2505	
E4 Jamb	25.3400	0.0500	1.2670	
E5 Ground floor (normal)	18.9000	0.1600	3.0240	
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000	
P1 Party wall - Ground floor	8.3000	0.0800	0.6640	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000	
E18 Party wall between dwellings	10.8000	0.0600	0.6480	
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764	
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280	
E16 Corner (normal)	13.5000	0.0900	1.2150	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E20 Exposed floor (normal)	1.9000	0.3200	0.6080	
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800	
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680	
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.8004 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	54.2015 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

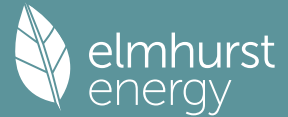
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)
Daily hot water use													
135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =	2065.4007		
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(56)
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(57)
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)
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													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	2383.3728	2383	(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													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944 (86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925 (89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910 (90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (92)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)
Temperature adjustment												0.0000
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761 (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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710 (97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98a)
Space heating requirement - total per year (kWh/year)												2692.0799
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799
Space heating per m2										(98c) / (4) =		32.5997 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	79.8000 (216)
Efficiency of water heater (217)m	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2916.6630	(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												2862.8126	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4024.2977	(238)

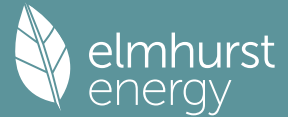
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 1			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.18	TER	11.99
Environmental	96 A	% DER < TER			65.14
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	29.38	DPER	44.29	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

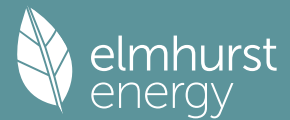
3. Heat losses and heat loss parameter

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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.9983	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9700 (34)
266.6986 (35)

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	47.5594 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	90.7386	90.4905	90.2473	89.1049	88.8912	87.8962	87.8962	87.7120	88.2795	88.8912	89.3236	89.7756	(39)
Average = Sum(39)m / 12 =												89.1039	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0988	1.0958	1.0928	1.0790	1.0764	1.0644	1.0644	1.0621	1.0690	1.0764	1.0817	1.0871	(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													2.5100 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													28.6361 (42b)
Hot water usage for other uses													40.3348 (42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Distribution loss (46)m = 0.15 x (45)m													1049.9202
Water storage loss (or HIU loss):													0.0000 (46)
Total storage loss													0.0000 (56)
If cylinder contains dedicated solar storage													0.0000 (57)
Primary loss													0.0000 (59)
Combi loss													0.0000 (61)
Total heat required for water heating calculated for each month													
WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)													892.4322 (64)
Electric shower(s)													892 (64)
Heat gains from water heating, kWh/month													
	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
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	(69)
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	67.4219	67.6068	67.7890	68.6580	68.8231	69.6022	69.6022	69.7484	69.3000	68.8231	68.4900	68.1451
alpha	5.4948	5.5071	5.5193	5.5772	5.5882	5.6401	5.6401	5.6499	5.6200	5.5882	5.5660	5.5430
util living area	0.9960	0.9891	0.9750	0.9310	0.8295	0.6422	0.4714	0.5103	0.7430	0.9431	0.9899	0.9970 (86)
MIT	19.8683	20.0789	20.3261	20.6340	20.8614	20.9745	20.9962	20.9941	20.9428	20.6545	20.2082	19.8361 (87)
Th 2	20.0018	20.0043	20.0067	20.0180	20.0201	20.0300	20.0300	20.0319	20.0262	20.0201	20.0158	20.0114 (88)
util rest of house	0.9947	0.9855	0.9664	0.9073	0.7761	0.5553	0.3695	0.4061	0.6609	0.9185	0.9859	0.9960 (89)
MIT 2	18.9818	19.1920	19.4360	19.7363	19.9327	20.0194	20.0292	20.0304	19.9987	19.7623	19.3306	18.9574 (90)
Living area fraction	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	0.3840 (91)
MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9833	0.9639	0.9090	0.7920	0.5882	0.4088	0.4463	0.6908	0.9210	0.9840	0.9950 (94)
Useful gains	604.0614	712.5965	758.7551	766.4880	683.2761	496.5669	332.7469	348.7783	523.8213	632.6300	603.3947	573.3788 (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	1363.0958	1324.1067	1198.2846	996.2843	763.5117	508.5793	334.0472	350.8862	552.7364	844.9001	1122.5835	1355.1460 (97)
Space heating kWh	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98a)
Space heating requirement - total per year (kWh/year)												2641.1947
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	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.1947
Space heating per m2												(98c) / (4) = 31.9835 (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	826.2246	650.4322	666.6111	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8972	0.9506	0.9369	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	741.2566	618.2714	624.5259	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.6029	212.2745	181.1117	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	35.1507	53.0686	45.2779	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												133.4973 (107)
Energy for space heating												31.9835 (99)
Energy for space cooling												1.6166 (108)
Total												33.6000 (109)
Fabric Energy Efficiency (DFEE)												33.6 (109)

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

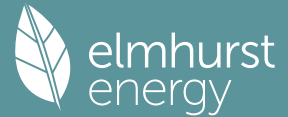
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1345 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
Yes
Blower Door
5.0000 (17)
0.3845 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor (20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.4011		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	54.2015 (37)

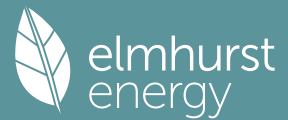
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177 (39)
Average = Sum(39)m / 12 =												95.7460
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676 (40)
HLP (average)												1.1594
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												2.5100 (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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU 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	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												

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	892.4322 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 892 (64)												

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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				
North				4.1800	10.6334	0.6300		0.7000	0.7700		13.5838 (74)		
South				8.5900	46.7521	0.6300		0.7000	0.7700		122.7343 (78)		
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)	
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9967	0.9918	0.9822	0.9522	0.8768	0.7114	0.5349	0.5757	0.8019	0.9594	0.9922	0.9975 (86)
MIT	19.7261	19.9258	20.1757	20.5057	20.7801	20.9484	20.9905	20.9862	20.8997	20.5488	20.0808	19.6962 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9955	0.9889	0.9757	0.9337	0.8292	0.6176	0.4144	0.4542	0.7202	0.9398	0.9889	0.9966 (89)
MIT 2	18.7890	18.9889	19.2371	19.5636	19.8103	19.9420	19.9622	19.9627	19.9100	19.6107	19.1528	18.7665 (90)
Living area fraction	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (91)
MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (92)
Temperature adjustment												0.0000
adjusted MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9943	0.9868	0.9730	0.9331	0.8409	0.6524	0.4611	0.5013	0.7485	0.9402	0.9871	0.9956	(94)
Useful gains	586.4914	685.1825	726.8037	741.7972	680.8046	516.5410	351.9015	368.1630	535.4680	614.6542	583.8311	558.1020	(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	1445.9899	1403.4322	1269.0131	1055.6436	810.3802	541.5555	355.1872	373.2342	587.5688	895.2378	1190.8501	1438.8882	(97)
Space heating kWh	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050	(98a)
Space heating requirement - total per year (kWh/year)												3149.0208	
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	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3149.0208	
Space heating per m2										(98c) / (4) =		38.1330	(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	888.6605	699.5838	717.0911	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8351	0.9092	0.8896	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	742.1400	636.0598	637.9419	0.0000	0.0000	0.0000	0.0000	(102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.9469	38.7380	32.5719	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												95.2568 (107)
Energy for space cooling												38.1330 (99)
Total												1.1535 (108)
Fabric Energy Efficiency (TFEE)												39.2865 (109)
												39.3 (109)

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Plot Reference	Unit 1			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.18	TER	11.99
Environmental	96 A	% DER < TER			65.14
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	29.38	DPER	44.29	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

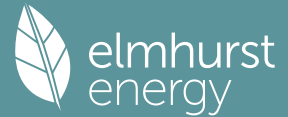
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

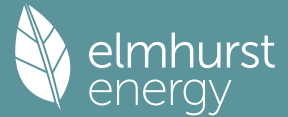
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)	
Space heating requirement - total per year (kWh/year)												2275.1765	
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765	
Space heating per m2										(98c) / (4) =		27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												609.9016 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2379.5646	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			345.5227 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1800 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3657.6219 (286)
Dwelling Primary energy Rate (DPER)			44.2900 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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			2.2100	1.0000	2.2100			(26)
TER Opening Type			12.7700	1.1450	14.6221			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.4011			(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)

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

266.6986 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385	
E3 Sill	5.0100	0.0500	0.2505	
E4 Jamb	25.3400	0.0500	1.2670	
E5 Ground floor (normal)	18.9000	0.1600	3.0240	
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000	
P1 Party wall - Ground floor	8.3000	0.0800	0.6640	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000	
E18 Party wall between dwellings	10.8000	0.0600	0.6480	
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764	
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280	
E16 Corner (normal)	13.5000	0.0900	1.2150	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E20 Exposed floor (normal)	1.9000	0.3200	0.6080	
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800	
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680	
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	54.2015 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

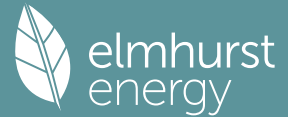
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)
Daily hot water use													
135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =	2065.4007		
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(56)
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	(57)
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)
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													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	2383.3728	2383.3728	(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													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North				4.1800	10.6334		0.6300		0.7000		0.7700	13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944 (86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925 (89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910 (90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (92)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)
Temperature adjustment												0.0000
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761 (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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710 (97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98a)
Space heating requirement - total per year (kWh/year)												2692.0799
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799
Space heating per m2										(98c) / (4) =		32.5997 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000 (201)
Fraction of space heat from main system(s)												1.0000 (202)
Efficiency of main space heating system 1 (in %)												92.3000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	79.8000 (216)
Efficiency of water heater (217)m	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2916.6630	(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												2862.8126	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4024.2977	(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	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

Full SAP Calculation Printout



Plot Reference	Unit 1			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.54	TER	11.99
Environmental	100 A	% DER < TER			95.50
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	71.27	DPER	18.02	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

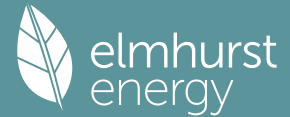
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									fLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)
Space heating requirement - total per year (kWh/year)												2275.1765
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765
Space heating per m2										(98c) / (4) =		27.5512 (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 %)												373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.1544	-69.6732	-102.4013	-115.5400	-124.3428	-115.0172	-113.3695	-106.5680	-93.5893	-78.6076	-53.0471	-41.3227 (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	-19.4624	-43.1597	-89.7661	-142.0022	-193.8290	-197.7963	-195.3101	-163.1269	-117.6359	-65.6344	-27.1562	-15.2610 (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												609.9016 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	47.7915	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	0.1345	-142.7757
PV Unit electricity exported	-1270.1403	0.1245	-158.1534
Total			-300.9290 (269)
Total CO2, kg/year			44.5937 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5400 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	1.4970	-1589.3087
PV Unit electricity exported	-1270.1403	0.4570	-580.4570
Total			-2169.7658 (283)
Total Primary energy kWh/year			1487.8562 (286)
Dwelling Primary energy Rate (DPER)			18.0200 (287)

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

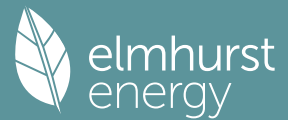
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

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

$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.4011	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			

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

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 54.2015 (37)

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

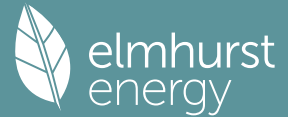
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =			2065.4007
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =			2383.3728 (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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507	
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300	
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944	(86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206	(87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460	(88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925	(89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910	(90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(91)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9881	0.9762	0.9559	0.9038	0.7952	0.6009	0.4193	0.4539	0.6921	0.9078	0.9752	0.9903	(94)
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761	(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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710	(97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98a)
Space heating requirement - total per year (kWh/year)												2692.0799	
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799	
Space heating per m ²										(98c) / (4) =		32.5997	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

0.0000 (201)

Efficiency of main space heating system 1 (in %)

1.0000 (202)

Efficiency of main space heating system 2 (in %)

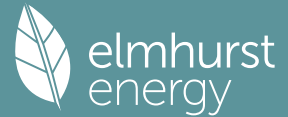
92.3000 (206)

Efficiency of secondary/supplementary heating system, %

0.0000 (207)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	86.0140 (217)
Fuel for water heating, kWh/month												
	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2916.6630 (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												2862.8126 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												4024.2977 (238)

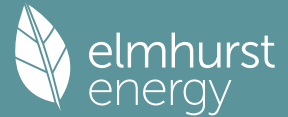
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 1			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.54	TER	11.99
Environmental	100 A	% DER < TER			95.50
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	71.27	DPER	18.02	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

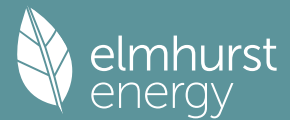
3. Heat losses and heat loss parameter

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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.9983	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9700 (34)
266.6986 (35)

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	47.5594 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	90.7386	90.4905	90.2473	89.1049	88.8912	87.8962	87.8962	87.7120	88.2795	88.8912	89.3236	89.7756	(39)
Average = Sum(39)m / 12 =												89.1039	
HLP	1.0988	1.0958	1.0928	1.0790	1.0764	1.0644	1.0644	1.0621	1.0690	1.0764	1.0817	1.0871	(40)
HLP (average)												1.0790	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (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	0.0000	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393		(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348		(42c)
Average daily hot water use (litres/day)													63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742		(44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Energy content (annual)										Total =	Sum(45)m =	1049.9202	
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	0.0000	(46)
Water storage loss (or HIU 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	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	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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643		(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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643		(64)
12Total per year (kWh/year)													892.4322 (64)
Electric shower(s)													892 (64)
53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985		(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =													603.9924 (64a)
Heat gains from water heating, kWh/month													
36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907		(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	67.4219	67.6068	67.7890	68.6580	68.8231	69.6022	69.6022	69.7484	69.3000	68.8231	68.4900	68.1451
alpha	5.4948	5.5071	5.5193	5.5772	5.5882	5.6401	5.6401	5.6499	5.6200	5.5882	5.5660	5.5430
util living area	0.9960	0.9891	0.9750	0.9310	0.8295	0.6422	0.4714	0.5103	0.7430	0.9431	0.9899	0.9970 (86)
MIT	19.8683	20.0789	20.3261	20.6340	20.8614	20.9745	20.9962	20.9941	20.9428	20.6545	20.2082	19.8361 (87)
Th 2	20.0018	20.0043	20.0067	20.0180	20.0201	20.0300	20.0300	20.0319	20.0262	20.0201	20.0158	20.0114 (88)
util rest of house	0.9947	0.9855	0.9664	0.9073	0.7761	0.5553	0.3695	0.4061	0.6609	0.9185	0.9859	0.9960 (89)
MIT 2	18.9818	19.1920	19.4360	19.7363	19.9327	20.0194	20.0292	20.0304	19.9987	19.7623	19.3306	18.9574 (90)
Living area fraction	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	0.3840 (91)
MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9833	0.9639	0.9090	0.7920	0.5882	0.4088	0.4463	0.6908	0.9210	0.9840	0.9950 (94)
Useful gains	604.0614	712.5965	758.7551	766.4880	683.2761	496.5669	332.7469	348.7783	523.8213	632.6300	603.3947	573.3788 (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	1363.0958	1324.1067	1198.2846	996.2843	763.5117	508.5793	334.0472	350.8862	552.7364	844.9001	1122.5835	1355.1460 (97)
Space heating kWh	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98a)
Space heating requirement - total per year (kWh/year)												2641.1947
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	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.1947
Space heating per m2												(98c) / (4) = 31.9835 (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	826.2246	650.4322	666.6111	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8972	0.9506	0.9369	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	741.2566	618.2714	624.5259	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.6029	212.2745	181.1117	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	35.1507	53.0686	45.2779	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												133.4973 (107)
Energy for space heating												31.9835 (99)
Energy for space cooling												1.6166 (108)
Total												33.6000 (109)
Fabric Energy Efficiency (DFEE)												33.6 (109)

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

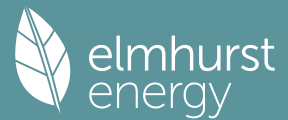
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.4011		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	54.2015 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177 (39)
Average = Sum(39)m / 12 =												95.7460

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676 (40)
HLP (average)												1.1594
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

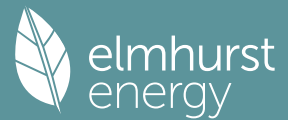
4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												0.0000 (61)

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	892.4322 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	603.9924 (64a)
												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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				
North			4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South			8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507	
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300	
util living area	0.9967	0.9918	0.9822	0.9522	0.8768	0.7114	0.5349	0.5757	0.8019	0.9594	0.9922	0.9975	(86)
MIT	19.7261	19.9258	20.1757	20.5057	20.7801	20.9484	20.9905	20.9862	20.8997	20.5488	20.0808	19.6962	(87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460	(88)
util rest of house	0.9955	0.9889	0.9757	0.9337	0.8292	0.6176	0.4144	0.4542	0.7202	0.9398	0.9889	0.9966	(89)
MIT 2	18.7890	18.9889	19.2371	19.5636	19.8103	19.9420	19.9622	19.9627	19.9100	19.6107	19.1528	18.7665	(90)
Living area fraction	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235	(91)
MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9943	0.9868	0.9730	0.9331	0.8409	0.6524	0.4611	0.5013	0.7485	0.9402	0.9871	0.9956	(94)
Ext temp.	586.4914	685.1825	726.8037	741.7972	680.8046	516.5410	351.9015	368.1630	535.4680	614.6542	583.8311	558.1020	(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	1445.9899	1403.4322	1269.0131	1055.6436	810.3802	541.5555	355.1872	373.2342	587.5688	895.2378	1190.8501	1438.8882	(97)
Space heating requirement - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050	(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	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050	(98c)
Space heating per m2												3149.0208	(99)

8c. Space cooling requirement

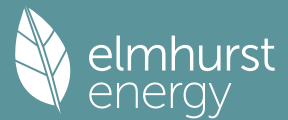
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	888.6605	699.5838	717.0911	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8351	0.9092	0.8896	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	742.1400	636.0598	637.9419	0.0000	0.0000	0.0000	0.0000	(102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.9469	38.7380	32.5719	0.0000	0.0000	0.0000	0.2500 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												95.2568 (107)
Energy for space cooling												38.1330 (99)
Total												1.1535 (108)
Fabric Energy Efficiency (TFEE)												39.2865 (109)
												39.3 (109)

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Plot Reference	Unit 1				Issued on Date	02/07/2026	
Assessment Reference	Renewables			Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT				SAP Version	10.2	
SAP Rating	94 A	DER	0.54	TER	11.99		
Environmental	100 A	% DER < TER				95.50	
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29		
Compliance Check	See BREL	% DFEE < TFEE				14.47	
% DPER < TPER	71.27	DPER	18.02	TPER	62.72		
Assessor Details	Mr. Lee Humphries				Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

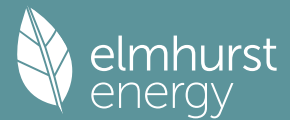
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)	
Space heating requirement - total per year (kWh/year)												2275.1765	
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765	
Space heating per m2										(98c) / (4) =		27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.1544	-69.6732	-102.4013	-115.5400	-124.3428	-115.0172	-113.3695	-106.5680	-93.5893	-78.6076	-53.0471	-41.3227 (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	-19.4624	-43.1597	-89.7661	-142.0022	-193.8290	-197.7963	-195.3101	-163.1269	-117.6359	-65.6344	-27.1562	-15.2610 (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												609.9016 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	47.7915	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	0.1345	-142.7757
PV Unit electricity exported	-1270.1403	0.1245	-158.1534
Total			-300.9290 (269)
Total CO2, kg/year			44.5937 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5400 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	1.4970	-1589.3087
PV Unit electricity exported	-1270.1403	0.4570	-580.4570
Total			-2169.7658 (283)
Total Primary energy kWh/year			1487.8562 (286)
Dwelling Primary energy Rate (DPER)			18.0200 (287)

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

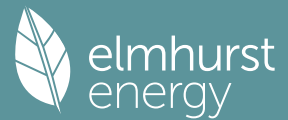
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

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

$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.4011		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			

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

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 54.2015 \quad (37)$$

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

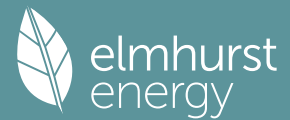
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North					4.1800	10.6334	0.6300	0.7000			0.7700	13.5838 (74)	
South					8.5900	46.7521	0.6300	0.7000			0.7700	122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)	
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)	

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, n _{l,m} (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507	
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300	
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944	(86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206	(87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460	(88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925	(89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910	(90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(91)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(92)
Temperature adjustment	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)

8. Space heating requirement

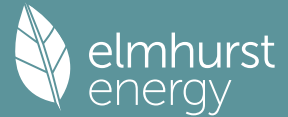
Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9881	0.9762	0.9559	0.9038	0.7952	0.6009	0.4193	0.4539	0.6921	0.9078	0.9752	0.9903	(94)
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761	(95)
Ext temp.	4.3000	4.9000	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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710	(97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98a)
Space heating requirement - total per year (kWh/year)												2692.0799	
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799	
Space heating per m ²										(98c) / (4) =		32.5997	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	86.0140 (217)
Fuel for water heating, kWh/month												
	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2916.6630 (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												2862.8126 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												4024.2977 (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	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 2			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

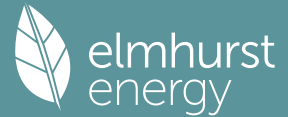
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			325.5798 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3453.7087 (286)
Dwelling Primary energy Rate (DPER)			41.8200 (287)

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

1. Overall dwelling characteristics

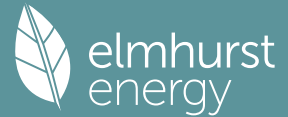
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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			2.2100	1.0000	2.2100			(26)
TER Opening Type			12.7700	1.1450	14.6221			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			137.6700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8475			(33)
Main dwelling								
Party Wall			93.6900	0.0000	0.0000			(32)

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

266.6986 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385	
E3 Sill	5.0100	0.0500	0.2505	
E4 Jamb	25.3400	0.0500	1.2670	
E5 Ground floor (normal)	10.1000	0.1600	1.6160	
E6 Intermediate floor within a dwelling	7.7000	0.0000	0.0000	
P1 Party wall - Ground floor	17.1000	0.0800	1.3680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000	
E18 Party wall between dwellings	21.6000	0.0600	1.2960	
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.1200	2.1120	
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	2.7000	0.0900	0.2430	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E20 Exposed floor (normal)	1.9000	0.3200	0.6080	
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800	
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680	
P8 Party Wall - Exposed floor (inverted)	0.5000	0.2400	0.1200	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)

Water storage loss (or HIU loss):

Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)

Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)

If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)

Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)

WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
Total per year (kWh/year) = Sum(64)m =												2383.3728	(64)
12Total per year (kWh/year)												2383	(64)

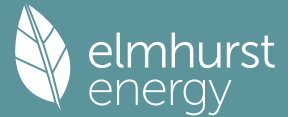
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)

Heat gains from water heating, kWh/month													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North				4.1800	10.6334		0.6300		0.7000		0.7700	13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Ext temp.	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating requirement - total per year (kWh/year)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2										(98c) / (4) =		26.0046 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Efficiency of water heater	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	85.6690 (217)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement	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)
(221)m												
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(238)

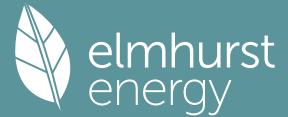
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 2				Issued on Date	02/07/2026	
Assessment Reference	Energy Efficiency			Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT				SAP Version	10.2	
SAP Rating	83 B	DER	3.94	TER	10.53		
Environmental	97 A	% DER < TER				62.58	
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58		
Compliance Check	See BREL	% DFEE < TFEE				14.80	
% DPER < TPER	23.72	DPER	41.82	TPER	54.83		
Assessor Details	Mr. Lee Humphries				Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9698 (34)
266.6986 (35)

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (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												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)												
	109.2332	95.5196	89.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1049.9202
	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 (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 892.4322 (64)
Electric shower(s)												892 (64)
	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												603.9924 (64a)
Heat gains from water heating, kWh/month												
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)

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
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	172.0440	247.9840	214.8321	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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

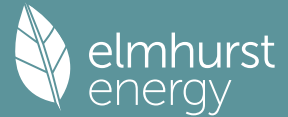
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.8475		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (37)

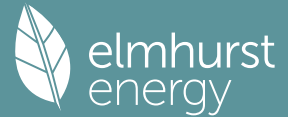
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Average = Sum(39)m / 12 =	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637 (39)
												85.8920
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482 (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												2.5100 (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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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				
North			4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South			8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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 (98c)
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 (98d)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98e)
Space heating requirement after solar 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	2573.9215 (98f)
Space heating per m ²	(98c) / (4) = 31.1688 (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	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

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Plot Reference	Unit 2			Issued on Date	02/07/2026	
Assessment Reference	Energy Efficiency		Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2	
SAP Rating	83 B		DER	3.94	TER	10.53
Environmental	97 A		% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31		DFEE	27.75	TFEE	32.58
Compliance Check	See BREL		% DFEE < TFEE			14.80
% DPER < TPER	23.72		DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

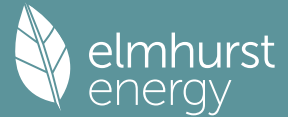
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			325.5798 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3453.7087 (286)
Dwelling Primary energy Rate (DPER)			41.8200 (287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

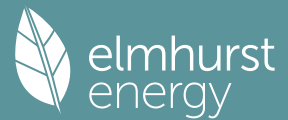
	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

elmhurst
energy

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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	
North					4.1800	10.6334	0.6300		0.7000		0.7700	13.5838 (74)	
South					8.5900	46.7521	0.6300		0.7000		0.7700	122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)	
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Ext temp.	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating requirement - total per year (kWh/year)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2										(98c) / (4) =		26.0046 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Efficiency of water heater	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	85.6690 (217)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement	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)
(221)m												
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 2			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

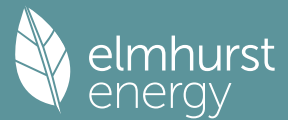
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (37)

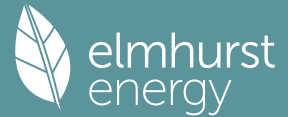
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers												
	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use												
	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m												
	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (64)
Electric shower(s)												3126 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Pumps, fans	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Total internal gains	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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							

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

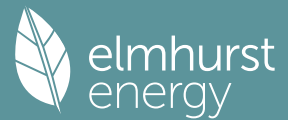
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3269 (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													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

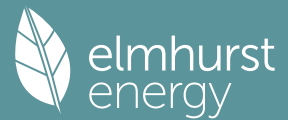
List of Thermal Bridges	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			10.5000 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000
Point Thermal Bridges			(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

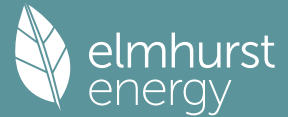
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (238)

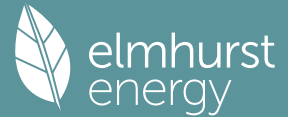
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 2			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9698 (34)
266.6986 (35)

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (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												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)												
	109.2332	95.5196	89.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1049.9202
	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 (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 892.4322 (64)
Electric shower(s)												892 (64)
	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												603.9924 (64a)
Heat gains from water heating, kWh/month												
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)

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
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	172.0440	247.9840	214.8321	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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

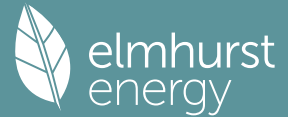
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.8475		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5000 (36)
Point Thermal Bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

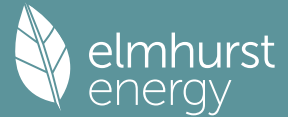
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 43.1792 Feb 42.9310 Mar 42.6878 Apr 41.5455 May 41.3318 Jun 40.3368 Jul 40.3368 Aug 40.1526 Sep 40.7200 Oct 41.3318 Nov 41.7641 Dec 42.2162 (38)
Heat transfer coeff 87.5267 87.2786 87.0354 85.8930 85.6793 84.6843 84.6843 84.5001 85.0676 85.6793 86.1117 86.5637 (39)
Average = Sum(39)m / 12 = 85.8920

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482 (40)
HLP (average)												1.0401
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)
Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)
Average daily hot water use (litres/day) 63.2183 (43)
Daily hot water use Jan 68.9710 Feb 67.0790 Mar 65.0134 Apr 62.4424 May 60.1488 Jun 57.7653 Jul 57.2700 Aug 59.3314 Sep 61.4457 Oct 63.8935 Nov 66.4872 Dec 68.8742 (44)
Energy conte 109.2332 95.5196 99.9231 85.4805 80.9719 71.0291 69.2631 73.4647 75.7687 86.7028 94.7232 107.8403 (45)
Energy content (annual) Total = Sum(45)m = 1049.9202
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 (or HIU loss):
Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)
If cylinder contains dedicated solar storage 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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
North				4.1800	10.6334		0.6300		0.7000		0.7700		13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700		122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393		117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826		560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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 (98c)
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 (98d)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98e)
Space heating requirement after solar 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	2573.9215 (98f)
Space heating per m ²	(98c) / (4) = 31.1688 (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	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

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Plot Reference	Unit 2			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

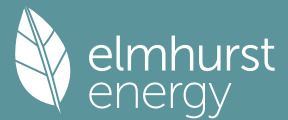
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (37)

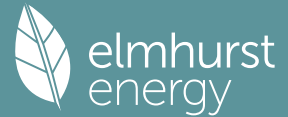
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9864
												31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers												
	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m												
	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (64)
Electric shower(s)												3126 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Pumps, fans	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)												
	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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							

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (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	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

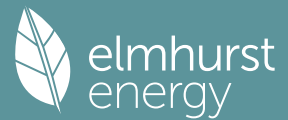
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

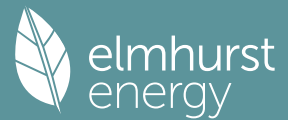
List of Thermal Bridges	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000 (36)
Point Thermal bridges			0.0000 (36a)
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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
North					4.1800	10.6334	0.6300	0.7000			0.7700			13.5838 (74)
South					8.5900	46.7521	0.6300	0.7000			0.7700			122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393			117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740			664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

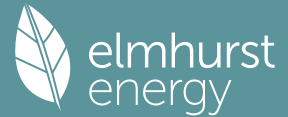
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (238)

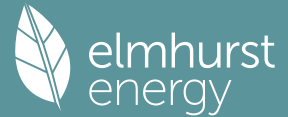
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 3			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9864
												31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

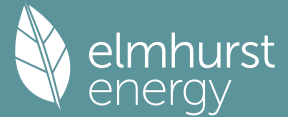
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1585.0207	0.1410	223.4165	(264)
Space and water heating			300.0974	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	176.5557	0.1443	25.4824	(268)
Total CO2, kg/year			325.5798	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400	(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	487.9048	1.5818	771.7629	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387	(278)
Space and water heating			3182.9016	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	176.5557	1.5338	270.8071	(282)
Total Primary energy kWh/year			3453.7087	(286)
Dwelling Primary energy Rate (DPER)			41.8200	(287)

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

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830	(1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660	(5)

2. Ventilation rate

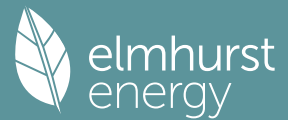
	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	3 * 10 =	30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes	
Pressure Test Method	Blower Door	
Measured/design AP50	5.0000	(17)
Infiltration rate	0.3845	(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) =	0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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	
North					4.1800	10.6334	0.6300		0.7000		0.7700	13.5838 (74)	
South					8.5900	46.7521	0.6300		0.7000		0.7700	122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)	
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Ext temp.	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating requirement - total per year (kWh/year)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2										(98c) / (4) =		26.0046 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Efficiency of water heater	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement	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)
(221)m												
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(238)

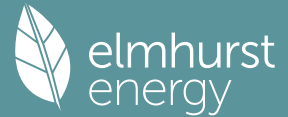
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 3				Issued on Date	02/07/2026	
Assessment Reference	Energy Efficiency			Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT				SAP Version	10.2	
SAP Rating	83 B	DER	3.94	TER	10.53		
Environmental	97 A	% DER < TER				62.58	
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58		
Compliance Check	See BREL	% DFEE < TFEE				14.80	
% DPER < TPER	23.72	DPER	41.82	TPER	54.83		
Assessor Details	Mr. Lee Humphries				Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							

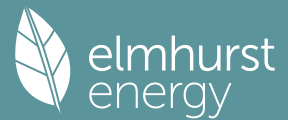
Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(39)m	Jan 43.1792	Feb 42.9310	Mar 42.6878	Apr 41.5455	May 41.3318	Jun 40.3368	Jul 40.3368	Aug 40.1526	Sep 40.7200	Oct 41.3318	Nov 41.7641	Dec 42.2162 (39)
Heat transfer coeff	81.9148	81.6667	81.4235	80.2811	80.0674	79.0724	79.0724	78.8882	79.4557	80.0674	80.4997	80.9518 (39)
Average = Sum(39)m / 12 =												80.2801
HLP	Jan 0.9919	Feb 0.9889	Mar 0.9860	Apr 0.9722	May 0.9696	Jun 0.9575	Jul 0.9575	Aug 0.9553	Sep 0.9622	Oct 0.9696	Nov 0.9748	Dec 0.9803 (40)
HLP (average)												0.9721
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	0.0000	0.0000										0.0000 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Distribution loss (46)m = 0.15 x (45)m										Total =	Sum(45)m =	1049.9202
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss												
if cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
12Total per year (kWh/year)										Total per year (kWh/year) =	Sum(64)m =	892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
												603.9924 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037 (73)

[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
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	172.0440	247.9840	214.8321	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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

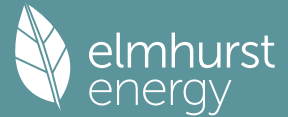
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.8475		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (37)

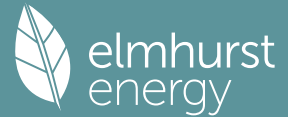
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Average = Sum(39)m / 12 =	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637 (39)
												85.8920
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482 (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												2.5100 (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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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
North				4.1800	10.6334		0.6300		0.7000		0.7700		13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700		122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393		117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826		560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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 (98c)
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 (98d)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98e)
Space heating requirement after solar 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	2573.9215 (98f)
Space heating per m ²	(98c) / (4) = 31.1688 (99)											

8c. Space cooling requirement

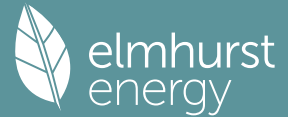
Calculated for June, July and August. See Table 10b	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

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Plot Reference	Unit 3			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

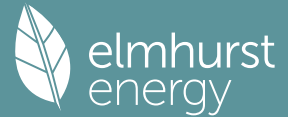
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1585.0207	0.1410	223.4165	(264)
Space and water heating			300.0974	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	176.5557	0.1443	25.4824	(268)
Total CO2, kg/year			325.5798	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400	(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	487.9048	1.5818	771.7629	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387	(278)
Space and water heating			3182.9016	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	176.5557	1.5338	270.8071	(282)
Total Primary energy kWh/year			3453.7087	(286)
Dwelling Primary energy Rate (DPER)			41.8200	(287)

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

1. Overall dwelling characteristics

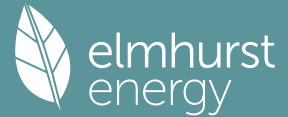
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830	(1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660	(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	3 * 10 =	30.0000	(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) =	30.0000 / (5) =	0.1345 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.3845		(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) =	0.3269	(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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

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3. Heat losses and heat loss parameter

Element	Gross	Openings	NetArea	U-value	A x U	K-value	A x K					
Main dwelling	m2	m2	m2	W/m2K	W/K	kJ/m2K	kJ/K					
TER Opaque door			2.2100	1.0000	2.2100		(26)					
TER Opening Type			12.7700	1.1450	14.6221		(27)					
Ground Floor			41.2900	0.1300	5.3677		(28a)					
Exposed Floor			0.9500	0.1300	0.1235		(28b)					
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)					
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)					
Total net area of external elements Aum(A, m2)			137.6700				(31)					
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		33.8475		(33)					
Main dwelling												
Party Wall			93.6900	0.0000	0.0000		(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)					
List of Thermal Bridges												
K1 Element				Length	Psi-value		Total					
E2 Other lintels (including other steel lintels)				8.7700	0.0500		0.4385					
E3 Sill				5.0100	0.0500		0.2505					
E4 Jamb				25.3400	0.0500		1.2670					
E5 Ground floor (normal)				10.1000	0.1600		1.6160					
E6 Intermediate floor within a dwelling				7.7000	0.0000		0.0000					
P1 Party wall - Ground floor				17.1000	0.0800		1.3680					
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				17.1000	0.0000		0.0000					
E18 Party wall between dwellings				21.6000	0.0600		1.2960					
P4 Party wall - Roof (insulation at ceiling level)				17.6000	0.1200		2.1120					
E10 Eaves (insulation at ceiling level)				9.6000	0.0600		0.5760					
E16 Corner (normal)				2.7000	0.0900		0.2430					
E17 Corner (inverted - internal area greater than external area)				2.7000	-0.0900		-0.2430					
E20 Exposed floor (normal)				1.9000	0.3200		0.6080					
P7 Party Wall - Exposed floor (normal)				0.5000	0.1600		0.0800					
E21 Exposed floor (inverted)				2.4000	0.3200		0.7680					
P8 Party Wall - Exposed floor (inverted)				0.5000	0.2400		0.1200					
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							10.5000 (36)					
Point Thermal bridges						(36a) =	0.0000					
Total fabric heat loss						(33) + (36) + (36a) =	44.3475 (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
	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637 (39)
Average = Sum(39)m / 12 =												85.8920
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

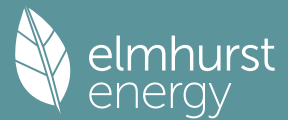
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500 (42a)	
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)	
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)	
Average daily hot water use (litres/day)												124.3484 (43)	
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content (annual)	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242 (44)	
Distribution loss (46)m = 0.15 x (45)m	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587 (45)	
Water storage loss (or HIU loss):										Total = Sum(45)m =		2065.4007	
Store volume	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888 (46)	
a) If manufacturer declared loss factor is known (kWh/day):												200.0000 (47)	
Temperature factor from Table 2b												1.6525 (48)	
Enter (49) or (54) in (55)												0.5400 (49)	
Total storage loss												0.8924 (55)	
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)	
Primary loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)	
Combi loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Total heat required for water heating calculated for each month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
WWHRS	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848 (62)	
PV diverter	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (63a)	
Solar input	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000	-0.0000 (63b)	
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)	
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)	
12Total per year (kWh/year)	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)	
Electric shower(s)												2383.3728 (64)	
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)	
												0.0000 (64a)	
Heat gains from water heating, kWh/month													
	111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844 (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)
	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North					4.1800	10.6334	0.6300		0.7000		0.7700	13.5838 (74)
South					8.5900	46.7521	0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Ext temp.	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating requirement - total per year (kWh/year)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2										(98c) / (4) =		26.0046 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Efficiency of water heater (217)m	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 3			Issued on Date	02/07/2026	
Assessment Reference	Renewables	Plot Type Ref				
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2	
SAP Rating	95 A	DER	0.30	TER	10.53	
Environmental	100 A	% DER < TER				97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58	
Compliance Check	See BREL	% DFEE < TFEE				14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83	
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

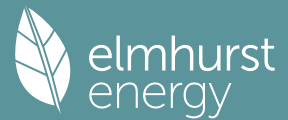
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (37)

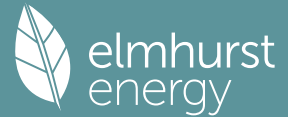
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9864
												31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers												
	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m												
	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (64)
Electric shower(s)												3126 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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
	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5												
	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5												
	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5												
	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)												
	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)												
	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains												
	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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			

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (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	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

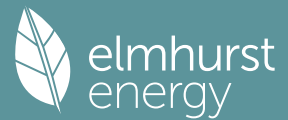
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

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

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

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

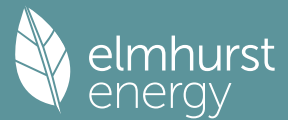
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

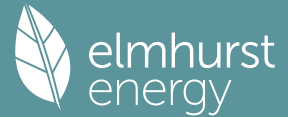
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 3			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum (A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7356 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	81.9148	81.6667	81.4235	80.2811	80.0674	79.0724	79.0724	78.8882	79.4557	80.0674	80.4997	80.9518	(39)
Average = Sum(39)m / 12 =												80.2801	
HLP	0.9919	0.9889	0.9860	0.9722	0.9696	0.9575	0.9575	0.9553	0.9622	0.9696	0.9748	0.9803	(40)
HLP (average)												0.9721	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (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	0.0000	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)												63.2183	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	68.8742	(44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Energy content (annual)													
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	0.0000	(46)
Water storage loss (or HIU 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	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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	91.6643	(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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)												892.4322	(64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												603.9924	(64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)													
-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)													
49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

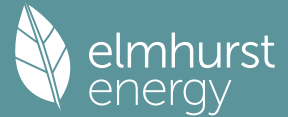
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.8475		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (37)

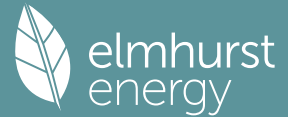
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
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													2.5100 (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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Energy content (annual)										Total = Sum(45)m =		1049.9202	
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 (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													(61)

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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			
North				4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)			
South				8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)			
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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 (98c)
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 (98d)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98e)
Space heating requirement after solar 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	2573.9215 (98f)
Space heating per m ²	(98c) / (4) = 31.1688 (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	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

Full SAP Calculation Printout



Plot Reference	Unit 3			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

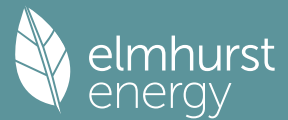
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (37)

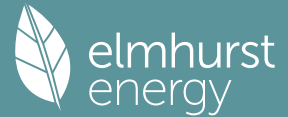
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Heat transfer coeff	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31
												0.9864
												31

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers												
	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m												
	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (64)
Electric shower(s)												3126 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
												0.0000 (64a)
Heat gains from water heating, kWh/month												
	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Pumps, fans	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)												
	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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							

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (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	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

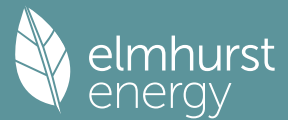
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

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

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

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

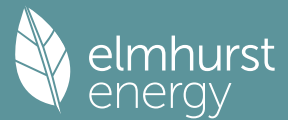
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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
North					4.1800	10.6334	0.6300	0.7000			0.7700			13.5838 (74)
South					8.5900	46.7521	0.6300	0.7000			0.7700			122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393			117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740			664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

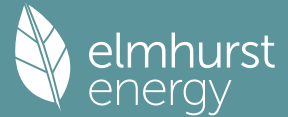
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (238)

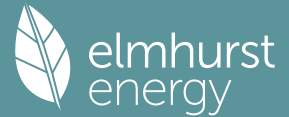
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 4			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.20	TER	12.04
Environmental	96 A	% DER < TER			65.12
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	29.44	DPER	44.42	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

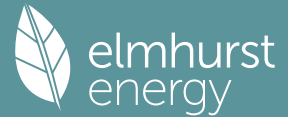
4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m												2446.2059
Water storage loss (or HIU loss):	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	576.2750	588.1620	564.3505	543.2888	516.0962	497.1882	478.4771	480.1001	494.4784	511.9209	543.4367	564.7584 (73)

[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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
East			2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (76)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction												
										fLA = Living area / (4) =		0.3840 (91)
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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												
	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2										(98c) / (4) =		27.8507 (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 %)												372.1570 (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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)												
	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)												
	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m												
	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month												
	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(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	2385.7147	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Total CO2, kg/year			346.6233 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2000 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Total Primary energy kWh/year			3667.8410 (286)
Dwelling Primary energy Rate (DPER)			44.4200 (287)

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

1. Overall dwelling characteristics

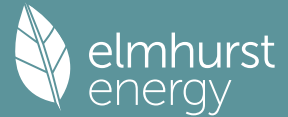
	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)

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Effective ac 0.5868 0.5835 0.5802 0.5646 0.5617 0.5482 0.5482 0.5457 0.5534 0.5617 0.5676 0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)

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

263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760

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

11.8004 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 56.4983 (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)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

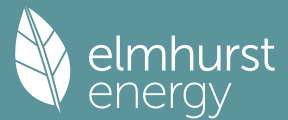
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												124.3484 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242 (44)
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587 (45)
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848 (62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
12Total per year (kWh/year)												2383.3728 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	(72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W		
North					4.1800	10.6334	0.6300	0.7000		0.7700	13.5838 (74)		
East					2.3800	19.6403	0.6300	0.7000		0.7700	14.2855 (76)		
South					8.5900	46.7521	0.6300	0.7000		0.7700	122.7343 (78)		
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255	(83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178	(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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377		
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825		
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939	(86)	
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770	(87)	
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237	(88)	
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919	(89)	
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205	(90)	
Living area fraction														
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)	

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895	(94)	
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410	(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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693	(97)	
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98a)	
Space heating requirement - total per year (kWh/year)												2714.4591		
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591		
Space heating per m2										(98c) / (4) =		32.8707	(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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)	
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	79.8000	(216)	
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(219)	
Space cooling fuel requirement														

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(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(238)

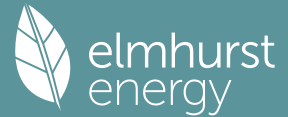
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2940.9091	0.2100	617.5909 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2863.2509	0.2100	601.2827 (264)
Space and water heating			1218.8736 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	193.5790	0.1443	27.9394 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135
PV Unit electricity exported	-1225.9732	0.1259	-154.3704
Total			-264.0839 (269)
Total CO2, kg/year			994.6584 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400 (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	2940.9091	1.1300	3323.2272 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735 (278)
Space and water heating			6558.7008 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5790	1.5338	296.9180 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732
PV Unit electricity exported	-1225.9732	0.4622	-566.6467
Total			-1787.0199 (283)
Total Primary energy kWh/year			5198.6997 (286)
Target Primary Energy Rate (TPER)			62.9500 (287)

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Plot Reference	Unit 4				Issued on Date	02/07/2026	
Assessment Reference	Energy Efficiency			Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT				SAP Version	10.2	
SAP Rating	82 B	DER	4.20	TER	12.04		
Environmental	96 A	% DER < TER				65.12	
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81		
Compliance Check	See BREL	% DFEE < TFEE				14.10	
% DPER < TPER	29.44	DPER	44.42	TPER	62.95		
Assessor Details	Mr. Lee Humphries				Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
(38)m	Jan 43.1792	Feb 42.9310	Mar 42.6878	Apr 41.5455	May 41.3318	Jun 40.3368	Jul 40.3368	Aug 40.1526	Sep 40.7200	Oct 41.3318	Nov 41.7641	Dec 42.2162 (38)
Heat transfer coeff	93.0354	92.7873	92.5441	91.4017	91.1880	90.1930	90.1930	90.0088	90.5763	91.1880	91.6203	92.0724 (39)
Average = Sum(39)m / 12 =												91.4007
HLP	Jan 1.1266	Feb 1.1236	Mar 1.1207	Apr 1.1068	May 1.1042	Jun 1.0922	Jul 1.0922	Aug 1.0900	Sep 1.0968	Oct 1.1042	Nov 1.1095	Dec 1.1149 (40)
HLP (average)												1.1068
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

Assumed occupancy													2.5100 (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	0.0000 (42a)	
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)	
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)	
Average daily hot water use (litres/day)													63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)	
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)	
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =	1049.9202		
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 (46)	
Water storage loss (or HIU 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	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	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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)		
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	892.4322	892 (64)	
Electric shower(s)													
53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)		
												603.9924 (64a)	
Heat gains from water heating, kWh/month													
36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)		

Metabolic gains (Table 5), Watts												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (73)

[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

North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
East	2.3800	19.6403	0.4500	0.0000	0.7700	16.1967 (76)

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South	8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)	
Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	620.6297	752.3586	835.6860	915.5139	952.3768	935.9488	901.1880	855.8525	815.1736	720.8480	629.6216	585.9639 (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	64.9758	65.1495	65.3208	66.1371	66.2922	67.0234	67.0234	67.1606	66.7399	66.2922	65.9793	65.6554
alpha	5.3317	5.3433	5.3547	5.4091	5.4195	5.4682	5.4682	5.4774	5.4493	5.4195	5.3986	5.3770
util living area	0.9955	0.9871	0.9686	0.9118	0.7914	0.5991	0.4376	0.4791	0.7154	0.9345	0.9886	0.9966 (86)
MIT	19.8302	20.0605	20.3338	20.6598	20.8816	20.9793	20.9968	20.9949	20.9475	20.6552	20.1837	19.7940 (87)
Th 2	19.9792	19.9816	19.9840	19.9953	19.9974	20.0072	20.0072	20.0090	20.0034	19.9974	19.9931	19.9886 (88)
util rest of house	0.9939	0.9829	0.9581	0.8837	0.7336	0.5139	0.3404	0.3784	0.6317	0.9072	0.9841	0.9955 (89)
MIT 2	18.9269	19.1563	19.4245	19.7381	19.9247	19.9988	20.0065	20.0078	19.9786	19.7427	19.2889	18.9885 (90)
Living area fraction	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (92)
Temperature adjustment	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)
adjusted MIT	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9925	0.9804	0.9555	0.8868	0.7518	0.5463	0.3778	0.4172	0.6624	0.9103	0.9820	0.9943 (94)
Useful gains	615.9833	737.5760	798.5121	811.8519	715.9739	511.3004	340.4866	357.0602	539.9327	656.1616	618.2843	582.6368 (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	1393.0894	1355.0218	1228.3953	1022.9674	783.5012	520.8907	341.5415	358.8500	566.1566	865.6564	1148.2339	1384.9864 (97)
Space heating kWh	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98a)
Space heating requirement - total per year (kWh/year)												2649.5431
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	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2649.5431
Space heating per m2										(98c) / (4) =		32.0846 (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	847.8145	667.4284	684.0667	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9196	0.9621	0.9492	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.6761	642.1495	649.3204	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1047.8110	1009.4818	958.7663	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	193.0571	273.2952	230.2277	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	48.2643	68.3238	57.5569	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												174.1450 (107)
Energy for space heating												32.0846 (99)
Energy for space cooling												2.1088 (108)
Total												34.1934 (109)
Fabric Energy Efficiency (DFEE)												34.2 (109)

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

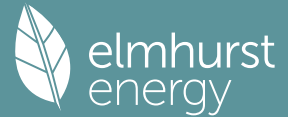
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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)

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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	3 * 10 =	30.0000 (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) =	30.0000	Air changes per hour	0.1345 (8)
Pressure test			Yes	
Pressure Test Method			Blower Door	
Measured/design AP50				5.0000 (17)
Infiltration rate				0.3845 (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) =			0.3269 (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)
	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283 (35)

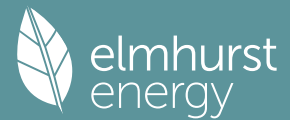
List of Thermal Bridges													
K1 Element													
E2 Other lintels (including other steel lintels)													
E3 Sill													
E4 Jamb													
E5 Ground floor (normal)													
E6 Intermediate floor within a dwelling													
P1 Party wall - Ground floor													
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)													
E18 Party wall between dwellings													
P4 Party wall - Roof (insulation at ceiling level)													
E12 Gable (insulation at ceiling level)													
E16 Corner (normal)													
E17 Corner (inverted - internal area greater than external area)													
E20 Exposed floor (normal)													
P7 Party Wall - Exposed floor (normal)													
E21 Exposed floor (inverted)													
E10 Eaves (insulation at ceiling level)													
Thermal bridges (Sum(L x Psi) calculated using Appendix K)													11.8004 (36)
Point Thermal bridges													(36a) = 0.0000
Total fabric heat loss													(33) + (36) + (36a) = 56.4983 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Average = Sum(39)m / 12 =	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145	(39)
												98.0428	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954	(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													2.5100 (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													
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses													
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
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 (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

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Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)

12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											603.9924 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (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	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
East	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (76)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	600.4810	718.2547	789.3716	858.3383	888.2572	872.1864	839.7639	799.6728	765.1329	683.2718	605.5330	568.6886 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9963	0.9903	0.9778	0.9386	0.8465	0.6704	0.4997	0.5438	0.7777	0.9531	0.9912	0.9971 (86)
MIT	19.6856	19.9030	20.1778	20.5292	20.8046	20.9566	20.9920	20.9879	20.9061	20.5469	20.0535	19.6521 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9949	0.9870	0.9698	0.9162	0.7930	0.5761	0.3836	0.4252	0.6928	0.9313	0.9875	0.9961 (89)
MIT 2	18.7324	18.9497	19.2215	19.5654	19.8074	19.9236	19.9402	19.9407	19.8918	19.5899	19.1090	18.7063 (90)
Living area fraction	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	0.3840 (91)
MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9936	0.9846	0.9668	0.9164	0.8073	0.6114	0.4285	0.4711	0.7225	0.9319	0.9855	0.9950 (94)
Useful gains	596.6349	707.1720	763.1678	786.5604	717.0735	533.2575	359.8446	376.7094	552.8194	636.7395	596.7241	565.8677 (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	1475.0697	1433.3511	1298.2184	1081.9580	830.6057	553.9239	362.5579	381.0774	600.9324	915.4359	1215.6716	1467.8371 (97)
Space heating kWh	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98a)
Space heating requirement - total per year (kWh/year)												3160.8372
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	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3160.8372
Space heating per m2												38.2761 (99)

8c. Space cooling requirement

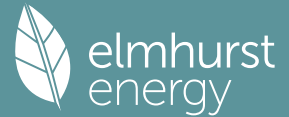
Calculated for June, July and August. See Table 10b												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	910.2503	716.5800	734.5468	0.0000	0.0000	0.0000	0.0000 (100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8644	0.9273	0.9077	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	786.8221	664.4795	666.7760	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	973.2835	937.6873	893.1018	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	134.2522	203.2667	168.3864	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	33.5631	50.8167	42.0966	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												126.4763 (107)
Energy for space cooling												38.2761 (99)
Total												1.5316 (108)
Fabric Energy Efficiency (TFEE)												39.8076 (109)
												39.8 (109)

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Plot Reference	Unit 4			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.20	TER	12.04
Environmental	96 A	% DER < TER			65.12
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	29.44	DPER	44.42	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (25)

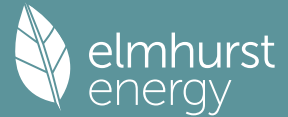
3. Heat losses and heat loss parameter

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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

elmhurst
energy

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

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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
East			2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (76)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2										(98c) / (4) =		27.8507 (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 %)												372.1570 (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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(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	2385.7147	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Total CO2, kg/year			346.6233 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2000 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Total Primary energy kWh/year			3667.8410 (286)
Dwelling Primary energy Rate (DPER)			44.4200 (287)

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

1. Overall dwelling characteristics

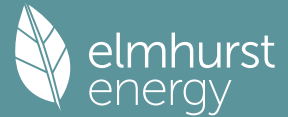
	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)

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Effective ac 0.5868 0.5835 0.5802 0.5646 0.5617 0.5482 0.5482 0.5457 0.5534 0.5617 0.5676 0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)

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

263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760

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

11.8004 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 56.4983 (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)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

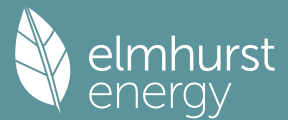
4. Water heating energy requirements (kWh/year)

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers												66.0500 (42a)
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547		
Hot water usage for baths												28.5393 (42b)
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191		
Hot water usage for other uses												40.3348 (42c)
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681		124.3484 (43)
Average daily hot water use (litres/day)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242 (44)
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2065.4007
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330		31.6888 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												0.8924 (55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848 (62)	
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
12Total per year (kWh/year)												2383.3728 (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	111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844 (65)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
----------------------------------	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----	-----

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(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	543.0923	(73)

6. Solar gains

[Jan]				Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W			
North				4.1800	10.6334	0.6300	0.7000		0.7700	13.5838 (74)			
East				2.3800	19.6403	0.6300	0.7000		0.7700	14.2855 (76)			
South				8.5900	46.7521	0.6300	0.7000		0.7700	122.7343 (78)			
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255	(83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377	
util living area	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825	
	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939	(86)
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770	(87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237	(88)
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919	(89)
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205	(90)
Living area fraction	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(92)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Useful gains	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895	(94)
Ext temp.	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410	(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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693	(97)
Space heating requirement - total per year (kWh/year)	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(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	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98c)
Space heating per m2										(98c) / (4) =		32.8707	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Space heating efficiency (main heating system 1)	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98)	
Space heating fuel (main heating system)	92.3000	92.3000	92.3000	92.3000	92.3000	0.0000	0.0000	0.0000	0.0000	92.3000	92.3000	92.3000	(210)	
Space heating efficiency (main heating system 2)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329	(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)	
Water heating requirement	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)	
Efficiency of water heater (217)m	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	79.8000	(216)	
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(219)	
Space cooling fuel requirement														

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(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	7.0685	7.3041	7.0685	7.3041	7.0685	(231)
Lighting	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(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	2940.9091	0.2100	617.5909 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2863.2509	0.2100	601.2827 (264)
Space and water heating			1218.8736 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	193.5790	0.1443	27.9394 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135
PV Unit electricity exported	-1225.9732	0.1259	-154.3704
Total			-264.0839 (269)
Total CO2, kg/year			994.6584 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400 (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	2940.9091	1.1300	3323.2272 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735 (278)
Space and water heating			6558.7008 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5790	1.5338	296.9180 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732
PV Unit electricity exported	-1225.9732	0.4622	-566.6467
Total			-1787.0199 (283)
Total Primary energy kWh/year			5198.6997 (286)
Target Primary Energy Rate (TPER)			62.9500 (287)

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Plot Reference	Unit 4			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (37)

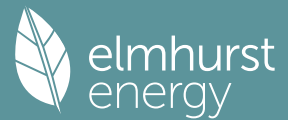
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	94.6128	94.3034	94.0002	92.5758	92.3093	91.0688	91.0688	90.8390	91.5466	92.3093	92.8484	93.4120 (39)
Average = Sum(39)m / 12 =												92.5745
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1457	1.1420	1.1383	1.1210	1.1178	1.1028	1.1028	1.1000	1.1086	1.1178	1.1243	1.1312 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	576.2750	588.1620	564.3505	543.2888	516.0962	497.1882	478.4771	480.1001	494.4784	511.9209	543.4367	564.7584 (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					

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
East	2.3800	19.6403	0.4500	0.0000	0.7700	16.1967 (76)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2										(98c) / (4) =		27.8507 (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 %)												372.1570 (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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-48.2145	-69.7176	-102.3211	-115.2566	-124.0942	-115.0212	-113.3682	-106.5568	-93.5698	-78.5938	-53.0959	-41.3716 (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	-19.4023	-43.1154	-89.8463	-142.2857	-194.0775	-197.7923	-195.3114	-163.1380	-117.6553	-65.6482	-27.1073	-15.2121 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	53.9415	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	0.1345	-142.7172
PV Unit electricity exported	-1270.5918	0.1245	-158.2095
Total			-300.9266 (269)
Total CO2, kg/year			45.6967 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5500 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	1.4970	-1588.6408
PV Unit electricity exported	-1270.5918	0.4570	-580.6663
Total			-2169.3071 (283)
Total Primary energy kWh/year			1498.5340 (286)
Dwelling Primary energy Rate (DPER)			18.1500 (287)

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

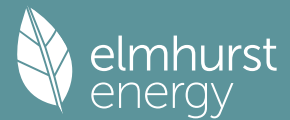
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(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 infiltr rate	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.2100	1.0000	2.2100			(26)
TER Opening Type			15.1500	1.1450	17.3473			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.6979		(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283	(35)

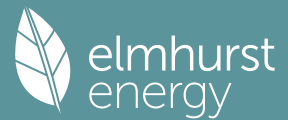
List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							8.7700	0.0500	0.4385				
E3 Sill							5.0100	0.0500	0.2505				
E4 Jamb							25.3400	0.0500	1.2670				
E5 Ground floor (normal)							18.9000	0.1600	3.0240				
E6 Intermediate floor within a dwelling							16.5000	0.0000	0.0000				
P1 Party wall - Ground floor							8.3000	0.0800	0.6640				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							8.3000	0.0000	0.0000				
E18 Party wall between dwellings							10.8000	0.0600	0.6480				
P4 Party wall - Roof (insulation at ceiling level)							16.4700	0.1200	1.9764				
E12 Gable (insulation at ceiling level)							8.8000	0.0600	0.5280				
E16 Corner (normal)							13.5000	0.0900	1.2150				
E17 Corner (inverted - internal area greater than external area)							2.7000	-0.0900	-0.2430				
E20 Exposed floor (normal)							1.9000	0.3200	0.6080				
P7 Party Wall - Exposed floor (normal)							0.5000	0.1600	0.0800				
E21 Exposed floor (inverted)							2.4000	0.3200	0.7680				
E10 Eaves (insulation at ceiling level)							9.6000	0.0600	0.5760				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.8004	(36)
Point Thermal bridges												0.0000	(36a)
Total fabric heat loss												(33) + (36) + (36a) =	56.4983 (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	
	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145	(39)
Average = Sum(39)m / 12 =												98.0428	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954	(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													2.5100 (42)
Hot water usage for mixer showers													
	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths													
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses													
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)

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Heat gains from water heating, kWh/month
111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	543.0923 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		Specific data		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
East	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (76)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377	
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825	
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939 (86)	
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770 (87)	
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)	
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919 (89)	
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205 (90)	
Living area fraction	fLA = Living area / (4) =												0.3840 (91)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (93)	

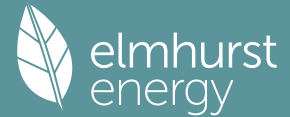
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895 (94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410 (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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693 (97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98a)
Space heating requirement - total per year (kWh/year)												2714.4591
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591
Space heating per m2												(98c) / (4) = 32.8707 (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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329 (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)												

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	86.0645	(216)
(217)m	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	86.0645	(217)
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(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	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(238)

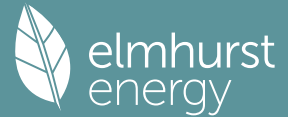
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2940.9091	0.2100	617.5909	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2863.2509	0.2100	601.2827	(264)
Space and water heating			1218.8736	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	193.5790	0.1443	27.9394	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135	
PV Unit electricity exported	-1225.9732	0.1259	-154.3704	
Total			-264.0839	(269)
Total CO2, kg/year			994.6584	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400	(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	2940.9091	1.1300	3323.2272	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735	(278)
Space and water heating			6558.7008	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	193.5790	1.5338	296.9180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732	
PV Unit electricity exported	-1225.9732	0.4622	-566.6467	
Total			-1787.0199	(283)
Total Primary energy kWh/year			5198.6997	(286)
Target Primary Energy Rate (TPER)			62.9500	(287)

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Plot Reference	Unit 4			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.2951	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	93.0354	92.7873	92.5441	91.4017	91.1880	90.1930	90.1930	90.0088	90.5763	91.1880	91.6203	92.0724	(39)
Average = Sum(39)m / 12 =												91.4007	
HLP	1.1266	1.1236	1.1207	1.1068	1.1042	1.0922	1.0922	1.0900	1.0968	1.1042	1.1095	1.1149	(40)
HLP (average)												1.1068	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (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												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		1049.9202
Water storage loss (or HIU loss):	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (46)
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
												603.9924 (64a)
Heat gains from water heating, kWh/month												
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (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	
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011	(74)
East	2.3800	19.6403	0.4500	0.0000	0.7700	16.1967	(76)

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South	8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)	
Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	620.6297	752.3586	835.6860	915.5139	952.3768	935.9488	901.1880	855.8525	815.1736	720.8480	629.6216	585.9639 (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	64.9758	65.1495	65.3208	66.1371	66.2922	67.0234	67.0234	67.1606	66.7399	66.2922	65.9793	65.6554
alpha	5.3317	5.3433	5.3547	5.4091	5.4195	5.4682	5.4682	5.4774	5.4493	5.4195	5.3986	5.3770
util living area	0.9955	0.9871	0.9686	0.9118	0.7914	0.5991	0.4376	0.4791	0.7154	0.9345	0.9886	0.9966 (86)
MIT	19.8302	20.0605	20.3338	20.6598	20.8816	20.9793	20.9968	20.9949	20.9475	20.6552	20.1837	19.7940 (87)
Th 2	19.9792	19.9816	19.9840	19.9953	19.9974	20.0072	20.0072	20.0090	20.0034	19.9974	19.9931	19.9886 (88)
util rest of house	0.9939	0.9829	0.9581	0.8837	0.7336	0.5139	0.3404	0.3784	0.6317	0.9072	0.9841	0.9955 (89)
MIT 2	18.9269	19.1563	19.4245	19.7381	19.9247	19.9988	20.0065	20.0078	19.9786	19.7427	19.2889	18.9885 (90)
Living area fraction	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (91)
Temperature adjustment	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (92)
adjusted MIT	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9925	0.9804	0.9555	0.8868	0.7518	0.5463	0.3778	0.4172	0.6624	0.9103	0.9820	0.9943 (94)
Useful gains	615.9833	737.5760	798.5121	811.8519	715.9739	511.3004	340.4866	357.0602	539.9327	656.1616	618.2843	582.6368 (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	1393.0894	1355.0218	1228.3953	1022.9674	783.5012	520.8907	341.5415	358.8500	566.1566	865.6564	1148.2339	1384.9864 (97)
Space heating kWh	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98a)
Space heating requirement - total per year (kWh/year)												2649.5431
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	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2649.5431
Space heating per m2										(98c) / (4) =		32.0846 (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	847.8145	667.4284	684.0667	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9196	0.9621	0.9492	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.6761	642.1495	649.3204	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1047.8110	1009.4818	958.7663	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	193.0571	273.2952	230.2277	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	48.2643	68.3238	57.5569	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												174.1450 (107)
Energy for space heating												32.0846 (99)
Energy for space cooling												2.1088 (108)
Total												34.1934 (109)
Fabric Energy Efficiency (DFEE)												34.2 (109)

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

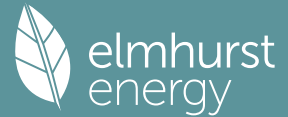
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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)

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

0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1345 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
Yes
5.0000 (17)
0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 56.4983 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
HLP (average)												1.1872
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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)

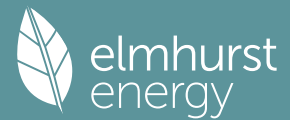
Hot water usage for baths 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)

Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)

Average daily hot water use (litres/day) 63.2183 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

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Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)

12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											603.9924 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (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	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
East	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (76)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	600.4810	718.2547	789.3716	858.3383	888.2572	872.1864	839.7639	799.6728	765.1329	683.2718	605.5330	568.6886 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9963	0.9903	0.9778	0.9386	0.8465	0.6704	0.4997	0.5438	0.7777	0.9531	0.9912	0.9971 (86)
MIT	19.6856	19.9030	20.1778	20.5292	20.8046	20.9566	20.9920	20.9879	20.9061	20.5469	20.0535	19.6521 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9949	0.9870	0.9698	0.9162	0.7930	0.5761	0.3836	0.4252	0.6928	0.9313	0.9875	0.9961 (89)
MIT 2	18.7324	18.9497	19.2215	19.5654	19.8074	19.9236	19.9402	19.9407	19.8918	19.5899	19.1090	18.7063 (90)
Living area fraction	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	0.3840 (91)
MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9936	0.9846	0.9668	0.9164	0.8073	0.6114	0.4285	0.4711	0.7225	0.9319	0.9855	0.9950 (94)
Useful gains	596.6349	707.1720	763.1678	786.5604	717.0735	533.2575	359.8446	376.7094	552.8194	636.7395	596.7241	565.8677 (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	1475.0697	1433.3511	1298.2184	1081.9580	830.6057	553.9239	362.5579	381.0774	600.9324	915.4359	1215.6716	1467.8371 (97)
Space heating kWh	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98a)
Space heating requirement - total per year (kWh/year)												3160.8372
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	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3160.8372
Space heating per m2												(98c) / (4) = 38.2761 (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	910.2503	716.5800	734.5468	0.0000	0.0000	0.0000	0.0000 (100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8644	0.9273	0.9077	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	786.8221	664.4795	666.7760	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	973.2835	937.6873	893.1018	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	134.2522	203.2667	168.3864	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	33.5631	50.8167	42.0966	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												126.4763 (107)
Energy for space cooling												38.2761 (99)
Total												1.5316 (108)
Fabric Energy Efficiency (TFEE)												39.8076 (109)
												39.8 (109)

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Plot Reference	Unit 4			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		49.8562 (37)

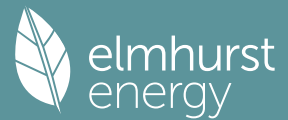
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	94.6128	94.3034	94.0002	92.5758	92.3093	91.0688	91.0688	90.8390	91.5466	92.3093	92.8484	93.4120 (39)
Average = Sum(39)m / 12 =												92.5745
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1457	1.1420	1.1383	1.1210	1.1178	1.1028	1.1028	1.1000	1.1086	1.1178	1.1243	1.1312 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	576.2750	588.1620	564.3505	543.2888	516.0962	497.1882	478.4771	480.1001	494.4784	511.9209	543.4367	564.7584 (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							

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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
East	2.3800	19.6403	0.4500	0.0000	0.7700	16.1967 (76)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2										(98c) / (4) =		27.8507 (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 %)												372.1570 (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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-48.2145	-69.7176	-102.3211	-115.2566	-124.0942	-115.0212	-113.3682	-106.5568	-93.5698	-78.5938	-53.0959	-41.3716 (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	-19.4023	-43.1154	-89.8463	-142.2857	-194.0775	-197.7923	-195.3114	-163.1380	-117.6553	-65.6482	-27.1073	-15.2121 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	53.9415	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	0.1345	-142.7172
PV Unit electricity exported	-1270.5918	0.1245	-158.2095
Total			-300.9266 (269)
Total CO2, kg/year			45.6967 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5500 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	1.4970	-1588.6408
PV Unit electricity exported	-1270.5918	0.4570	-580.6663
Total			-2169.3071 (283)
Total Primary energy kWh/year			1498.5340 (286)
Dwelling Primary energy Rate (DPER)			18.1500 (287)

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

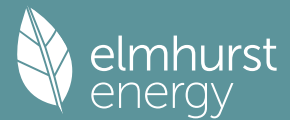
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(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 infiltr rate	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.2100	1.0000	2.2100			(26)
TER Opening Type			15.1500	1.1450	17.3473			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.6979		(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283	(35)

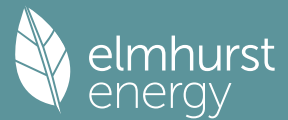
List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							8.7700	0.0500	0.4385				
E3 Sill							5.0100	0.0500	0.2505				
E4 Jamb							25.3400	0.0500	1.2670				
E5 Ground floor (normal)							18.9000	0.1600	3.0240				
E6 Intermediate floor within a dwelling							16.5000	0.0000	0.0000				
P1 Party wall - Ground floor							8.3000	0.0800	0.6640				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							8.3000	0.0000	0.0000				
E18 Party wall between dwellings							10.8000	0.0600	0.6480				
P4 Party wall - Roof (insulation at ceiling level)							16.4700	0.1200	1.9764				
E12 Gable (insulation at ceiling level)							8.8000	0.0600	0.5280				
E16 Corner (normal)							13.5000	0.0900	1.2150				
E17 Corner (inverted - internal area greater than external area)							2.7000	-0.0900	-0.2430				
E20 Exposed floor (normal)							1.9000	0.3200	0.6080				
P7 Party Wall - Exposed floor (normal)							0.5000	0.1600	0.0800				
E21 Exposed floor (inverted)							2.4000	0.3200	0.7680				
E10 Eaves (insulation at ceiling level)							9.6000	0.0600	0.5760				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.8004	(36)
Point Thermal bridges												0.0000	(36a)
Total fabric heat loss												(33) + (36) + (36a) =	56.4983 (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	
	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145	(39)
Average = Sum(39)m / 12 =												98.0428	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954	(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													2.5100 (42)
Hot water usage for mixer showers													
	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths													
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses													
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)

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Heat gains from water heating, kWh/month
111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	543.0923 (73)

6. Solar gains

[Jan]	Area m2		Solar flux Table 6a W/m2		Specific data or Table 6b		Specific data or Table 6c		Access factor Table 6d		Gains W	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
East	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (76)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377	
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825	
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939 (86)	
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770 (87)	
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)	
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919 (89)	
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205 (90)	
Living area fraction	fLA = Living area / (4) =												0.3840 (91)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (92)	
Temperature adjustment													0.0000
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (93)	

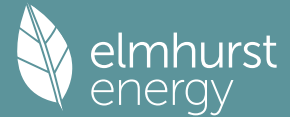
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895 (94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410 (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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693 (97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98a)
Space heating requirement - total per year (kWh/year)												2714.4591
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591
Space heating per m2												(98c) / (4) = 32.8707 (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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329 (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)												

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	86.0645	(216)
(217)m													(217)
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(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	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(238)

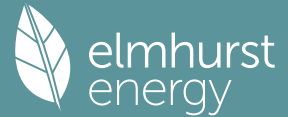
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	2940.9091	0.2100	617.5909	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2863.2509	0.2100	601.2827	(264)
Space and water heating			1218.8736	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	193.5790	0.1443	27.9394	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135	
PV Unit electricity exported	-1225.9732	0.1259	-154.3704	
Total			-264.0839	(269)
Total CO2, kg/year			994.6584	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400	(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	2940.9091	1.1300	3323.2272	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735	(278)
Space and water heating			6558.7008	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	193.5790	1.5338	296.9180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732	
PV Unit electricity exported	-1225.9732	0.4622	-566.6467	
Total			-1787.0199	(283)
Total Primary energy kWh/year			5198.6997	(286)
Target Primary Energy Rate (TPER)			62.9500	(287)

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Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.20	TER	12.04
Environmental	96 A	% DER < TER			65.12
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	29.44	DPER	44.42	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (25)

3. Heat losses and heat loss parameter

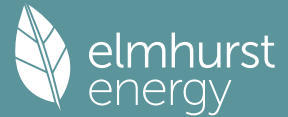
Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
Main dwelling							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

4. Water heating energy requirements (kWh/year)												

Assumed occupancy												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m												2446.2059
Water storage loss (or HIU loss):	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

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

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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)
West			2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction												
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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												
	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2												(98c) / (4) = 27.8507 (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 %)												372.1570 (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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)												
	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)												
	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m												
	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month												
	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(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	2385.7147	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Total CO2, kg/year			346.6233 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2000 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Total Primary energy kWh/year			3667.8410 (286)
Dwelling Primary energy Rate (DPER)			44.4200 (287)

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

1. Overall dwelling characteristics

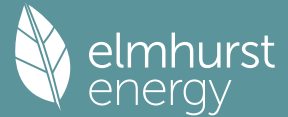
	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)

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Effective ac 0.5868 0.5835 0.5802 0.5646 0.5617 0.5482 0.5482 0.5457 0.5534 0.5617 0.5676 0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)

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

263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760

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

11.8004 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 56.4983 (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)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

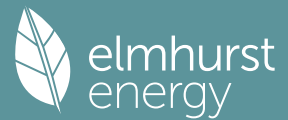
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500 (42a)	
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)	
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)	
Average daily hot water use (litres/day)												124.3484 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242 (44)	
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587 (45)	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888 (46)	
Water storage loss (or HIU loss):													
Store volume												200.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8924 (55)	
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)	
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848 (62)	
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)	
12Total per year (kWh/year)												2383.3728 (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	111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844 (65)	

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	(72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North					4.1800	10.6334	0.6300		0.7000	0.7700	13.5838 (74)	
South					8.5900	46.7521	0.6300		0.7000	0.7700	122.7343 (78)	
West					2.3800	19.6403	0.6300		0.7000	0.7700	14.2855 (80)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377	
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825	
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939	(86)
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770	(87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237	(88)
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919	(89)
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205	(90)
Living area fraction	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(92)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895	(94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410	(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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693	(97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98a)
Space heating requirement - total per year (kWh/year)												2714.4591	
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591	
Space heating per m2										(98c) / (4) =		32.8707	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)	
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	79.8000	(216)	
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(219)	
Space cooling fuel requirement														

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1	2940.9091	1.1300	3323.2272 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735 (278)
Space and water heating			6558.7008 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5790	1.5338	296.9180 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732
PV Unit electricity exported	-1225.9732	0.4622	-566.6467
Total			-1787.0199 (283)
Total Primary energy kWh/year			5198.6997 (286)
Target Primary Energy Rate (TPER)			62.9500 (287)

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Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.20	TER	12.04
Environmental	96 A	% DER < TER			65.12
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	29.44	DPER	44.42	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

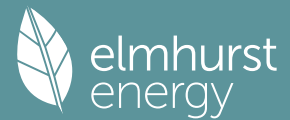
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.2951	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	93.0354	92.7873	92.5441	91.4017	91.1880	90.1930	90.1930	90.0088	90.5763	91.1880	91.6203	92.0724	(39)
Average = Sum(39)m / 12 =												91.4007	
HLP	1.1266	1.1236	1.1207	1.1068	1.1042	1.0922	1.0922	1.0900	1.0968	1.1042	1.1095	1.1149	(40)
HLP (average)												1.1068	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													28.6361 (42b)
Hot water usage for other uses													40.3348 (42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Distribution loss (46)m = 0.15 x (45)m													1049.9202
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)													892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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West	2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)	
Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	620.6297	752.3586	835.6860	915.5139	952.3768	935.9488	901.1880	855.8525	815.1736	720.8480	629.6216	585.9639 (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	64.9758	65.1495	65.3208	66.1371	66.2922	67.0234	67.0234	67.1606	66.7399	66.2922	65.9793	65.6554
alpha	5.3317	5.3433	5.3547	5.4091	5.4195	5.4682	5.4682	5.4774	5.4493	5.4195	5.3986	5.3770
util living area	0.9955	0.9871	0.9686	0.9118	0.7914	0.5991	0.4376	0.4791	0.7154	0.9345	0.9886	0.9966 (86)
MIT	19.8302	20.0605	20.3338	20.6598	20.8816	20.9793	20.9968	20.9949	20.9475	20.6552	20.1837	19.7940 (87)
Th 2	19.9792	19.9816	19.9840	19.9953	19.9974	20.0072	20.0072	20.0090	20.0034	19.9974	19.9931	19.9886 (88)
util rest of house	0.9939	0.9829	0.9581	0.8837	0.7336	0.5139	0.3404	0.3784	0.6317	0.9072	0.9841	0.9955 (89)
MIT 2	18.9269	19.1563	19.4245	19.7381	19.9247	19.9988	20.0065	20.0078	19.9786	19.7427	19.2889	18.9885 (90)
Living area fraction	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (92)
Temperature adjustment	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)
adjusted MIT	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9925	0.9804	0.9555	0.8868	0.7518	0.5463	0.3778	0.4172	0.6624	0.9103	0.9820	0.9943 (94)
Useful gains	615.9833	737.5760	798.5121	811.8519	715.9739	511.3004	340.4866	357.0602	539.9327	656.1616	618.2843	582.6368 (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	1393.0894	1355.0218	1228.3953	1022.9674	783.5012	520.8907	341.5415	358.8500	566.1566	865.6564	1148.2339	1384.9864 (97)
Space heating kWh	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98a)
Space heating requirement - total per year (kWh/year)												2649.5431
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	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2649.5431
Space heating per m2										(98c) / (4) =		32.0846 (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	847.8145	667.4284	684.0667	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9196	0.9621	0.9492	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.6761	642.1495	649.3204	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1047.8110	1009.4818	958.7663	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	193.0571	273.2952	230.2277	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	48.2643	68.3238	57.5569	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												174.1450 (107)
Energy for space heating												32.0846 (99)
Energy for space cooling												2.1088 (108)
Total												34.1934 (109)
Fabric Energy Efficiency (DFEE)												34.2 (109)

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

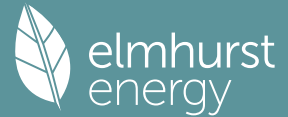
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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)

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

0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1345 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
Yes
5.0000 (17)
0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 56.4983 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
HLP (average)												1.1872
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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)

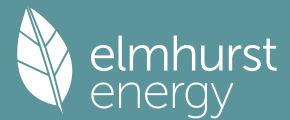
Hot water usage for baths 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)

Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)

Average daily hot water use (litres/day) 63.2183 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

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Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)

12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											603.9924 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (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	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
West	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (80)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	600.4810	718.2547	789.3716	858.3383	888.2572	872.1864	839.7639	799.6728	765.1329	683.2718	605.5330	568.6886 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9963	0.9903	0.9778	0.9386	0.8465	0.6704	0.4997	0.5438	0.7777	0.9531	0.9912	0.9971 (86)
MIT	19.6856	19.9030	20.1778	20.5292	20.8046	20.9566	20.9920	20.9879	20.9061	20.5469	20.0535	19.6521 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9949	0.9870	0.9698	0.9162	0.7930	0.5761	0.3836	0.4252	0.6928	0.9313	0.9875	0.9961 (89)
MIT 2	18.7324	18.9497	19.2215	19.5654	19.8074	19.9236	19.9402	19.9407	19.8918	19.5899	19.1090	18.7063 (90)
Living area fraction	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	0.3840 (91)
MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9936	0.9846	0.9668	0.9164	0.8073	0.6114	0.4285	0.4711	0.7225	0.9319	0.9855	0.9950 (94)
Useful gains	596.6349	707.1720	763.1678	786.5604	717.0735	533.2575	359.8446	376.7094	552.8194	636.7395	596.7241	565.8677 (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	1475.0697	1433.3511	1298.2184	1081.9580	830.6057	553.9239	362.5579	381.0774	600.9324	915.4359	1215.6716	1467.8371 (97)
Space heating kWh	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98a)
Space heating requirement - total per year (kWh/year)												3160.8372
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	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3160.8372
Space heating per m2												(98c) / (4) = 38.2761 (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	910.2503	716.5800	734.5468	0.0000	0.0000	0.0000	0.0000 (100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8644	0.9273	0.9077	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	786.8221	664.4795	666.7760	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	973.2835	937.6873	893.1018	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	134.2522	203.2667	168.3864	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	33.5631	50.8167	42.0966	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												126.4763 (107)
Energy for space cooling												38.2761 (99)
Total												1.5316 (108)
Fabric Energy Efficiency (TFEE)												39.8076 (109)
												39.8 (109)

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Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.20	TER	12.04
Environmental	96 A	% DER < TER			65.12
CO ₂ Emissions (t/year)	0.33	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	29.44	DPER	44.42	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

Ventilation heat loss calculated monthly (39)m = 0.33 x (25)m x (5)												
(39)m	Jan 44.7566	Feb 44.4472	Mar 44.1439	Apr 42.7196	May 42.4531	Jun 41.2125	Jul 41.2125	Aug 40.9828	Sep 41.6904	Oct 42.4531	Nov 42.9922	Dec 43.5558 (39)
Heat transfer coeff	94.6128	94.3034	94.0002	92.5758	92.3093	91.0688	91.0688	90.8390	91.5466	92.3093	92.8484	93.4120 (39)
Average = Sum(39)m / 12 =												92.5745
HLP	Jan 1.1457	Feb 1.1420	Mar 1.1383	Apr 1.1210	May 1.1178	Jun 1.1028	Jul 1.1028	Aug 1.1000	Sep 1.1086	Oct 1.1178	Nov 1.1243	Dec 1.1312 (40)
HLP (average)												1.1210
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

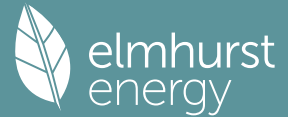
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5. Internal gains (see Table 5 and 5a)

6. Solar gains

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

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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)
West			2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction												
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2										(98c) / (4) =		27.8507 (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 %)												372.1570 (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	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(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	2385.7147	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Total CO2, kg/year			346.6233 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.2000 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Total Primary energy kWh/year			3667.8410 (286)
Dwelling Primary energy Rate (DPER)			44.4200 (287)

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

1. Overall dwelling characteristics

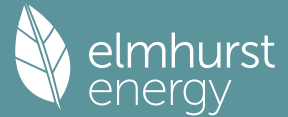
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)

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Effective ac 0.5868 0.5835 0.5802 0.5646 0.5617 0.5482 0.5482 0.5457 0.5534 0.5617 0.5676 0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)

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

263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760

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

11.8004 (36)

Point Thermal bridges

(36a) = 0.0000

Total fabric heat loss

(33) + (36) + (36a) = 56.4983 (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)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

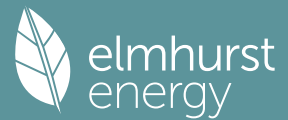
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500 (42a)	
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)	
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)	
Average daily hot water use (litres/day)												124.3484 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242 (44)	
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587 (45)	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888 (46)	
Water storage loss (or HIU loss):													
Store volume												200.0000 (47)	
a) If manufacturer declared loss factor is known (kWh/day):												1.6525 (48)	
Temperature factor from Table 2b												0.5400 (49)	
Enter (49) or (54) in (55)												0.8924 (55)	
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (56)	
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637 (57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)	
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848 (62)	
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)	
12Total per year (kWh/year)													2383.3728 (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	111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844 (65)	

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	0.0000	0.0000	0.0000	0.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	(72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	(73)

6. Solar gains

[Jan]					Area m2	Solar flux Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	FF	Access factor Table 6d	Gains W	
North					4.1800	10.6334	0.6300	0.7000		0.7700	13.5838 (74)	
South					8.5900	46.7521	0.6300	0.7000		0.7700	122.7343 (78)	
West					2.3800	19.6403	0.6300	0.7000		0.7700	14.2855 (80)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
alpha	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377	
util living area	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825	
	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939	(86)
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770	(87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237	(88)
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919	(89)
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205	(90)
Living area fraction	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(92)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)
Temperature adjustment												0.0000	
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030	(93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895	(94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410	(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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693	(97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98a)
Space heating requirement - total per year (kWh/year)												2714.4591	
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591	
Space heating per m2										(98c) / (4) =		32.8707	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)													0.0000	(201)
Fraction of space heat from main system(s)													1.0000	(202)
Efficiency of main space heating system 1 (in %)													92.3000	(206)
Efficiency of main space heating system 2 (in %)													0.0000	(207)
Efficiency of secondary/supplementary heating system, %													0.0000	(208)
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194	(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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)	
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	79.8000	(216)	
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(219)	
Space cooling fuel requirement														

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	2940.9091	1.1300	3323.2272	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735	(278)
Space and water heating			6558.7008	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	193.5790	1.5338	296.9180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732	
PV Unit electricity exported	-1225.9732	0.4622	-566.6467	
Total			-1787.0199	(283)
Total Primary energy kWh/year			5198.6997	(286)
Target Primary Energy Rate (TPER)			62.9500	(287)

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Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	94.6128	94.3034	94.0002	92.5758	92.3093	91.0688	91.0688	90.8390	91.5466	92.3093	92.8484	93.4120 (39)
Average = Sum(39)m / 12 =												92.5745
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1457	1.1420	1.1383	1.1210	1.1178	1.1028	1.1028	1.1000	1.1086	1.1178	1.1243	1.1312 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

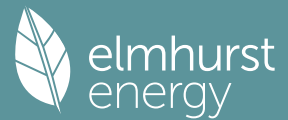
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	576.2750	588.1620	564.3505	543.2888	516.0962	497.1882	478.4771	480.1001	494.4784	511.9209	543.4367	564.7584 (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
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North		4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South		8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)
West		2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction												
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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												
	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2												(98c) / (4) = 27.8507 (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 %)												372.1570 (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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)												
	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)												
	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m												
	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month												
	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-48.2145	-69.7176	-102.3211	-115.2566	-124.0942	-115.0212	-113.3682	-106.5568	-93.5698	-78.5938	-53.0959	-41.3716 (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	-19.4023	-43.1154	-89.8463	-142.2857	-194.0775	-197.7923	-195.3114	-163.1380	-117.6553	-65.6482	-27.1073	-15.2121 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	53.9415	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	0.1345	-142.7172
PV Unit electricity exported	-1270.5918	0.1245	-158.2095
Total			-300.9266 (269)
Total CO2, kg/year			45.6967 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5500 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	1.4970	-1588.6408
PV Unit electricity exported	-1270.5918	0.4570	-580.6663
Total			-2169.3071 (283)
Total Primary energy kWh/year			1498.5340 (286)
Dwelling Primary energy Rate (DPER)			18.1500 (287)

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

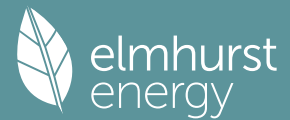
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(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 infiltr rate	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.2100	1.0000	2.2100			(26)
TER Opening Type			15.1500	1.1450	17.3473			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.6979		(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283	(35)

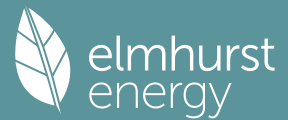
List of Thermal Bridges													
K1 Element							Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)							8.7700	0.0500	0.4385				
E3 Sill							5.0100	0.0500	0.2505				
E4 Jamb							25.3400	0.0500	1.2670				
E5 Ground floor (normal)							18.9000	0.1600	3.0240				
E6 Intermediate floor within a dwelling							16.5000	0.0000	0.0000				
P1 Party wall - Ground floor							8.3000	0.0800	0.6640				
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)							8.3000	0.0000	0.0000				
E18 Party wall between dwellings							10.8000	0.0600	0.6480				
P4 Party wall - Roof (insulation at ceiling level)							16.4700	0.1200	1.9764				
E12 Gable (insulation at ceiling level)							8.8000	0.0600	0.5280				
E16 Corner (normal)							13.5000	0.0900	1.2150				
E17 Corner (inverted - internal area greater than external area)							2.7000	-0.0900	-0.2430				
E20 Exposed floor (normal)							1.9000	0.3200	0.6080				
P7 Party Wall - Exposed floor (normal)							0.5000	0.1600	0.0800				
E21 Exposed floor (inverted)							2.4000	0.3200	0.7680				
E10 Eaves (insulation at ceiling level)							9.6000	0.0600	0.5760				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)												11.8004	(36)
Point Thermal bridges												0.0000	(36a)
Total fabric heat loss												(33) + (36) + (36a) =	56.4983 (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	
	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145	(39)
Average = Sum(39)m / 12 =												98.0428	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954	(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													2.5100 (42)
Hot water usage for mixer showers													
	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths													
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses													
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage													
	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)

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Heat gains from water heating, kWh/month
111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	543.0923 (73)

6. Solar gains

[Jan]	Area		Solar flux		Specific data		Specific data		Access		Gains	
	m2		Table 6a		or Table 6b		or Table 6c		factor		W	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
West	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (80)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939 (86)
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919 (89)
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205 (90)
Living area fraction	fLA = Living area / (4) =											0.3840 (91)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (93)

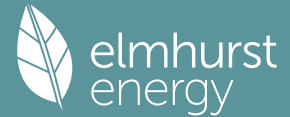
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895 (94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410 (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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693 (97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98a)
Space heating requirement - total per year (kWh/year)	2714.4591											
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2714.4591											
Space heating per m2	(98c) / (4) = 32.8707 (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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329 (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)												

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	86.0645	(216)
(217)m													(217)
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(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	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(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	2940.9091	0.2100	617.5909	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2863.2509	0.2100	601.2827	(264)
Space and water heating			1218.8736	(265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293	(267)
Energy for lighting	193.5790	0.1443	27.9394	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135	
PV Unit electricity exported	-1225.9732	0.1259	-154.3704	
Total			-264.0839	(269)
Total CO2, kg/year			994.6584	(272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400	(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	2940.9091	1.1300	3323.2272	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735	(278)
Space and water heating			6558.7008	(279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008	(281)
Energy for lighting	193.5790	1.5338	296.9180	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732	
PV Unit electricity exported	-1225.9732	0.4622	-566.6467	
Total			-1787.0199	(283)
Total Primary energy kWh/year			5198.6997	(286)
Target Primary Energy Rate (TPER)			62.9500	(287)

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Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

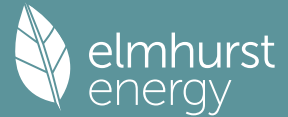
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.2951	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	93.0354	92.7873	92.5441	91.4017	91.1880	90.1930	90.1930	90.0088	90.5763	91.1880	91.6203	92.0724	(39)
Average = Sum(39)m / 12 =												91.4007	
HLP	1.1266	1.1236	1.1207	1.1068	1.1042	1.0922	1.0922	1.0900	1.0968	1.1042	1.1095	1.1149	(40)
HLP (average)												1.1068	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													28.6361 (42b)
Hot water usage for other uses													40.3348 (42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Distribution loss (46)m = 0.15 x (45)m													1049.9202
Water storage loss (or HIU loss):													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)													892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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West	2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)	
Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	620.6297	752.3586	835.6860	915.5139	952.3768	935.9488	901.1880	855.8525	815.1736	720.8480	629.6216	585.9639 (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	64.9758	65.1495	65.3208	66.1371	66.2922	67.0234	67.0234	67.1606	66.7399	66.2922	65.9793	65.6554
alpha	5.3317	5.3433	5.3547	5.4091	5.4195	5.4682	5.4682	5.4774	5.4493	5.4195	5.3986	5.3770
util living area	0.9955	0.9871	0.9686	0.9118	0.7914	0.5991	0.4376	0.4791	0.7154	0.9345	0.9886	0.9966 (86)
MIT	19.8302	20.0605	20.3338	20.6598	20.8816	20.9793	20.9968	20.9949	20.9475	20.6552	20.1837	19.7940 (87)
Th 2	19.9792	19.9816	19.9840	19.9953	19.9974	20.0072	20.0072	20.0090	20.0034	19.9974	19.9931	19.9886 (88)
util rest of house	0.9939	0.9829	0.9581	0.8837	0.7336	0.5139	0.3404	0.3784	0.6317	0.9072	0.9841	0.9955 (89)
MIT 2	18.9269	19.1563	19.4245	19.7381	19.9247	19.9988	20.0065	20.0078	19.9786	19.7427	19.2889	18.9885 (90)
Living area fraction	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (92)
Temperature adjustment	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)
adjusted MIT	19.2738	19.5035	19.7736	20.0920	20.2922	20.3753	20.3868	20.3868	20.3506	20.0931	19.6325	19.2424 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9925	0.9804	0.9555	0.8868	0.7518	0.5463	0.3778	0.4172	0.6624	0.9103	0.9820	0.9943 (94)
Useful gains	615.9833	737.5760	798.5121	811.8519	715.9739	511.3004	340.4866	357.0602	539.9327	656.1616	618.2843	582.6368 (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	1393.0894	1355.0218	1228.3953	1022.9674	783.5012	520.8907	341.5415	358.8500	566.1566	865.6564	1148.2339	1384.9864 (97)
Space heating kWh	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98a)
Space heating requirement - total per year (kWh/year)												2649.5431
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	578.1669	414.9236	319.8331	152.0032	50.2403	0.0000	0.0000	0.0000	0.0000	155.8642	381.5638	596.9481 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2649.5431
Space heating per m2												32.0846 (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	847.8145	667.4284	684.0667	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9196	0.9621	0.9492	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	779.6761	642.1495	649.3204	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	1047.8110	1009.4818	958.7663	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	193.0571	273.2952	230.2277	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	48.2643	68.3238	57.5569	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												174.1450 (107)
Energy for space heating												32.0846 (99)
Energy for space cooling												2.1088 (108)
Total												34.1934 (109)
Fabric Energy Efficiency (DFEE)												34.2 (109)

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

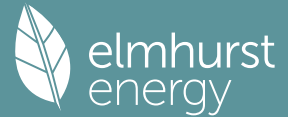
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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)

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

0 * 10 = 0.0000 (6c)
0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000 / (5) = 0.1345 (8)
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered
Blower Door
Yes
5.0000 (17)
0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			15.1500	1.1450	17.3473		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 44.6979		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385
E3 Sill	5.0100	0.0500	0.2505
E4 Jamb	25.3400	0.0500	1.2670
E5 Ground floor (normal)	18.9000	0.1600	3.0240
E6 Intermediate floor within a dwelling	16.5000	0.0000	0.0000
P1 Party wall - Ground floor	8.3000	0.0800	0.6640
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0600	0.6480
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.1200	1.9764
E12 Gable (insulation at ceiling level)	8.8000	0.0600	0.5280
E16 Corner (normal)	13.5000	0.0900	1.2150
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 56.4983 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145 (39)
Average = Sum(39)m / 12 =												98.0428
HLP	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954 (40)
HLP (average)												1.1872
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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)

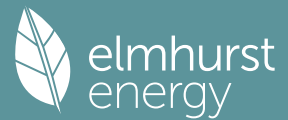
Hot water usage for baths 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)

Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)

Average daily hot water use (litres/day) 63.2183 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =	1049.9202	
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)

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Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)

12Total per year (kWh/year)	Total per year (kWh/year) = Sum(64)m =											892.4322 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =											603.9924 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434 (72)
Total internal gains	449.8774	463.3429	443.1908	430.9747	408.9903	395.5896	380.6446	379.7538	391.0995	402.4060	425.4814	439.5631 (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	
North	4.1800		10.6334		0.6300		0.7000		0.7700		13.5838 (74)	
South	8.5900		46.7521		0.6300		0.7000		0.7700		122.7343 (78)	
West	2.3800		19.6403		0.6300		0.7000		0.7700		14.2855 (80)	
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	600.4810	718.2547	789.3716	858.3383	888.2572	872.1864	839.7639	799.6728	765.1329	683.2718	605.5330	568.6886 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9963	0.9903	0.9778	0.9386	0.8465	0.6704	0.4997	0.5438	0.7777	0.9531	0.9912	0.9971 (86)
MIT	19.6856	19.9030	20.1778	20.5292	20.8046	20.9566	20.9920	20.9879	20.9061	20.5469	20.0535	19.6521 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9949	0.9870	0.9698	0.9162	0.7930	0.5761	0.3836	0.4252	0.6928	0.9313	0.9875	0.9961 (89)
MIT 2	18.7324	18.9497	19.2215	19.5654	19.8074	19.9236	19.9402	19.9407	19.8918	19.5899	19.1090	18.7063 (90)
Living area fraction	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	0.3840 (91)
MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0984	19.3158	19.5887	19.9355	20.1903	20.3203	20.3441	20.3428	20.2813	19.9574	19.4717	19.0695 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9936	0.9846	0.9668	0.9164	0.8073	0.6114	0.4285	0.4711	0.7225	0.9319	0.9855	0.9950 (94)
Useful gains	596.6349	707.1720	763.1678	786.5604	717.0735	533.2575	359.8446	376.7094	552.8194	636.7395	596.7241	565.8677 (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	1475.0697	1433.3511	1298.2184	1081.9580	830.6057	553.9239	362.5579	381.0774	600.9324	915.4359	1215.6716	1467.8371 (97)
Space heating kWh	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98a)
Space heating requirement - total per year (kWh/year)												3160.8372
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	653.5555	487.9923	398.0776	212.6862	84.4680	0.0000	0.0000	0.0000	0.0000	207.3501	445.6422	671.0653 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3160.8372
Space heating per m2												(98c) / (4) = 38.2761 (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	910.2503	716.5800	734.5468	0.0000	0.0000	0.0000	0.0000 (100)

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Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8644	0.9273	0.9077	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	786.8221	664.4795	666.7760	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	973.2835	937.6873	893.1018	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh												
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	134.2522	203.2667	168.3864	0.0000	0.0000	0.0000	0.0000 (104)
Intermittency factor (Table 10b)									fC = cooled area / (4) =			1.0000 (105)
Space cooling kWh	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500 (106)
Space cooling requirement	0.0000	0.0000	0.0000	0.0000	0.0000	33.5631	50.8167	42.0966	0.0000	0.0000	0.0000	0.0000 (107)
Energy for space heating												126.4763 (107)
Energy for space cooling												38.2761 (99)
Total												1.5316 (108)
Fabric Energy Efficiency (TFEE)												39.8076 (109)
												39.8 (109)

Full SAP Calculation Printout



Plot Reference	Unit 5			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.55	TER	12.04
Environmental	100 A	% DER < TER			95.43
CO ₂ Emissions (t/year)	0	DFEE	34.19	TFEE	39.81
Compliance Check	See BREL	% DFEE < TFEE			14.10
% DPER < TPER	71.17	DPER	18.15	TPER	62.95
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			15.1500	1.1450	17.3473		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030	110.0000	9168.5000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.2951		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	21762.1700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							263.5283 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	49.8562 (37)

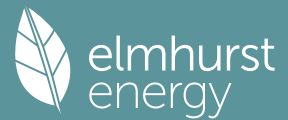
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Heat transfer coeff	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558	(38)
Average = Sum(39)m / 12 =	94.6128	94.3034	94.0002	92.5758	92.3093	91.0688	91.0688	90.8390	91.5466	92.3093	92.8484	93.4120	(39)
												92.5745	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.1457	1.1420	1.1383	1.1210	1.1178	1.1028	1.1028	1.1000	1.1086	1.1178	1.1243	1.1312	(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												2.5100 (42)
Hot water usage for mixer showers												
	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m												
	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage												
	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (64)
Electric shower(s)												3126 (64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000 (64a)
Heat gains from water heating, kWh/month												
	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (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
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Pumps, fans	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (69)
Losses e.g. evaporation (negative values) (Table 5)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (70)
Water heating gains (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Total internal gains	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
	576.2750	588.1620	564.3505	543.2888	516.0962	497.1882	478.4771	480.1001	494.4784	511.9209	543.4367	564.7584 (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							

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North		4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South		8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)
West		2.3800		19.6403		0.4500		0.0000		0.7700		16.1967 (80)

Solar gains	170.7523	289.0157	392.4952	484.5393	543.3865	540.3592	520.5434	476.0987	424.0741	318.4420	204.1402	146.4008 (83)
Total gains	747.0273	877.1777	956.8457	1027.8280	1059.4827	1037.5474	999.0205	956.1988	918.5525	830.3629	747.5768	711.1591 (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	63.8925	64.1021	64.3089	65.2983	65.4869	66.3789	66.3789	66.5468	66.0325	65.4869	65.1066	64.7138
alpha	5.2595	5.2735	5.2873	5.3532	5.3658	5.4253	5.4253	5.4365	5.4022	5.3658	5.3404	5.3143
util living area												
	0.9897	0.9758	0.9485	0.8765	0.7429	0.5507	0.3994	0.4343	0.6564	0.8972	0.9765	0.9918 (86)
Living	19.9526	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	19.9209
Non living	18.7724	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.7411
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.4642	20.1744	20.4319	20.7256	20.9106	20.9856	20.9979	20.9967	20.9640	20.7308	20.2990	20.0718 (87)
Th 2	19.9637	19.9667	19.9697	19.9837	19.9863	19.9986	19.9986	20.0008	19.9938	19.9863	19.9810	19.9755 (88)
util rest of house												
	0.9863	0.9684	0.9329	0.8419	0.6820	0.4695	0.3094	0.3414	0.5732	0.8603	0.9679	0.9891 (89)
MIT 2	19.4888	19.0527	19.3718	19.7256	19.9183	19.9912	19.9980	19.9998	19.9729	19.7420	19.2230	18.9635 (90)
Living area fraction												
MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (92)
Temperature adjustment												0.0000
adjusted MIT	19.8633	19.4834	19.7789	20.1096	20.2993	20.3731	20.3819	20.3826	20.3535	20.1217	19.6362	19.3891 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9859	0.9641	0.9295	0.8466	0.7018	0.5004	0.3441	0.3772	0.6041	0.8658	0.9642	0.9871 (94)
Useful gains	736.5054	845.6449	889.3879	870.1725	743.5082	519.1746	343.7148	360.6330	554.8606	718.9681	720.8234	702.0108 (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												
	1472.4898	1375.2656	1248.2198	1037.7358	793.7988	525.7467	344.4143	361.7760	572.4849	878.9381	1163.9628	1418.8467 (97)
Space heating kWh												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98a)
Space heating requirement - total per year (kWh/year)												2299.9142
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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2299.9142
Space heating per m2												(98c) / (4) = 27.8507 (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 %)												372.1570 (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												
	547.5724	355.9051	266.9709	120.6456	37.4163	0.0000	0.0000	0.0000	0.0000	119.0177	319.0604	533.3259 (98)
Space heating efficiency (main heating system 1)												
	372.1570	372.1570	372.1570	372.1570	372.1570	0.0000	0.0000	0.0000	0.0000	372.1570	372.1570	372.1570 (210)
Space heating fuel (main heating system)												
	147.1348	95.6330	71.7361	32.4179	10.0539	0.0000	0.0000	0.0000	0.0000	31.9805	85.7327	143.3067 (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												
	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m												
	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038	195.8038 (216)
Fuel for water heating, kWh/month												
	159.0203	140.7271	149.4443	130.9122	126.6468	113.8111	111.9518	116.4717	117.8608	131.8218	140.7014	157.1917 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.2077	17.0136	15.3188	11.2232	8.6691	7.0828	7.9083	10.2795	13.3520	17.5186	19.7872	21.7971 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-48.2145	-69.7176	-102.3211	-115.2566	-124.0942	-115.0212	-113.3682	-106.5568	-93.5698	-78.5938	-53.0959	-41.3716 (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	-19.4023	-43.1154	-89.8463	-142.2857	-194.0775	-197.7923	-195.3114	-163.1380	-117.6553	-65.6482	-27.1073	-15.2121 (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												

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Space heating fuel - main system 1	617.9957	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	195.8038	
Water heating fuel used	1596.5611	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	171.1580	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	53.9415	(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	617.9957	0.1568	96.8767 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1596.5611	0.1410	225.0432 (264)
Space and water heating			321.9199 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	171.1580	0.1443	24.7034 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	0.1345	-142.7172
PV Unit electricity exported	-1270.5918	0.1245	-158.2095
Total			-300.9266 (269)
Total CO2, kg/year			45.6967 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5500 (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	617.9957	1.5803	976.6193 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1596.5611	1.5212	2428.6939 (278)
Space and water heating			3405.3132 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	171.1580	1.5338	262.5278 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.1814	1.4970	-1588.6408
PV Unit electricity exported	-1270.5918	0.4570	-580.6663
Total			-2169.3071 (283)
Total Primary energy kWh/year			1498.5340 (286)
Dwelling Primary energy Rate (DPER)			18.1500 (287)

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

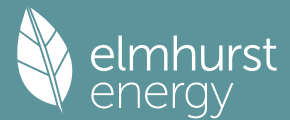
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

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

$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infiltr rate	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K	
Main dwelling								
TER Opaque door			2.2100	1.0000	2.2100			(26)
TER Opening Type			15.1500	1.1450	17.3473			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	100.7100	17.3600	83.3500	0.1800	15.0030			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			185.1900					(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	44.6979		(33)
Main dwelling								
Party Wall			46.1700	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							263.5283	(35)

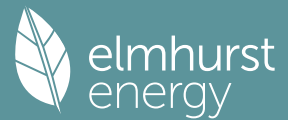
List of Thermal Bridges	Length	Psi-value	Total	
K1 Element	8.7700	0.0500	0.4385	
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505	
E3 Sill	25.3400	0.0500	1.2670	
E4 Jamb	18.9000	0.1600	3.0240	
E5 Ground floor (normal)	16.5000	0.0000	0.0000	
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640	
P1 Party wall - Ground floor	8.3000	0.0000	0.0000	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480	
E18 Party wall between dwellings	16.4700	0.1200	1.9764	
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280	
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150	
E16 Corner (normal)	2.7000	-0.0900	-0.2430	
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080	
E20 Exposed floor (normal)	0.5000	0.1600	0.0800	
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680	
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760	
E10 Eaves (insulation at ceiling level)				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)				11.8004 (36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	56.4983 (37)

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	99.6775	99.4294	99.1862	98.0438	97.8301	96.8351	96.8351	96.6509	97.2184	97.8301	98.2625	98.7145	(39)
Average = Sum(39)m / 12 =												98.0428	
HLP	1.2070	1.2040	1.2011	1.1873	1.1847	1.1726	1.1726	1.1704	1.1773	1.1847	1.1899	1.1954	(40)
HLP (average)												1.1872	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use													
135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =	2065.4007		
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	27.6637	27.6637	(56)
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	27.6637	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =	2383.3728	2383	(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)

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Heat gains from water heating, kWh/month
111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	115.4382	127.8066	115.4382	119.2862	115.4382	119.2862	115.4382	115.4382	119.2862	115.4382	119.2862	115.4382 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	554.3423	566.5725	543.5684	524.4750	498.4450	477.7716	459.9057	460.9621	474.6600	493.7331	523.3728	543.0923 (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				
North			4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South			8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
West			2.3800	19.6403	0.6300	0.7000	0.7700	14.2855 (80)				
Solar gains	150.6035	254.9118	346.1808	427.3636	479.2669	476.5968	459.1193	419.9191	374.0334	280.8658	180.0516	129.1255 (83)
Total gains	704.9458	821.4844	889.7491	951.8386	977.7118	954.3684	919.0250	880.8812	848.6934	774.5989	703.4244	672.2178 (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	60.6461	60.7974	60.9465	61.6566	61.7913	62.4262	62.4262	62.5452	62.1801	61.7913	61.5194	61.2377
alpha	5.0431	5.0532	5.0631	5.1104	5.1194	5.1617	5.1617	5.1697	5.1453	5.1194	5.1013	5.0825
util living area	0.9924	0.9830	0.9645	0.9133	0.8051	0.6230	0.4589	0.4973	0.7258	0.9272	0.9833	0.9939 (86)
MIT	19.8105	20.0217	20.2844	20.6079	20.8482	20.9688	20.9946	20.9919	20.9321	20.6297	20.1666	19.7770 (87)
Th 2	19.9144	19.9168	19.9191	19.9302	19.9323	19.9420	19.9420	19.9438	19.9382	19.9323	19.9281	19.9237 (88)
util rest of house	0.9898	0.9774	0.9527	0.8848	0.7463	0.5313	0.3511	0.3870	0.6382	0.8970	0.9768	0.9919 (89)
MIT 2	18.5564	18.8246	19.1540	19.5504	19.8121	19.9256	19.9404	19.9412	19.8970	19.5859	19.0185	18.5205 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (92)
Temperature adjustment												0.0000
adjusted MIT	19.0380	19.2843	19.5880	19.9565	20.2099	20.3262	20.3452	20.3447	20.2945	19.9867	19.4593	19.0030 (93)

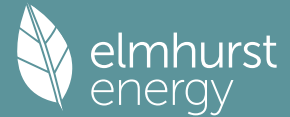
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9732	0.9483	0.8856	0.7628	0.5657	0.3927	0.4296	0.6694	0.8988	0.9731	0.9895 (94)
Useful gains	695.7982	799.4948	843.7511	842.9135	745.8136	539.8933	360.8556	378.3916	568.1481	696.2101	684.4907	665.1410 (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	1469.0426	1430.2205	1298.1519	1084.0203	832.5265	554.4966	362.6692	381.2572	602.2174	918.3026	1214.4571	1461.2693 (97)
Space heating kWh	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98a)
Space heating requirement - total per year (kWh/year)												2714.4591
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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2714.4591
Space heating per m2										(98c) / (4) =		32.8707 (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	575.2938	423.8477	338.0742	173.5969	64.5144	0.0000	0.0000	0.0000	0.0000	165.2368	381.5758	592.3194 (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)	623.2869	459.2066	366.2776	188.0790	69.8964	0.0000	0.0000	0.0000	0.0000	179.0215	413.4082	641.7329 (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)												

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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
Efficiency of water heater	85.9886	85.6240	85.0108	83.7985	81.9067	79.8000	79.8000	79.8000	79.8000	83.6605	85.3895	86.0645	(216)
Fuel for water heating, kWh/month	273.1259	242.5800	259.8745	232.8581	231.6016	214.9688	212.8639	220.9851	223.0106	236.2912	245.0209	270.0703	(217)
Space cooling fuel requirement													
(221)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	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	23.9858	19.2423	17.3255	12.6934	9.8048	8.0106	8.9442	11.6261	15.1011	19.8135	22.3793	24.6524	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.3879	-53.9965	-77.4427	-86.8753	-93.5098	-87.2131	-86.1202	-81.3723	-72.9841	-61.6318	-42.1530	-33.2019	(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	-22.0688	-46.3814	-92.1102	-138.2391	-182.6933	-183.5391	-181.3931	-153.6414	-112.6799	-66.3125	-29.4585	-17.4560	(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												2940.9091	(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												2863.2509	(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)												193.5790	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4042.8772	(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	2940.9091	0.2100	617.5909 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2863.2509	0.2100	601.2827 (264)
Space and water heating			1218.8736 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	193.5790	0.1443	27.9394 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	0.1346	-109.7135
PV Unit electricity exported	-1225.9732	0.1259	-154.3704
Total			-264.0839 (269)
Total CO2, kg/year			994.6584 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			12.0400 (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	2940.9091	1.1300	3323.2272 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2863.2509	1.1300	3235.4735 (278)
Space and water heating			6558.7008 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	193.5790	1.5338	296.9180 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-814.8885	1.4976	-1220.3732
PV Unit electricity exported	-1225.9732	0.4622	-566.6467
Total			-1787.0199 (283)
Total Primary energy kWh/year			5198.6997 (286)
Target Primary Energy Rate (TPER)			62.9500 (287)

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Plot Reference	Unit 6			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

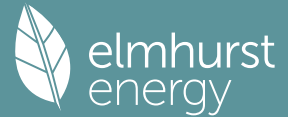
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233a)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234a)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235a)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235c)
Electricity generated by PVs (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (233b)
Electricity generated by wind turbines (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (234b)
Electricity generated by hydro-electric generators (Appendix M) (negative quantity)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235b)
Electricity used or net electricity generated by micro-CHP (Appendix N) (negative if net generation)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (235d)
Annual totals kWh/year												
Space heating fuel - main system 1												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1585.0207	0.1410	223.4165	(264)
Space and water heating			300.0974	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	176.5557	0.1443	25.4824	(268)
Total CO2, kg/year			325.5798	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400	(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	487.9048	1.5818	771.7629	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387	(278)
Space and water heating			3182.9016	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	176.5557	1.5338	270.8071	(282)
Total Primary energy kWh/year			3453.7087	(286)
Dwelling Primary energy Rate (DPER)			41.8200	(287)

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

1. Overall dwelling characteristics

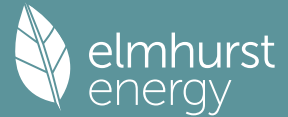
	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830	(1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830	(1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660	(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	3 * 10 =	30.0000	(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) =	30.0000 / (5) =	0.1345 (8)
Pressure test	Yes		
Pressure Test Method	Blower Door		
Measured/design AP50	5.0000		(17)
Infiltration rate	0.3845		(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) =	0.3269	(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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(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			2.2100	1.0000	2.2100			(26)
TER Opening Type			12.7700	1.1450	14.6221			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			137.6700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8475			(33)
Main dwelling								
Party Wall			93.6900	0.0000	0.0000			(32)

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

266.6986 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385	
E3 Sill	5.0100	0.0500	0.2505	
E4 Jamb	25.3400	0.0500	1.2670	
E5 Ground floor (normal)	10.1000	0.1600	1.6160	
E6 Intermediate floor within a dwelling	7.7000	0.0000	0.0000	
P1 Party wall - Ground floor	17.1000	0.0800	1.3680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000	
E18 Party wall between dwellings	21.6000	0.0600	1.2960	
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.1200	2.1120	
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	2.7000	0.0900	0.2430	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E20 Exposed floor (normal)	1.9000	0.3200	0.6080	
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800	
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680	
P8 Party Wall - Exposed floor (inverted)	0.5000	0.2400	0.1200	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)

Water storage loss (or HIU loss):

Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)

Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)

If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)

Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)

WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346	(64)
												2383.3728	(64)
												2383	(64)

12Total per year (kWh/year)

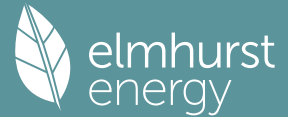
Electric shower(s)													
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)

Heat gains from water heating, kWh/month													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North				4.1800	10.6334		0.6300		0.7000		0.7700	13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Ext temp.	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating requirement - total per year (kWh/year)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2	(98c) / (4) = 26.0046 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Efficiency of water heater (217)m	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(238)

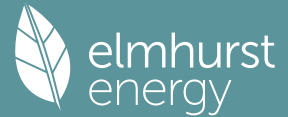
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 6			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) = 22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7356 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	81.9148	81.6667	81.4235	80.2811	80.0674	79.0724	79.0724	78.8882	79.4557	80.0674	80.4997	80.9518	(39)
Average = Sum(39)m / 12 =												80.2801	
HLP	0.9919	0.9889	0.9860	0.9722	0.9696	0.9575	0.9575	0.9553	0.9622	0.9696	0.9748	0.9803	(40)
HLP (average)												0.9721	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (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	0.0000	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)												63.2183	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	68.8742	(44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Energy content (annual)										Total = Sum(45)m =		1049.9202	
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	0.0000	(46)
Water storage loss (or HIU 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	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													
92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	91.6643	(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	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		892.4322	(64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												603.9924	(64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)													
-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)													
49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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												
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

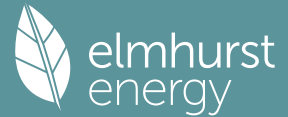
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 33.8475		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5000 (36)
Point Thermal Bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

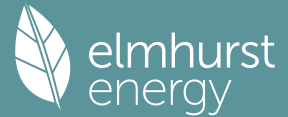
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 43.1792 Feb 42.9310 Mar 42.6878 Apr 41.5455 May 41.3318 Jun 40.3368 Jul 40.3368 Aug 40.1526 Sep 40.7200 Oct 41.3318 Nov 41.7641 Dec 42.2162 (38)
Heat transfer coeff 87.5267 87.2786 87.0354 85.8930 85.6793 84.6843 84.6843 84.5001 85.0676 85.6793 86.1117 86.5637 (39)
Average = Sum(39)m / 12 = 85.8920

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482 (40)
HLP (average)												1.0401
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)
Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)
Average daily hot water use (litres/day) 63.2183 (43)
Daily hot water use Jan 68.9710 Feb 67.0790 Mar 65.0134 Apr 62.4424 May 60.1488 Jun 57.7653 Jul 57.2700 Aug 59.3314 Sep 61.4457 Oct 63.8935 Nov 66.4872 Dec 68.8742 (44)
Energy conte 109.2332 95.5196 99.9231 85.4805 80.9719 71.0291 69.2631 73.4647 75.7687 86.7028 94.7232 107.8403 (45)
Energy content (annual) Total = Sum(45)m = 1049.9202
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 (or HIU loss):
Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)
If cylinder contains dedicated solar storage 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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
North				4.1800	10.6334	0.6300		0.7000		0.7700		13.5838 (74)
South				8.5900	46.7521	0.6300		0.7000		0.7700		122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98c)
Space heating requirement after solar 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	2573.9215 (98c)
Space heating per m ²	(98c) / (4) = 31.1688 (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	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

Full SAP Calculation Printout



Plot Reference	Unit 6			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	83 B	DER	3.94	TER	10.53
Environmental	97 A	% DER < TER			62.58
CO ₂ Emissions (t/year)	0.31	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	23.72	DPER	41.82	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

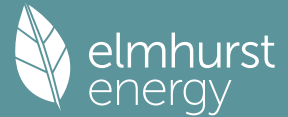
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2249.4812	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			325.5798 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			3.9400 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3453.7087 (286)
Dwelling Primary energy Rate (DPER)			41.8200 (287)

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

1. Overall dwelling characteristics

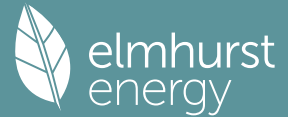
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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			2.2100	1.0000	2.2100			(26)
TER Opening Type			12.7700	1.1450	14.6221			(27)
Ground Floor			41.2900	0.1300	5.3677			(28a)
Exposed Floor			0.9500	0.1300	0.1235			(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778			(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)
Total net area of external elements Aum(A, m2)			137.6700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.8475			(33)
Main dwelling								
Party Wall			93.6900	0.0000	0.0000			(32)

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

266.6986 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)	8.7700	0.0500	0.4385	
E3 Sill	5.0100	0.0500	0.2505	
E4 Jamb	25.3400	0.0500	1.2670	
E5 Ground floor (normal)	10.1000	0.1600	1.6160	
E6 Intermediate floor within a dwelling	7.7000	0.0000	0.0000	
P1 Party wall - Ground floor	17.1000	0.0800	1.3680	
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000	
E18 Party wall between dwellings	21.6000	0.0600	1.2960	
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.1200	2.1120	
E10 Eaves (insulation at ceiling level)	9.6000	0.0600	0.5760	
E16 Corner (normal)	2.7000	0.0900	0.2430	
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0900	-0.2430	
E20 Exposed floor (normal)	1.9000	0.3200	0.6080	
P7 Party Wall - Exposed floor (normal)	0.5000	0.1600	0.0800	
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680	
P8 Party Wall - Exposed floor (inverted)	0.5000	0.2400	0.1200	
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			10.5000	(36)
Point Thermal bridges			(36a) =	0.0000
Total fabric heat loss			(33) + (36) + (36a) =	44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500	(42a)
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393	(42b)
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348	(42c)
Average daily hot water use (litres/day)													124.3484 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m													
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888	(46)

Water storage loss (or HIU loss):

Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)

Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)

If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)

Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848	(62)

WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346	(64)
												2383.3728	(64)
												2383	(64)

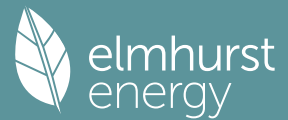
12Total per year (kWh/year)													
Electric shower(s)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
												0.0000	(64a)

Heat gains from water heating, kWh/month													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844	(65)

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

Metabolic gains (Table 5), Watts													
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North					4.1800	10.6334	0.6300		0.7000		0.7700	13.5838 (74)
South					8.5900	46.7521	0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938 (86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917 (89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953 (90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (92)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)
Temperature adjustment												0.0000
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897 (94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504 (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	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026 (97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98a)
Space heating requirement - total per year (kWh/year)												2147.4620
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620
Space heating per m2										(98c) / (4) =		26.0046 (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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293 (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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater (217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	79.8000 (216)
Fuel for water heating, kWh/month	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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)

Full SAP Calculation Printout



Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2326.6110	(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												2875.8887	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												3447.3219	(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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 6			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558	(38)
Heat transfer coeff	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914	(39)
Average = Sum(39)m / 12 =												81.4539	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965	(40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												147.2722	(43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy content	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930	(44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406	(45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												1.1124	(55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844	(56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874	(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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874	(64)
Total per year (kWh/year)												3126.1279	(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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359	(65)

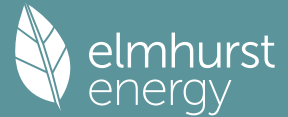
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386	(72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989	(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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (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	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

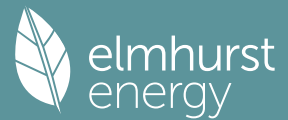
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

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

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

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

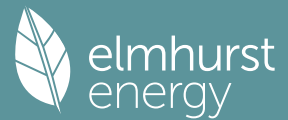
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

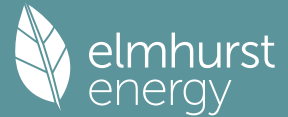
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 6			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	95 A	DER	0.30	TER	10.53
Environmental	100 A	% DER < TER			97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58
Compliance Check	See BREL	% DFEE < TFEE			14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.4447	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							

4. Water heating energy requirements (kWh/year)												
Assumed occupancy												2.5100 (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												
	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses												
	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use												
	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy content (annual)												
	109.2332	95.5196	89.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Distribution loss (46)m = 0.15 x (45)m												Total = Sum(45)m = 1049.9202
	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 (or HIU loss):												
Total storage loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Primary loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Combi loss												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (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												
	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
12Total per year (kWh/year)												Total per year (kWh/year) = Sum(64)m = 892 (64)
Electric shower(s)												892 (64)
	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												603.9924 (64a)
Heat gains from water heating, kWh/month												
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)

6. Solar gains						
[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	74.6846	74.9115	75.1352	76.2043	76.4078	77.3692	77.3692	77.5499	76.9960	76.4078	75.9974	75.5730
alpha	5.9790	5.9941	6.0090	6.0803	6.0939	6.1579	6.1579	6.1700	6.1331	6.0939	6.0665	6.0382
util living area	0.9956	0.9872	0.9690	0.9118	0.7888	0.5889	0.4261	0.4622	0.6926	0.9273	0.9881	0.9968 (86)
MIT	20.0333	20.2397	20.4697	20.7423	20.9184	20.9886	20.9986	20.9978	20.9706	20.7508	20.3476	20.0021 (87)
Th 2	20.0901	20.0926	20.0950	20.1066	20.1088	20.1189	20.1189	20.1208	20.1150	20.1088	20.1044	20.0998 (88)
util rest of house	0.9942	0.9830	0.9590	0.8850	0.7347	0.5126	0.3416	0.3751	0.6160	0.8992	0.9835	0.9957 (89)
MIT 2	19.2167	19.4225	19.6482	19.9114	20.0586	20.1142	20.1186	20.1202	20.1012	19.9259	19.5401	19.1937 (90)
Living area fraction									fLA = Living area / (4) =			0.3840 (91)
MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (92)
Temperature adjustment												0.0000
adjusted MIT	19.5303	19.7363	19.9637	20.2305	20.3888	20.4500	20.4565	20.4572	20.4350	20.2426	19.8502	19.5041 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9930	0.9810	0.9573	0.8892	0.7526	0.5417	0.3741	0.4086	0.6447	0.9040	0.9818	0.9947 (94)
Useful gains	603.8028	710.9514	753.5220	749.7180	649.3229	457.3572	304.4913	319.2966	488.8626	620.9430	602.0498	573.2388 (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	1247.5871	1211.6309	1096.2593	909.6215	695.6856	462.5729	304.9433	320.0645	503.3549	772.0616	1026.3850	1238.8937 (97)
Space heating kWh	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98a)
Space heating requirement - total per year (kWh/year)												2133.2539
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	478.9755	336.4566	254.9965	115.1305	34.4938	0.0000	0.0000	0.0000	0.0000	112.4323	305.5214	495.2473 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2133.2539
Space heating per m2										(98c) / (4) =		25.8326 (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	743.2808	585.1360	599.5502	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.9385	0.9746	0.9661	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	697.5883	570.2748	579.2027	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	172.0440	247.9840	214.8321	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	43.0110	61.9960	53.7080	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												158.7150 (107)
Energy for space heating												25.8326 (99)
Energy for space cooling												1.9220 (108)
Total												27.7545 (109)
Fabric Energy Efficiency (DFEE)												27.8 (109)

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

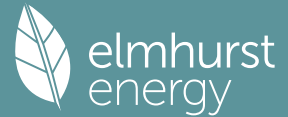
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test Yes
Pressure Test Method Blower Door
Measured/design AP50 5.0000 (17)
Infiltration rate 0.3845 (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) = 0.3269 (21)

Wind speed	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750
Adj infilt rate												
	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738

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			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			

Thermal bridges (Sum(L x Psi) calculated using Appendix K) 10.5000 (36)
Point Thermal Bridges 0.0000
Total fabric heat loss (33) + (36) + (36a) = 44.3475 (37)

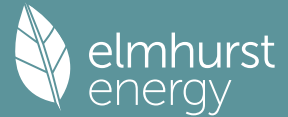
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)
Jan 43.1792 Feb 42.9310 Mar 42.6878 Apr 41.5455 May 41.3318 Jun 40.3368 Jul 40.3368 Aug 40.1526 Sep 40.7200 Oct 41.3318 Nov 41.7641 Dec 42.2162 (38)
Heat transfer coeff 87.5267 87.2786 87.0354 85.8930 85.6793 84.6843 84.6843 84.5001 85.0676 85.6793 86.1117 86.5637 (39)
Average = Sum(39)m / 12 = 85.8920

HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482
HLP (average)												
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (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 28.6361 28.2109 27.6120 26.5077 25.6809 24.7640 24.2688 24.8635 25.5110 26.4921 27.6191 28.5393 (42b)
Hot water usage for other uses 40.3348 38.8681 37.4014 35.9347 34.4680 33.0012 33.0012 34.4680 35.9347 37.4014 38.8681 40.3348 (42c)
Average daily hot water use (litres/day) 63.2183 (43)
Daily hot water use Jan 68.9710 Feb 67.0790 Mar 65.0134 Apr 62.4424 May 60.1488 Jun 57.7653 Jul 57.2700 Aug 59.3314 Sep 61.4457 Oct 63.8935 Nov 66.4872 Dec 68.8742 (44)
Energy conte 109.2332 95.5196 99.9231 85.4805 80.9719 71.0291 69.2631 73.4647 75.7687 86.7028 94.7232 107.8403 (45)
Energy content (annual) Total = Sum(45)m = 1049.9202
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 (or HIU loss):
Total storage loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (56)
If cylinder contains dedicated solar storage 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (57)
Primary loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (59)
Combi loss 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 (61)
Total heat required for water heating calculated for each month

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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	
North				4.1800	10.6334	0.6300		0.7000	0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300		0.7000	0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116
util living area	0.9965	0.9906	0.9787	0.9398	0.8452	0.6588	0.4843	0.5230	0.7572	0.9490	0.9911	0.9973 (86)
MIT	19.9054	20.1010	20.3343	20.6327	20.8585	20.9743	20.9963	20.9943	20.9430	20.6596	20.2327	19.8765 (87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433 (88)
util rest of house	0.9953	0.9875	0.9712	0.9186	0.7948	0.5733	0.3832	0.4200	0.6775	0.9266	0.9875	0.9964 (89)
MIT 2	19.0441	19.2399	19.4708	19.7641	19.9615	20.0512	20.0613	20.0625	20.0304	19.7955	19.3809	19.0231 (90)
Living area fraction	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (91)
MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (92)
Temperature adjustment	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)
adjusted MIT	19.3748	19.5706	19.8024	20.0977	20.3059	20.4057	20.4203	20.4203	20.3808	20.1273	19.7080	19.3508 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	586.3966	684.2988	723.8143	731.2218	655.3758	479.5156	322.2503	337.6619	505.3866	607.1329	583.0796	558.0720 (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	1319.4517	1280.4267	1157.7776	961.8013	737.3508	491.6502	323.5199	339.7163	534.2918	816.2960	1085.6934	1311.5075 (97)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98a)
Space heating requirement - 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	2573.9215 (98b)
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 (98c)
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 (98d)
Space heating kWh	545.3930	400.5979	322.8687	166.0172	60.9894	0.0000	0.0000	0.0000	0.0000	155.6173	361.8819	560.5560 (98e)
Space heating requirement after solar 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	2573.9215 (98f)
Space heating per m ²	(98c) / (4) = 31.1688 (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	796.0329	626.6642	642.2007	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8905	0.9476	0.9336	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	708.8733	593.8344	599.5388	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	119.7398	186.3675	158.8594	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	29.9350	46.5919	39.7149	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												116.2417 (107)
Energy for space cooling												31.1688 (99)
Total												1.4076 (108)
Fabric Energy Efficiency (TFEE)												32.5764 (109)
												32.6 (109)

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Plot Reference	Unit 6			Issued on Date	02/07/2026	
Assessment Reference	Renewables		Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2	
SAP Rating	95 A	DER	0.30	TER	10.53	
Environmental	100 A	% DER < TER				97.15
CO ₂ Emissions (t/year)	-0.01	DFEE	27.75	TFEE	32.58	
Compliance Check	See BREL	% DFEE < TFEE				14.80
% DPER < TPER	71.51	DPER	15.62	TPER	54.83	
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge					

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (5)

2. Ventilation rate

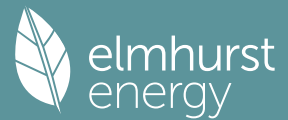
	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	4 * 10 = 40.0000 (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 40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778	110.0000	4203.0998 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	33.4447		(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000	110.0000	10305.9000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9698 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	10.1000	0.0460	0.4646
E6 Intermediate floor within a dwelling	7.7000	0.0010	0.0077
P1 Party wall - Ground floor	17.1000	0.0390	0.6669
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	17.1000	0.0000	0.0000
E18 Party wall between dwellings	21.6000	0.0420	0.9072
P4 Party wall - Roof (insulation at ceiling level)	17.6000	0.0330	0.5808
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
E16 Corner (normal)	2.7000	0.0380	0.1026
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
P8 Party Wall - Exposed floor (inverted)	0.5000	0.0730	0.0365
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.2909 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		38.7356 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	83.4922	83.1828	82.8796	81.4552	81.1887	79.9481	79.9481	79.7184	80.4260	81.1887	81.7278	82.2914 (39)
												81.4539
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.0110	1.0073	1.0036	0.9864	0.9832	0.9681	0.9681	0.9653	0.9739	0.9832	0.9897	0.9965 (40)
Days in month	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy	2.5100 (42)											
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy content	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

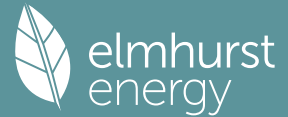
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (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	73.2736	73.5461	73.8152	75.1059	75.3525	76.5217	76.5217	76.7422	76.0671	75.3525	74.8554	74.3427
alpha	5.8849	5.9031	5.9210	6.0071	6.0235	6.1014	6.1014	6.1161	6.0711	6.0235	5.9904	5.9562
util living area	0.9890	0.9740	0.9456	0.8702	0.7324	0.5350	0.3851	0.4147	0.6275	0.8814	0.9733	0.9913 (86)
Living	20.1561	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.1296
Non living	19.1125	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.0885
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10
MIT	20.5683	20.3529	20.5663	20.8045	20.9432	20.9929	20.9992	20.9987	20.9818	20.8192	20.4618	20.2514 (87)
Th 2	20.0741	20.0773	20.0803	20.0947	20.0974	20.1100	20.1100	20.1123	20.1051	20.0974	20.0919	20.0862 (88)
util rest of house	0.9855	0.9663	0.9299	0.8365	0.6757	0.4634	0.3076	0.3353	0.5531	0.8434	0.9640	0.9885 (89)
MIT 2	19.6908	19.3608	19.6243	19.9114	20.0543	20.1063	20.1097	20.1119	20.0946	19.9355	19.5111	19.2683 (90)
Living area fraction									FLA = Living area / (4) =			0.3840 (91)
MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (92)
Temperature adjustment												0.0000
adjusted MIT	20.0277	19.7418	19.9860	20.2543	20.3956	20.4468	20.4513	20.4524	20.4353	20.2748	19.8762	19.6458 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9853	0.9629	0.9280	0.8430	0.6952	0.4908	0.3374	0.3659	0.5811	0.8516	0.9613	0.9868 (94)
Useful gains	723.6782	817.9699	842.9310	805.4322	674.2067	464.2085	307.6312	322.6129	500.7319	678.2459	702.8788	692.2157 (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	1313.1432	1234.5826	1117.7165	924.8668	705.9869	467.4370	307.9022	323.0537	509.5234	785.4861	1044.1672	1271.0548 (97)
Space heating kWh	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98a)
Space heating requirement - total per year (kWh/year)												1788.7741
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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1788.7741
Space heating per m2										(98c) / (4) =		21.6611 (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 %)												366.6236 (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	438.5619	279.9638	204.4404	85.9929	23.6445	0.0000	0.0000	0.0000	0.0000	79.7867	245.7276	430.6563 (98)
Space heating efficiency (main heating system 1)	366.6236	366.6236	366.6236	366.6236	366.6236	0.0000	0.0000	0.0000	0.0000	366.6236	366.6236	366.6236 (210)
Space heating fuel (main heating system)	119.6218	76.3627	55.7630	23.4554	6.4493	0.0000	0.0000	0.0000	0.0000	21.7626	67.0245	117.4655 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295	197.2295 (216)
Fuel for water heating, kWh/month	157.8709	139.7099	148.3640	129.9660	125.7313	112.9885	111.1426	115.6298	117.0088	130.8690	139.6844	156.0555 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-47.8094	-69.0185	-101.2066	-114.1548	-123.4182	-114.9141	-113.2679	-106.4771	-93.5194	-77.9418	-52.6370	-41.0612 (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	-19.8074	-43.8145	-90.9608	-143.3874	-194.7535	-197.8994	-195.4117	-163.2178	-117.7058	-66.3001	-27.5662	-15.5225 (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												487.9048 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	197.2295	
Water heating fuel used	1585.0207	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	-82.2919	(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	487.9048	0.1572	76.6808 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1585.0207	0.1410	223.4165 (264)
Space and water heating			300.0974 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	0.1344	-141.8743
PV Unit electricity exported	-1276.3470	0.1247	-159.1348
Total			-301.0091 (269)
Total CO2, kg/year			24.5707 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.3000 (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	487.9048	1.5818	771.7629 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1585.0207	1.5212	2411.1387 (278)
Space and water heating			3182.9016 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1055.4262	1.4968	-1579.7648
PV Unit electricity exported	-1276.3470	0.4576	-584.0751
Total			-2163.8399 (283)
Total Primary energy kWh/year			1289.8688 (286)
Dwelling Primary energy Rate (DPER)			15.6200 (287)

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

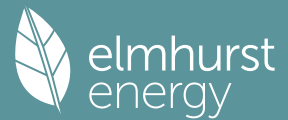
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	53.1900	14.9800	38.2100	0.1800	6.8778		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			137.6700				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	33.8475	(33)
Main dwelling							
Party Wall			93.6900	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

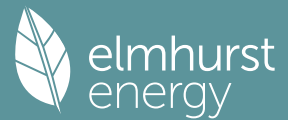
List of Thermal Bridges	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	10.1000	0.1600	1.6160
E5 Ground floor (normal)	7.7000	0.0000	0.0000
E6 Intermediate floor within a dwelling	17.1000	0.0800	1.3680
P1 Party wall - Ground floor	17.1000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	21.6000	0.0600	1.2960
E18 Party wall between dwellings	17.6000	0.1200	2.1120
P4 Party wall - Roof (insulation at ceiling level)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)	2.7000	0.0900	0.2430
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	0.5000	0.2400	0.1200
P8 Party Wall - Exposed floor (inverted)			10.5000 (36)
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			0.0000
Point Thermal Bridges			(36a) =
Total fabric heat loss			(33) + (36) + (36a) = 44.3475 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	87.5267	87.2786	87.0354	85.8930	85.6793	84.6843	84.6843	84.5001	85.0676	85.6793	86.1117	86.5637	(39)
Average = Sum(39)m / 12 =												85.8920	
HLP	1.0599	1.0569	1.0540	1.0401	1.0375	1.0255	1.0255	1.0233	1.0301	1.0375	1.0428	1.0482	(40)
HLP (average)												1.0401	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(64)
Electric shower(s)												2383	(64)
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =												0.0000	(64a)
Heat gains from water heating, kWh/month													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(69)
Pumps, fans	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	3.0000	(70)
Losses e.g. evaporation (negative values) (Table 5)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North												4.1800	10.6334		0.6300		0.7000		0.7700		13.5838 (74)		
South												8.5900	46.7521		0.6300		0.7000		0.7700		122.7343 (78)		
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393												
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106	(84)										

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil,m (see Table 9a)													21.0000 (85)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	69.8960	70.0947	70.2906	71.2255	71.4031	72.2420	72.2420	72.3996	71.9166	71.4031	71.0446	70.6736	
alpha	5.6597	5.6730	5.6860	5.7484	5.7602	5.8161	5.8161	5.8266	5.7944	5.7602	5.7363	5.7116	
util living area	0.9922	0.9822	0.9633	0.9097	0.7961	0.6050	0.4401	0.4732	0.6974	0.9167	0.9817	0.9938	(86)
MIT	20.0320	20.2208	20.4411	20.7096	20.8981	20.9832	20.9977	20.9966	20.9625	20.7384	20.3464	20.0031	(87)
Th 2	20.0337	20.0362	20.0386	20.0500	20.0522	20.0622	20.0622	20.0640	20.0583	20.0522	20.0478	20.0433	(88)
util rest of house	0.9896	0.9766	0.9516	0.8818	0.7404	0.5231	0.3475	0.3787	0.6170	0.8851	0.9748	0.9917	(89)
MIT 2	18.9247	19.1643	19.4401	19.7690	19.9717	20.0533	20.0615	20.0629	20.0359	19.8096	19.3338	18.8953	(90)
Living area fraction	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(91)
MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.3499	19.5700	19.8245	20.1302	20.3274	20.4104	20.4210	20.4214	20.3917	20.1662	19.7226	19.3207	(93)

8. Space heating requirement

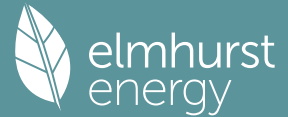
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9872	0.9731	0.9484	0.8845	0.7577	0.5541	0.3832	0.4151	0.6467	0.8895	0.9718	0.9897	(94)
Useful gains	685.4219	776.1469	803.6820	785.8164	681.2117	484.2832	322.8141	338.6008	516.6583	662.7348	669.9663	657.2504	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1317.2676	1280.3747	1159.7022	964.5960	739.1924	492.0508	323.5779	339.8103	535.2189	819.6275	1086.9555	1308.9026	(97)
Space heating kWh	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98a)
Space heating requirement - total per year (kWh/year)												2147.4620	
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	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2147.4620	
Space heating per m ²										(98c) / (4) =		26.0046	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	470.0932	338.8411	264.8790	128.7213	43.1376	0.0000	0.0000	0.0000	0.0000	116.7282	300.2322	484.8293	(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)	509.3101	367.1084	286.9762	139.4597	46.7363	0.0000	0.0000	0.0000	0.0000	126.4661	325.2787	525.2755	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.5843	85.1504	84.4678	83.1496	81.3271	79.8000	79.8000	79.8000	79.8000	82.9201	84.8691	85.6690 (217)
Fuel for water heating, kWh/month												
	274.4163	243.9294	261.5453	234.6754	233.2522	214.9688	212.8639	220.9851	223.0106	238.4012	246.5234	271.3171 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2326.6110 (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												2875.8887 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												3447.3219 (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	2326.6110	0.2100	488.5883 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2875.8887	0.2100	603.9366 (264)
Space and water heating			1092.5249 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			869.1915 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			10.5300 (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	2326.6110	1.1300	2629.0704 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2875.8887	1.1300	3249.7543 (278)
Space and water heating			5878.8247 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			4527.5638 (286)
Target Primary Energy Rate (TPER)			54.8300 (287)

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Plot Reference	Unit 7			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.18	TER	11.99
Environmental	96 A	% DER < TER			65.14
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	29.38	DPER	44.29	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

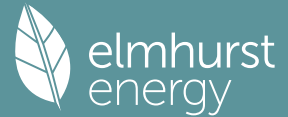
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)	
Space heating requirement - total per year (kWh/year)												2275.1765	
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765	
Space heating per m2										(98c) / (4) =		27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												609.9016 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2379.5646	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			345.5227 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1800 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3657.6219 (286)
Dwelling Primary energy Rate (DPER)			44.2900 (287)

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

1. Overall dwelling characteristics

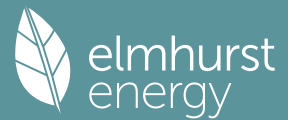
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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			2.2100	1.0000	2.2100			(26)					
TER Opening Type			12.7700	1.1450	14.6221			(27)					
Ground Floor			41.2900	0.1300	5.3677			(28a)					
Exposed Floor			0.9500	0.1300	0.1235			(28b)					
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314			(29a)					
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)					
Total net area of external elements Aum(A, m2)			185.1900					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.4011			(33)					
Main dwelling													
Party Wall			46.1700	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				8.7700	0.0500		0.4385						
E3 Sill				5.0100	0.0500		0.2505						
E4 Jamb				25.3400	0.0500		1.2670						
E5 Ground floor (normal)				18.9000	0.1600		3.0240						
E6 Intermediate floor within a dwelling				16.5000	0.0000		0.0000						
P1 Party wall - Ground floor				8.3000	0.0800		0.6640						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				8.3000	0.0000		0.0000						
E18 Party wall between dwellings				10.8000	0.0600		0.6480						
P4 Party wall - Roof (insulation at ceiling level)				16.4700	0.1200		1.9764						
E12 Gable (insulation at ceiling level)				8.8000	0.0600		0.5280						
E16 Corner (normal)				13.5000	0.0900		1.2150						
E17 Corner (inverted - internal area greater than external area)				2.7000	-0.0900		-0.2430						
E20 Exposed floor (normal)				1.9000	0.3200		0.6080						
P7 Party Wall - Exposed floor (normal)				0.5000	0.1600		0.0800						
E21 Exposed floor (inverted)				2.4000	0.3200		0.7680						
E10 Eaves (insulation at ceiling level)				9.6000	0.0600		0.5760						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.8004	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	54.2015	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 43.1792	Feb 42.9310	Mar 42.6878	Apr 41.5455	May 41.3318	Jun 40.3368	Jul 40.3368	Aug 40.1526	Sep 40.7200	Oct 41.3318	Nov 41.7641	Dec 42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	
HLP	Jan 1.1792	Feb 1.1762	Mar 1.1733	Apr 1.1594	May 1.1569	Jun 1.1448	Jul 1.1448	Aug 1.1426	Sep 1.1495	Oct 1.1569	Nov 1.1621	Dec 1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

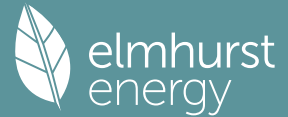
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)	
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)	
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)	
Average daily hot water use (litres/day)												124.3484 (43)	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)	
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =		2065.4007	
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)	
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)	
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)	
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	22.5120	23.2624	(59)	
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)	
Total heat required for water heating calculated for each month													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)	
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2383.3728 (64)
Electric shower(s)													2383 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(64a)
Heat gains from water heating, kWh/month													Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 0.0000 (64a)
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	(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)
	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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			
North				4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)			
South				8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)			
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944 (86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925 (89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910 (90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (92)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)
Temperature adjustment												0.0000
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9881	0.9762	0.9559	0.9038	0.7952	0.6009	0.4193	0.4539	0.6921	0.9078	0.9752	0.9903 (94)
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761 (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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710 (97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98a)
Space heating requirement - total per year (kWh/year)												2692.0799
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799
Space heating per m2										(98c) / (4) =		32.5997 (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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater (217)m	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	79.8000 (216)
Fuel for water heating, kWh/month	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (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)

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2916.6630	(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												2862.8126	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4024.2977	(238)

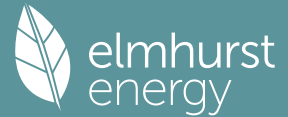
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 7				Issued on Date	02/07/2026	
Assessment Reference	Energy Efficiency			Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT				SAP Version	10.2	
SAP Rating	82 B	DER	4.18	TER	11.99		
Environmental	96 A	% DER < TER				65.14	
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29		
Compliance Check	See BREL	% DFEE < TFEE				14.47	
% DPER < TPER	29.38	DPER	44.29	TPER	62.72		
Assessor Details	Mr. Lee Humphries				Assessor ID	DT88-0001	
Client	BBA Architects and Planners, Ian Burridge						

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

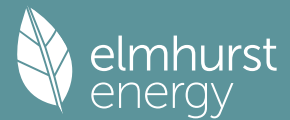
3. Heat losses and heat loss parameter

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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.9983	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9700 (34)
266.6986 (35)

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	47.5594 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	90.7386	90.4905	90.2473	89.1049	88.8912	87.8962	87.8962	87.7120	88.2795	88.8912	89.3236	89.7756	(39)
Average = Sum(39)m / 12 =												89.1039	
HLP	1.0988	1.0958	1.0928	1.0790	1.0764	1.0644	1.0644	1.0621	1.0690	1.0764	1.0817	1.0871	(40)
HLP (average)												1.0790	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													28.6361 (42b)
Hot water usage for other uses													40.3348 (42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Distribution loss (46)m = 0.15 x (45)m													1049.9202
Water storage loss (or HIU loss):													0.0000 (46)
Total storage loss													0.0000 (56)
If cylinder contains dedicated solar storage													0.0000 (57)
Primary loss													0.0000 (59)
Combi loss													0.0000 (61)
Total heat required for water heating calculated for each month													
WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)													892.4322 (64)
Electric shower(s)													892 (64)
Heat gains from water heating, kWh/month													
	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
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	(69)
Losses e.g. evaporation (negative values) (Table 5)													
Water heating gains (Table 5)													
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	67.4219	67.6068	67.7890	68.6580	68.8231	69.6022	69.6022	69.7484	69.3000	68.8231	68.4900	68.1451
alpha	5.4948	5.5071	5.5193	5.5772	5.5882	5.6401	5.6401	5.6499	5.6200	5.5882	5.5660	5.5430
util living area	0.9960	0.9891	0.9750	0.9310	0.8295	0.6422	0.4714	0.5103	0.7430	0.9431	0.9899	0.9970 (86)
MIT	19.8683	20.0789	20.3261	20.6340	20.8614	20.9745	20.9962	20.9941	20.9428	20.6545	20.2082	19.8361 (87)
Th 2	20.0018	20.0043	20.0067	20.0180	20.0201	20.0300	20.0300	20.0319	20.0262	20.0201	20.0158	20.0114 (88)
util rest of house	0.9947	0.9855	0.9664	0.9073	0.7761	0.5553	0.3695	0.4061	0.6609	0.9185	0.9859	0.9960 (89)
MIT 2	18.9818	19.1920	19.4360	19.7363	19.9327	20.0194	20.0292	20.0304	19.9987	19.7623	19.3306	18.9574 (90)
Living area fraction	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	0.3840 (91)
MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9833	0.9639	0.9090	0.7920	0.5882	0.4088	0.4463	0.6908	0.9210	0.9840	0.9950 (94)
Useful gains	604.0614	712.5965	758.7551	766.4880	683.2761	496.5669	332.7469	348.7783	523.8213	632.6300	603.3947	573.3788 (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	1363.0958	1324.1067	1198.2846	996.2843	763.5117	508.5793	334.0472	350.8862	552.7364	844.9001	1122.5835	1355.1460 (97)
Space heating kWh	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98a)
Space heating requirement - total per year (kWh/year)												2641.1947
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	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.1947
Space heating per m2												(98c) / (4) = 31.9835 (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	826.2246	650.4322	666.6111	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8972	0.9506	0.9369	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	741.2566	618.2714	624.5259	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.6029	212.2745	181.1117	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	35.1507	53.0686	45.2779	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												133.4973 (107)
Energy for space heating												31.9835 (99)
Energy for space cooling												1.6166 (108)
Total												33.6000 (109)
Fabric Energy Efficiency (DFEE)												33.6 (109)

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

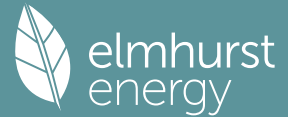
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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

0 * 20 = 0.0000 (6d)
0 * 35 = 0.0000 (6e)
0 * 20 = 0.0000 (6f)
3 * 10 = 30.0000 (7a)
0 * 10 = 0.0000 (7b)
0 * 40 = 0.0000 (7c)

Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) = 30.0000
Pressure test
Pressure Test Method
Measured/design AP50
Infiltration rate
Number of sides sheltered

Air changes per hour
(5) = 0.1345 (8)
Yes
Blower Door
5.0000 (17)
0.3845 (18)
2 (19)

Shelter factor
Infiltration rate adjusted to include shelter factor

(20) = 1 - [0.075 x (19)] = 0.8500 (20)
(21) = (18) x (20) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.4011		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	54.2015 (37)

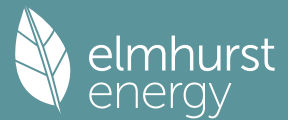
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177 (39)
Average = Sum(39)m / 12 =												95.7460
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676 (40)
HLP (average)												1.1594
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												2.5100 (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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU 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	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												

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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				
North			4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South			8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9967	0.9918	0.9822	0.9522	0.8768	0.7114	0.5349	0.5757	0.8019	0.9594	0.9922	0.9975 (86)
MIT	19.7261	19.9258	20.1757	20.5057	20.7801	20.9484	20.9905	20.9862	20.8997	20.5488	20.0808	19.6962 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9955	0.9889	0.9757	0.9337	0.8292	0.6176	0.4144	0.4542	0.7202	0.9398	0.9889	0.9966 (89)
MIT 2	18.7890	18.9889	19.2371	19.5636	19.8103	19.9420	19.9622	19.9627	19.9100	19.6107	19.1528	18.7665 (90)
Living area fraction	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (92)
MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (93)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
adjusted MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9943	0.9868	0.9730	0.9331	0.8409	0.6524	0.4611	0.5013	0.7485	0.9402	0.9871	0.9956 (94)
Ext temp.	586.4914	685.1825	726.8037	741.7972	680.8046	516.5410	351.9015	368.1630	535.4680	614.6542	583.8311	558.1020 (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	1445.9899	1403.4322	1269.0131	1055.6436	810.3802	541.5555	355.1872	373.2342	587.5688	895.2378	1190.8501	1438.8882 (97)
Space heating requirement - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (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
Space heating kWh	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (98c)
Space heating per m ²	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208 (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	888.6605	699.5838	717.0911	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8351	0.9092	0.8896	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	742.1400	636.0598	637.9419	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.9469	38.7380	32.5719	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												95.2568 (107)
Energy for space cooling												38.1330 (99)
Total												1.1535 (108)
Fabric Energy Efficiency (TFEE)												39.2865 (109)
												39.3 (109)

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Plot Reference	Unit 7			Issued on Date	02/07/2026
Assessment Reference	Energy Efficiency	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	82 B	DER	4.18	TER	11.99
Environmental	96 A	% DER < TER			65.14
CO ₂ Emissions (t/year)	0.33	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	29.38	DPER	44.29	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Heat transfer coeff	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
Average = Sum(39)m / 12 =												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Daily hot water use	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy conte	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Energy content (annual)										Total = Sum(45)m =		2446.2059
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		3126.1279 (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)
												0.0000 (64a)
Heat gains from water heating, kWh/month	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

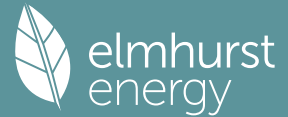
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North			4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South			8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

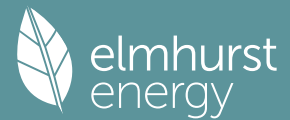
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)	
Space heating requirement - total per year (kWh/year)												2275.1765	
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765	
Space heating per m2										(98c) / (4) =		27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (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												609.9016 (211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(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	2379.5646	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Total CO2, kg/year			345.5227 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			4.1800 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Total Primary energy kWh/year			3657.6219 (286)
Dwelling Primary energy Rate (DPER)			44.2900 (287)

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

1. Overall dwelling characteristics

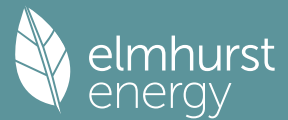
	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (22b)
Effective ac	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (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			2.2100	1.0000	2.2100			(26)					
TER Opening Type			12.7700	1.1450	14.6221			(27)					
Ground Floor			41.2900	0.1300	5.3677			(28a)					
Exposed Floor			0.9500	0.1300	0.1235			(28b)					
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314			(29a)					
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464			(30)					
Total net area of external elements Aum(A, m2)			185.1900					(31)					
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	42.4011			(33)					
Main dwelling													
Party Wall			46.1700	0.0000	0.0000			(32)					
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986	(35)					
List of Thermal Bridges													
K1 Element				Length	Psi-value		Total						
E2 Other lintels (including other steel lintels)				8.7700	0.0500		0.4385						
E3 Sill				5.0100	0.0500		0.2505						
E4 Jamb				25.3400	0.0500		1.2670						
E5 Ground floor (normal)				18.9000	0.1600		3.0240						
E6 Intermediate floor within a dwelling				16.5000	0.0000		0.0000						
P1 Party wall - Ground floor				8.3000	0.0800		0.6640						
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)				8.3000	0.0000		0.0000						
E18 Party wall between dwellings				10.8000	0.0600		0.6480						
P4 Party wall - Roof (insulation at ceiling level)				16.4700	0.1200		1.9764						
E12 Gable (insulation at ceiling level)				8.8000	0.0600		0.5280						
E16 Corner (normal)				13.5000	0.0900		1.2150						
E17 Corner (inverted - internal area greater than external area)				2.7000	-0.0900		-0.2430						
E20 Exposed floor (normal)				1.9000	0.3200		0.6080						
P7 Party Wall - Exposed floor (normal)				0.5000	0.1600		0.0800						
E21 Exposed floor (inverted)				2.4000	0.3200		0.7680						
E10 Eaves (insulation at ceiling level)				9.6000	0.0600		0.5760						
Thermal bridges (Sum(L x Psi) calculated using Appendix K)							11.8004	(36)					
Point Thermal bridges						(36a) =	0.0000						
Total fabric heat loss						(33) + (36) + (36a) =	54.2015	(37)					
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan 43.1792	Feb 42.9310	Mar 42.6878	Apr 41.5455	May 41.3318	Jun 40.3368	Jul 40.3368	Aug 40.1526	Sep 40.7200	Oct 41.3318	Nov 41.7641	Dec 42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	
HLP	Jan 1.1792	Feb 1.1762	Mar 1.1733	Apr 1.1594	May 1.1569	Jun 1.1448	Jul 1.1448	Aug 1.1426	Sep 1.1495	Oct 1.1569	Nov 1.1621	Dec 1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

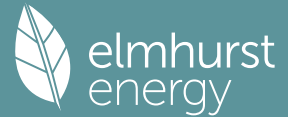
4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers													
66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	66.0500 (42a)	
Hot water usage for baths													
28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	28.5393 (42b)	
Hot water usage for other uses													
40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	40.3348 (42c)	
Average daily hot water use (litres/day)													124.3484 (43)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	134.9242 (44)	
Energy content (annual)	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Distribution loss (46)m = 0.15 x (45)m										Total = Sum(45)m =			2065.4007
32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	31.6888 (46)	
Water storage loss (or HIU loss):													
Store volume													200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.6525 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.8924 (55)
Total storage loss													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637 (56)	
If cylinder contains dedicated solar storage													
27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637 (57)	
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)	
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													
265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	262.1848 (62)	
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501 (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													
234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	232.4346 (64)	
12Total per year (kWh/year)													Total per year (kWh/year) = Sum(64)m = 2383.3728 (64)
Electric shower(s)													2383 (64)
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	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													
111.9765	99.4800	106.5981	95.6499	94.0852	86.2423	86.0655	88.5867	88.5895	97.0552	101.1232	110.9844	110.9844 (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)
125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	

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Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725 (72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328 (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
North				4.1800	10.6334		0.6300		0.7000		0.7700	13.5838 (74)
South				8.5900	46.7521		0.6300		0.7000		0.7700	122.7343 (78)
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944 (86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925 (89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910 (90)
Living area fraction	fLA = Living area / (4) = 0.3840 (91)											
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761 (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 (95)
Heat loss rate W	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710 (97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98a)
Space heating requirement - total per year (kWh/year)	2692.0799											
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	2692.0799											
Space heating per m2	(98c) / (4) = 32.5997 (99)											

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)											
Fraction of space heat from main system(s)	1.0000 (202)											
Efficiency of main space heating system 1 (in %)	92.3000 (206)											
Efficiency of main space heating system 2 (in %)	0.0000 (207)											
Efficiency of secondary/supplementary heating system, %	0.0000 (208)											
Space heating requirement	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938 (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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204 (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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Water heating requirement	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	79.8000 (216)
Efficiency of water heater (217)m	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (219)
Fuel for water heating, kWh/month	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Space cooling fuel requirement (221)m	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)
Pumps and Fa												

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Lighting	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212	(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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367	(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												2916.6630	(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												2862.8126	(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)												199.6839	(232)
Energy saving/generation technologies (Appendices M ,N and Q)													
PV generation												-2040.8617	(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												4024.2977	(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	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 7			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.54	TER	11.99
Environmental	100 A	% DER < TER			95.50
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	71.27	DPER	18.02	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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	2.5100 (42)											
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

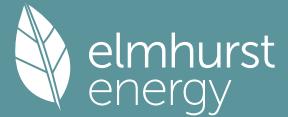
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432	
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762	
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924 (86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626	
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097	
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0	
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0	
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10	
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077 (87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981 (88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899 (89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239 (90)	
Living area fraction									fLA = Living area / (4) =				0.3840 (91)
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (92)	
Temperature adjustment												0.0000	
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400 (93)	

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881 (94)
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304 (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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003 (97)
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98a)
Space heating requirement - total per year (kWh/year)												2275.1765
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765
Space heating per m2										(98c) / (4) =		27.5512 (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 %)												373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296 (98)
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399 (210)
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283 (216)
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517 (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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (231)
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845 (232)
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.1544	-69.6732	-102.4013	-115.5400	-124.3428	-115.0172	-113.3695	-106.5680	-93.5893	-78.6076	-53.0471	-41.3227 (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	-19.4624	-43.1597	-89.7661	-142.0022	-193.8290	-197.7963	-195.3101	-163.1269	-117.6359	-65.6344	-27.1562	-15.2610 (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												609.9016 (211)

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	47.7915	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	0.1345	-142.7757
PV Unit electricity exported	-1270.1403	0.1245	-158.1534
Total			-300.9290 (269)
Total CO2, kg/year			44.5937 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5400 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	1.4970	-1589.3087
PV Unit electricity exported	-1270.1403	0.4570	-580.4570
Total			-2169.7658 (283)
Total Primary energy kWh/year			1487.8562 (286)
Dwelling Primary energy Rate (DPER)			18.0200 (287)

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

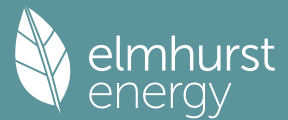
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

$$(20) = 1 - [0.075 \times (19)] = 0.8500 \quad (20)$$
$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.4011	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			

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

Point Thermal Bridges

Total fabric heat loss (33) + (36) + (36a) = 54.2015 (37)

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

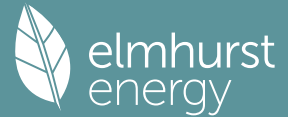
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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				
North					4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South					8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)		
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)		

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

Utilisation factor for gains for living area, nil _m (see Table 9a)	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	21.0000 (85)
tau	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507	
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300	
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944	(86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206	(87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460	(88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925	(89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910	(90)
Living area fraction	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(91)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(92)
Temperature adjustment	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)

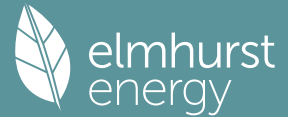
8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9881	0.9762	0.9559	0.9038	0.7952	0.6009	0.4193	0.4539	0.6921	0.9078	0.9752	0.9903	(94)
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761	(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	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710	(97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98a)
Space heating requirement - total per year (kWh/year)												2692.0799	
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799	
Space heating per m ²										(98c) / (4) =		32.5997	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												92.3000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	86.0140 (217)
Fuel for water heating, kWh/month												
	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2916.6630 (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												2862.8126 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												4024.2977 (238)

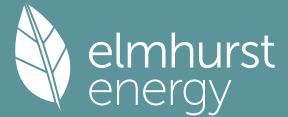
12a. Carbon dioxide emissions - Individual heating systems including micro-CHP

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)

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Plot Reference	Unit 7			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.54	TER	11.99
Environmental	100 A	% DER < TER			95.50
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	71.27	DPER	18.02	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBArchitects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) =	30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

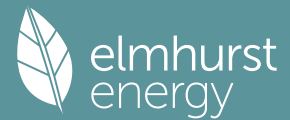
3. Heat losses and heat loss parameter

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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	41.9983	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)

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) = 22023.9700 (34)
266.6986 (35)

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K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	8.7700	0.0240	0.2105
E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	47.5594 (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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	90.7386	90.4905	90.2473	89.1049	88.8912	87.8962	87.8962	87.7120	88.2795	88.8912	89.3236	89.7756	(39)
Average = Sum(39)m / 12 =												89.1039	
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP (average)	1.0988	1.0958	1.0928	1.0790	1.0764	1.0644	1.0644	1.0621	1.0690	1.0764	1.0817	1.0871	(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													2.5100 (42)
Hot water usage for mixer showers													0.0000 (42a)
Hot water usage for baths													28.6361 (42b)
Hot water usage for other uses													40.3348 (42c)
Average daily hot water use (litres/day)													63.2183 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742	(44)
Energy content (annual)	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403	(45)
Distribution loss (46)m = 0.15 x (45)m													
Water storage loss (or HIU 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													
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Total heat required for water heating calculated for each month													
WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(63c)
Output from w/h	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643	(64)
12Total per year (kWh/year)													
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985	(64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907	(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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(73)

6. Solar gains

[Jan]	Area m ²	Solar flux Table 6a W/m ²	g Specific data or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
North	4.1800	10.6334	0.4500	0.0000	0.7700	15.4011 (74)
South	8.5900	46.7521	0.4500	0.0000	0.7700	139.1545 (78)

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Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814 (83)
Total gains	608.0736	724.7049	787.1471	843.1752	862.7531	844.2383	813.9349	781.4167	758.2487	686.8925	613.1880	576.2851 (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	67.4219	67.6068	67.7890	68.6580	68.8231	69.6022	69.6022	69.7484	69.3000	68.8231	68.4900	68.1451
alpha	5.4948	5.5071	5.5193	5.5772	5.5882	5.6401	5.6401	5.6499	5.6200	5.5882	5.5660	5.5430
util living area	0.9960	0.9891	0.9750	0.9310	0.8295	0.6422	0.4714	0.5103	0.7430	0.9431	0.9899	0.9970 (86)
MIT	19.8683	20.0789	20.3261	20.6340	20.8614	20.9745	20.9962	20.9941	20.9428	20.6545	20.2082	19.8361 (87)
Th 2	20.0018	20.0043	20.0067	20.0180	20.0201	20.0300	20.0300	20.0319	20.0262	20.0201	20.0158	20.0114 (88)
util rest of house	0.9947	0.9855	0.9664	0.9073	0.7761	0.5553	0.3695	0.4061	0.6609	0.9185	0.9859	0.9960 (89)
MIT 2	18.9818	19.1920	19.4360	19.7363	19.9327	20.0194	20.0292	20.0304	19.9987	19.7623	19.3306	18.9574 (90)
Living area fraction	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	0.3840 (91)
MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (92)
Temperature adjustment												0.0000
adjusted MIT	19.3222	19.5326	19.7778	20.0810	20.2893	20.3861	20.4005	20.4004	20.3612	20.1049	19.6676	19.2948 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9934	0.9833	0.9639	0.9090	0.7920	0.5882	0.4088	0.4463	0.6908	0.9210	0.9840	0.9950 (94)
Useful gains	604.0614	712.5965	758.7551	766.4880	683.2761	496.5669	332.7469	348.7783	523.8213	632.6300	603.3947	573.3788 (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	1363.0958	1324.1067	1198.2846	996.2843	763.5117	508.5793	334.0472	350.8862	552.7364	844.9001	1122.5835	1355.1460 (97)
Space heating kWh	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98a)
Space heating requirement - total per year (kWh/year)												2641.1947
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	564.7216	410.9349	327.0100	165.4534	59.6953	0.0000	0.0000	0.0000	0.0000	157.9289	373.8159	581.6348 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2641.1947
Space heating per m2												(98c) / (4) = 31.9835 (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	826.2246	650.4322	666.6111	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8972	0.9506	0.9369	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	741.2566	618.2714	624.5259	0.0000	0.0000	0.0000	0.0000 (102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	936.5383	903.5866	867.9556	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	140.6029	212.2745	181.1117	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	35.1507	53.0686	45.2779	0.0000	0.0000	0.0000	0.0000 (107)
Space cooling requirement												133.4973 (107)
Energy for space heating												31.9835 (99)
Energy for space cooling												1.6166 (108)
Total												33.6000 (109)
Fabric Energy Efficiency (DFEE)												33.6 (109)

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

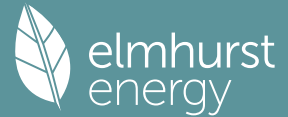
1. Overall dwelling characteristics

Main dwelling	Area (m2)	Storey height (m)	Volume (m3)
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	222.9660 (5)

2. Ventilation rate

	m3 per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)

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Number of flues attached to solid fuel boiler 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 3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
 Pressure test Yes
 Pressure Test Method Blower Door
 Measured/design AP50 5.0000 (17)
 Infiltration rate 0.3845 (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) = 0.3269 (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	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841 (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	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738 (25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) = 42.4011		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.8004 (36)
Point Thermal Bridges			0.0000
Total fabric heat loss		(33) + (36) + (36a) =	54.2015 (37)

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

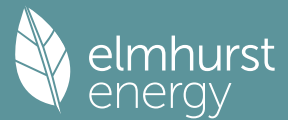
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(38)m	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162 (38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177 (39)
Average = Sum(39)m / 12 =												95.7460
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676 (40)
HLP (average)												1.1594
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 2.5100 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
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	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												63.2183 (43)
Daily hot water use	68.9710	67.0790	65.0134	62.4424	60.1488	57.7653	57.2700	59.3314	61.4457	63.8935	66.4872	68.8742 (44)
Energy conte	109.2332	95.5196	99.9231	85.4805	80.9719	71.0291	69.2631	73.4647	75.7687	86.7028	94.7232	107.8403 (45)
Energy content (annual)										Total = Sum(45)m =		1049.9202
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 (or HIU loss):												
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (56)
If cylinder contains dedicated solar storage												
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (57)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (59)
Total heat required for water heating calculated for each month												

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WWHRS	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (62)
PV diverter	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63a)
Solar input	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63b)
FGHRS	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63c)
Output from w/h	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (63d)
12Total per year (kWh/year)	92.8482	81.1916	84.9347	72.6584	68.8261	60.3747	58.8737	62.4450	64.4034	73.6974	80.5147	91.6643 (64)
Electric shower(s)	53.0985	47.3112	51.6620	49.3004	50.2255	47.9103	49.5073	50.2255	49.3004	51.6620	50.6906	53.0985 (64a)
Heat gains from water heating, kWh/month	36.4867	32.1257	34.1492	30.4897	29.7629	27.0713	27.0952	28.1676	28.4260	31.3399	32.8013	36.1907 (65)
Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 603.9924 (64a)												892 (64)

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

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	49.0412	47.8061	45.8994	42.3468	40.0039	37.5990	36.4183	37.8597	39.4805	42.1235	45.5574	48.6434	(72)
Total internal gains	453.5180	467.3735	446.8313	434.7366	412.6308	399.3515	384.2851	383.3943	394.8614	406.0466	429.2433	443.2037	(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				
North			4.1800	10.6334	0.6300	0.7000	0.7700	13.5838 (74)				
South			8.5900	46.7521	0.6300	0.7000	0.7700	122.7343 (78)				
Solar gains	136.3180	226.9663	300.1585	360.2429	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)	
Total gains	589.8360	694.3398	746.9898	794.9794	809.6387	791.7416	763.2362	734.4501	715.3690	653.7527	591.4826	560.5815 (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	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300
util living area	0.9967	0.9918	0.9822	0.9522	0.8768	0.7114	0.5349	0.5757	0.8019	0.9594	0.9922	0.9975 (86)
MIT	19.7261	19.9258	20.1757	20.5057	20.7801	20.9484	20.9905	20.9862	20.8997	20.5488	20.0808	19.6962 (87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460 (88)
util rest of house	0.9955	0.9889	0.9757	0.9337	0.8292	0.6176	0.4144	0.4542	0.7202	0.9398	0.9889	0.9966 (89)
MIT 2	18.7890	18.9889	19.2371	19.5636	19.8103	19.9420	19.9622	19.9627	19.9100	19.6107	19.1528	18.7665 (90)
Living area fraction	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (92)
MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (93)
Temperature adjustment	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000
adjusted MIT	19.1488	19.3486	19.5975	19.9253	20.1827	20.3284	20.3571	20.3557	20.2900	19.9710	19.5091	19.1235 (93)

8. Space heating requirement

Utilisation	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Useful gains	0.9943	0.9868	0.9730	0.9331	0.8409	0.6524	0.4611	0.5013	0.7485	0.9402	0.9871	0.9956 (94)
Ext temp.	586.4914	685.1825	726.8037	741.7972	680.8046	516.5410	351.9015	368.1630	535.4680	614.6542	583.8311	558.1020 (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	1445.9899	1403.4322	1269.0131	1055.6436	810.3802	541.5555	355.1872	373.2342	587.5688	895.2378	1190.8501	1438.8882 (97)
Space heating requirement - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (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
Space heating kWh	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)	639.4668	482.6637	403.4038	225.9694	96.4042	0.0000	0.0000	0.0000	0.0000	208.7542	437.0536	655.3050 (98c)
Space heating per m ²	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208	3149.0208 (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	888.6605	699.5838	717.0911	0.0000	0.0000	0.0000	0.0000 (100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.8351	0.9092	0.8896	0.0000	0.0000	0.0000	0.0000 (101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	742.1400	636.0598	637.9419	0.0000	0.0000	0.0000	0.0000 (102)

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Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	875.1786	844.3284	813.0595	0.0000	0.0000	0.0000	0.0000 (103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
Cooled fraction	0.0000	0.0000	0.0000	0.0000	0.0000	95.7878	154.9519	130.2876	0.0000	0.0000	0.0000	0.0000 (104)
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	1.0000 (105)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	23.9469	38.7380	32.5719	0.0000	0.0000	0.0000	0.0000 (106)
Space cooling requirement												0.0000 (107)
Energy for space heating												95.2568 (107)
Energy for space cooling												38.1330 (99)
Total												1.1535 (108)
Fabric Energy Efficiency (TFEE)												39.2865 (109)
												39.3 (109)

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Plot Reference	Unit 7			Issued on Date	02/07/2026
Assessment Reference	Renewables	Plot Type Ref			
Plot Address	Former Co-op Store, Mill Street, Calne, SN11 0HT			SAP Version	10.2
SAP Rating	94 A	DER	0.54	TER	11.99
Environmental	100 A	% DER < TER			95.50
CO ₂ Emissions (t/year)	0	DFEE	33.60	TFEE	39.29
Compliance Check	See BREL	% DFEE < TFEE			14.47
% DPER < TPER	71.27	DPER	18.02	TPER	62.72
Assessor Details	Mr. Lee Humphries			Assessor ID	DT88-0001
Client	BBA Architects and Planners, Ian Burridge				

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

1. Overall dwelling characteristics

	Area (m ²)	Storey height (m)	Volume (m ³)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 222.9660 (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	4 * 10 = 40.0000 (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) =	40.0000 / (5) = 0.1794 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4294 (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) = 0.3650 (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	0.4654	0.4562	0.4471	0.4015	0.3924	0.3467	0.3467	0.3376	0.3650	0.3924	0.4106	0.4289 (22b)
Effective ac	0.6083	0.6041	0.6000	0.5806	0.5770	0.5601	0.5601	0.5570	0.5666	0.5770	0.5843	0.5920 (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							
Glazing			12.7700	1.1450	14.6221		(27)
Front Door			2.2100	1.2000	2.6520		(26)
Ground Floor			41.2900	0.1100	4.5419	110.0000	4541.9000 (28a)
Exposed Floor			0.9500	0.1100	0.1045	20.0000	19.0000 (28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314	110.0000	9430.3000 (29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464	9.0000	380.1600 (30)
Total net area of external elements Aum(A, m ²)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	41.9983		(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000	110.0000	5078.7000 (32)
Internal Wall			162.1200			9.0000	1459.0800 (32c)
Internal Floor			41.2900			18.0000	743.2200 (32d)
Internal Ceiling			41.2900			9.0000	371.6100 (32e)
Heat capacity Cm = Sum(A x k)						(28)...(30) + (32) + (32a)...(32e) =	22023.9700 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m ² K							266.6986 (35)
List of Thermal Bridges							
K1 Element				Length	Psi-value	Total	
E2 Other lintels (including other steel lintels)				8.7700	0.0240	0.2105	

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E3 Sill	5.0100	0.0200	0.1002
E4 Jamb	25.3400	0.0150	0.3801
E5 Ground floor (normal)	18.9000	0.0460	0.8694
E6 Intermediate floor within a dwelling	16.5000	0.0010	0.0165
P1 Party wall - Ground floor	8.3000	0.0390	0.3237
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	8.3000	0.0000	0.0000
E18 Party wall between dwellings	10.8000	0.0420	0.4536
P4 Party wall - Roof (insulation at ceiling level)	16.4700	0.0330	0.5435
E12 Gable (insulation at ceiling level)	8.8000	0.0360	0.3168
E16 Corner (normal)	13.5000	0.0380	0.5130
E17 Corner (inverted - internal area greater than external area)	2.7000	-0.0740	-0.1998
E20 Exposed floor (normal)	1.9000	0.3200	0.6080
P7 Party Wall - Exposed floor (normal)	0.5000	0.2400	0.1200
E21 Exposed floor (inverted)	2.4000	0.3200	0.7680
E10 Eaves (insulation at ceiling level)	9.6000	0.0560	0.5376
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			5.5611 (36)
Point Thermal bridges			0.0000
Total fabric heat loss	(33) + (36) + (36a) =		47.5594 (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	44.7566	44.4472	44.1439	42.7196	42.4531	41.2125	41.2125	40.9828	41.6904	42.4531	42.9922	43.5558 (38)
Average = Sum(39)m / 12 =	92.3160	92.0066	91.7034	90.2790	90.0125	88.7720	88.7720	88.5422	89.2498	90.0125	90.5516	91.1152 (39)
												90.2777
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
HLP (average)	1.1179	1.1142	1.1105	1.0932	1.0900	1.0750	1.0750	1.0722	1.0808	1.0900	1.0965	1.1034 (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												2.5100 (42)
Hot water usage for mixer showers	91.1681	89.7980	87.8015	83.9816	81.1627	78.0190	76.2321	78.2134	80.3854	83.7608	87.6627	90.8188 (42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393 (42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348 (42c)
Average daily hot water use (litres/day)												147.2722 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Energy conte	160.1391	156.8770	152.8149	146.4240	141.3115	135.7842	133.5021	137.5449	141.8311	147.6542	154.1499	159.6930 (44)
Energy content (annual)	253.6211	223.3907	234.8708	200.4472	190.2324	166.9625	161.4592	170.3093	174.8919	200.3654	219.6148	250.0406 (45)
Distribution loss (46)m = 0.15 x (45)m	38.0432	33.5086	35.2306	30.0671	28.5349	25.0444	24.2189	25.5464	26.2338	30.0548	32.9422	37.5061 (46)
Water storage loss (or HIU loss):												
Store volume												200.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):												2.0600 (48)
Temperature factor from Table 2b												0.5400 (49)
Enter (49) or (54) in (55)												1.1124 (55)
Total storage loss	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (56)
If cylinder contains dedicated solar storage	34.4844	31.1472	34.4844	33.3720	34.4844	33.3720	34.4844	34.4844	33.3720	34.4844	33.3720	34.4844 (57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624 (59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (61)
Total heat required for water heating calculated for each month	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874 (64)
12Total per year (kWh/year)												3126.1279 (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	130.5265	116.0041	124.2920	111.3559	109.4497	100.2222	99.8826	102.8253	102.8588	112.8189	117.7291	129.3359 (65)

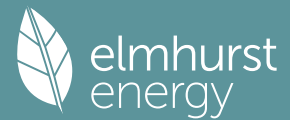
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
(66)m	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997 (66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788 (67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316 (68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500 (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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997 (71)
Water heating gains (Table 5)	175.4388	172.6252	167.0591	154.6610	147.1098	139.1976	134.2508	138.2060	142.8594	151.6384	163.5127	173.8386 (72)
Total internal gains	579.9156	592.1926	567.9910	547.0507	519.7368	500.9501	482.1176	483.7406	498.2403	515.5615	547.1986	568.3989 (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
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North				4.1800		10.6334		0.4500		0.0000		0.7700		15.4011 (74)
South				8.5900		46.7521		0.4500		0.0000		0.7700		139.1545 (78)
Solar gains	154.5556	257.3314	340.3157	408.4386	450.1223	444.8867	429.6498	398.0224	363.3873	280.8459	183.9447	133.0814	(83)	
Total gains	734.4711	849.5240	908.3068	955.4893	969.8591	945.8368	911.7674	881.7630	861.6276	796.4074	731.1433	701.4803	(84)	
7. Mean internal temperature (heating season)														
Temperature during heating periods in the living area from Table 9, Th1 (C)													21.0000 (85)	
Utilisation factor for gains for living area, nil,m (see Table 9a)														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
tau	66.2699	66.4927	66.7126	67.7651	67.9658	68.9156	68.9156	69.0944	68.5466	67.9658	67.5611	67.1432		
alpha	5.4180	5.4328	5.4475	5.5177	5.5311	5.5944	5.5944	5.6063	5.5698	5.5311	5.5041	5.4762		
util living area	0.9905	0.9786	0.9565	0.8972	0.7784	0.5863	0.4263	0.4586	0.6794	0.9064	0.9783	0.9924	(86)	
Living	19.9905	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	19.9626		
Non living	18.8361	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	18.8097		
24 / 16	0	0	0	0	0	0	0	0	0	0	0	0		
24 / 9	3	0	0	0	0	0	0	0	0	0	0	0		
16 / 9	28	0	0	0	0	0	0	0	0	0	0	10		
MIT	20.4836	20.1936	20.4278	20.7072	20.8976	20.9830	20.9976	20.9964	20.9621	20.7330	20.3237	20.1077	(87)	
Th 2	19.9862	19.9893	19.9923	20.0064	20.0090	20.0213	20.0213	20.0236	20.0166	20.0090	20.0037	19.9981	(88)	
util rest of house	0.9874	0.9719	0.9428	0.8662	0.7198	0.5030	0.3326	0.3631	0.5967	0.8717	0.9702	0.9899	(89)	
MIT 2	19.5277	19.0935	19.3855	19.7267	19.9294	20.0126	20.0206	20.0225	19.9943	19.7648	19.2706	19.0239	(90)	
Living area fraction									FLA = Living area / (4) =				0.3840 (91)	
MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400	(92)	
Temperature adjustment												0.0000		
adjusted MIT	19.8948	19.5159	19.7857	20.1032	20.3012	20.3852	20.3958	20.3964	20.3659	20.1366	19.6750	19.4400	(93)	
8. Space heating requirement														
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Utilisation	0.9870	0.9680	0.9395	0.8696	0.7382	0.5347	0.3687	0.3999	0.6273	0.8768	0.9669	0.9881	(94)	
Useful gains	724.9594	822.3037	853.3556	830.8790	715.9105	505.7202	336.1454	352.5830	540.4626	698.2614	706.9423	693.1304	(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	1439.6467	1344.7622	1218.3474	1011.4151	774.2149	513.5654	336.9569	353.8536	559.2293	858.4151	1138.6850	1388.6003	(97)	
Space heating kWh	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296	(98a)	
Space heating requirement - total per year (kWh/year)												2275.1765		
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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296	(98c)	
Space heating requirement after solar contribution - total per year (kWh/year)												2275.1765		
Space heating per m2										(98c) / (4) =			27.5512 (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 %)													373.0399 (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	531.7273	351.0921	271.5540	129.9860	43.3785	0.0000	0.0000	0.0000	0.0000	119.1543	310.8547	517.4296	(98)	
Space heating efficiency (main heating system 1)	373.0399	373.0399	373.0399	373.0399	373.0399	0.0000	0.0000	0.0000	0.0000	373.0399	373.0399	373.0399	(210)	
Space heating fuel (main heating system)	142.5390	94.1165	72.7949	34.8451	11.6284	0.0000	0.0000	0.0000	0.0000	31.9414	83.3302	138.7062	(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	311.3679	275.5491	292.6176	256.3312	247.9792	222.8465	219.2060	228.0561	230.7759	258.1122	275.4988	307.7874	(64)	
Efficiency of water heater (217)m	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	196.2283	(216)	
Fuel for water heating, kWh/month	158.6763	140.4227	149.1210	130.6290	126.3728	113.5649	111.7097	116.2198	117.6058	131.5367	140.3970	156.8517	(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	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(231)	
Lighting	21.8765	17.5501	15.8019	11.5772	8.9425	7.3061	8.1577	10.6037	13.7731	18.0711	20.4112	22.4845	(232)	
Electricity generated by PVs (Appendix M) (negative quantity) (233a)m	-48.1544	-69.6732	-102.4013	-115.5400	-124.3428	-115.0172	-113.3695	-106.5680	-93.5893	-78.6076	-53.0471	-41.3227	(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	-19.4624	-43.1597	-89.7661	-142.0022	-193.8290	-197.7963	-195.3101	-163.1269	-117.6359	-65.6344	-27.1562	-15.2610	(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												609.9016	(211)	

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Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	196.2283	
Water heating fuel used	1593.1073	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
Total electricity for the above, kWh/year	0.0000	(231)
Electricity for lighting (calculated in Appendix L)	176.5557	(232)
Energy saving/generation technologies (Appendices M ,N and Q)		
PV generation	-2331.7732	(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	47.7915	(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	609.9016	0.1566	95.4839 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	1593.1073	0.1410	224.5564 (264)
Space and water heating			320.0403 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	176.5557	0.1443	25.4824 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	0.1345	-142.7757
PV Unit electricity exported	-1270.1403	0.1245	-158.1534
Total			-300.9290 (269)
Total CO2, kg/year			44.5937 (272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			0.5400 (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	609.9016	1.5796	963.3749 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	1593.1073	1.5212	2423.4400 (278)
Space and water heating			3386.8149 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	176.5557	1.5338	270.8071 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-1061.6329	1.4970	-1589.3087
PV Unit electricity exported	-1270.1403	0.4570	-580.4570
Total			-2169.7658 (283)
Total Primary energy kWh/year			1487.8562 (286)
Dwelling Primary energy Rate (DPER)			18.0200 (287)

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

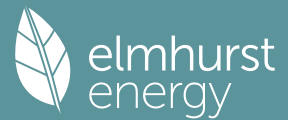
1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)
Main dwelling			
Ground floor	41.2900 (1b)	x 2.7000 (2b)	= 111.4830 (1b) - (3b)
First floor	41.2900 (1c)	x 2.7000 (2c)	= 111.4830 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)... (1n)	82.5800		(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)... (3n)	= 222.9660 (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	3 * 10 = 30.0000 (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) = 30.0000 / (5) = 0.1345 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.3845 (18)
Number of sides sheltered	2 (19)

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Shelter factor
Infiltration rate adjusted to include shelter factor

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

$$(21) = (18) \times (20) = 0.3269 \quad (21)$$

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	5.1000	5.0000	4.9000	4.4000	4.3000	3.8000	3.8000	3.7000	4.0000	4.3000	4.5000	4.7000	(22)
Wind factor	1.2750	1.2500	1.2250	1.1000	1.0750	0.9500	0.9500	0.9250	1.0000	1.0750	1.1250	1.1750	(22a)
Adj infilt rate													
Effective ac	0.4168	0.4086	0.4004	0.3596	0.3514	0.3105	0.3105	0.3024	0.3269	0.3514	0.3677	0.3841	(22b)
	0.5868	0.5835	0.5802	0.5646	0.5617	0.5482	0.5482	0.5457	0.5534	0.5617	0.5676	0.5738	(25)

3. Heat losses and heat loss parameter

Element	Gross m2	Openings m2	NetArea m2	U-value W/m2K	A x U W/K	K-value kJ/m2K	A x K kJ/K
Main dwelling							
TER Opaque door			2.2100	1.0000	2.2100		(26)
TER Opening Type			12.7700	1.1450	14.6221		(27)
Ground Floor			41.2900	0.1300	5.3677		(28a)
Exposed Floor			0.9500	0.1300	0.1235		(28b)
External Wall	100.7100	14.9800	85.7300	0.1800	15.4314		(29a)
Cold Pitched Roof	42.2400		42.2400	0.1100	4.6464		(30)
Total net area of external elements Aum(A, m2)			185.1900				(31)
Fabric heat loss, W/K = Sum (A x U)					(26)...(30) + (32) =	42.4011	(33)
Main dwelling							
Party Wall			46.1700	0.0000	0.0000		(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							266.6986 (35)

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

List of Thermal Bridges

	Length	Psi-value	Total
K1 Element	8.7700	0.0500	0.4385
E2 Other lintels (including other steel lintels)	5.0100	0.0500	0.2505
E3 Sill	25.3400	0.0500	1.2670
E4 Jamb	18.9000	0.1600	3.0240
E5 Ground floor (normal)	16.5000	0.0000	0.0000
E6 Intermediate floor within a dwelling	8.3000	0.0800	0.6640
P1 Party wall - Ground floor	8.3000	0.0000	0.0000
P3 Party wall - Intermediate floor between dwellings (in blocks of flats)	10.8000	0.0600	0.6480
E18 Party wall between dwellings	16.4700	0.1200	1.9764
P4 Party wall - Roof (insulation at ceiling level)	8.8000	0.0600	0.5280
E12 Gable (insulation at ceiling level)	13.5000	0.0900	1.2150
E16 Corner (normal)	2.7000	-0.0900	-0.2430
E17 Corner (inverted - internal area greater than external area)	1.9000	0.3200	0.6080
E20 Exposed floor (normal)	0.5000	0.1600	0.0800
P7 Party Wall - Exposed floor (normal)	2.4000	0.3200	0.7680
E21 Exposed floor (inverted)	9.6000	0.0600	0.5760
E10 Eaves (insulation at ceiling level)			

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

Point Thermal Bridges

Total fabric heat loss

$$(33) + (36) + (36a) = 54.2015 \quad (37)$$

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	43.1792	42.9310	42.6878	41.5455	41.3318	40.3368	40.3368	40.1526	40.7200	41.3318	41.7641	42.2162	(38)
Heat transfer coeff	97.3807	97.1326	96.8894	95.7470	95.5333	94.5383	94.5383	94.3541	94.9216	95.5333	95.9657	96.4177	(39)
Average = Sum(39)m / 12 =												95.7460	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.1792	1.1762	1.1733	1.1594	1.1569	1.1448	1.1448	1.1426	1.1495	1.1569	1.1621	1.1676	(40)
HLP (average)												1.1594	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													2.5100 (42)
Hot water usage for mixer showers	66.3041	65.3076	63.8557	61.0776	59.0274	56.7411	55.4415	56.8825	58.4621	60.9169	63.7547	66.0500	(42a)
Hot water usage for baths	28.6361	28.2109	27.6120	26.5077	25.6809	24.7640	24.2688	24.8635	25.5110	26.4921	27.6191	28.5393	(42b)
Hot water usage for other uses	40.3348	38.8681	37.4014	35.9347	34.4680	33.0012	33.0012	34.4680	35.9347	37.4014	38.8681	40.3348	(42c)
Average daily hot water use (litres/day)												124.3484	(43)
Daily hot water use	135.2751	132.3866	128.8690	123.5199	119.1762	114.5063	112.7115	116.2139	119.9078	124.8104	130.2419	134.9242	(44)
Energy conte	214.2426	188.5168	198.0669	169.0926	160.4341	140.7989	136.3148	143.8971	147.8583	169.3665	185.5534	211.2587	(45)
Energy content (annual)										Total = Sum(45)m =		2065.4007	
Distribution loss (46)m = 0.15 x (45)m	32.1364	28.2775	29.7100	25.3639	24.0651	21.1198	20.4472	21.5846	22.1787	25.4050	27.8330	31.6888	(46)
Water storage loss (or HIU loss):													
Store volume												200.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6525	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.8924	(55)
Total storage loss	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(56)
If cylinder contains dedicated solar storage	27.6637	24.9865	27.6637	26.7713	27.6637	26.7713	27.6637	27.6637	26.7713	27.6637	26.7713	27.6637	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	265.1687	234.5145	248.9930	218.3759	211.3602	190.0822	187.2409	194.8232	197.1416	220.2926	234.8367	262.1848	(62)
WWHRS	-30.3114	-26.8077	-28.0715	-23.2443	-21.6628	-18.5370	-17.3755	-18.4771	-19.1791	-22.6101	-25.6145	-29.7501	(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	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346	(64)
12Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		2383.3728	(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													

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111.9765 99.4800 106.5981 95.6499 94.0852 86.2423 86.0655 88.5867 88.5895 97.0552 101.1232 110.9844 (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	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	125.4997	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	119.0788	131.8372	119.0788	123.0481	119.0788	123.0481	119.0788	119.0788	123.0481	119.0788	123.0481	119.0788	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	224.7481	227.0803	221.2032	208.6917	192.8982	178.0546	168.1381	165.8059	171.6829	184.1944	199.9879	214.8316	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	35.5500	(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)	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	-100.3997	(71)
Water heating gains (Table 5)	150.5061	148.0358	143.2770	132.8471	126.4586	119.7809	115.6795	119.0681	123.0410	130.4506	140.4488	149.1725	(72)
Total internal gains	557.9828	570.6031	547.2089	528.2369	502.0855	481.5335	463.5463	464.6027	478.4219	497.3737	527.1347	546.7328	(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	
North				4.1800	10.6334	0.6300	0.7000		0.7700		13.5838 (74)	
South				8.5900	46.7521	0.6300	0.7000		0.7700		122.7343 (78)	
Solar gains	136.3180	226.9663	300.1585	360.2429	397.0079	392.3901	378.9511	351.0557	320.5076	247.7061	162.2393	117.3778 (83)
Total gains	694.3009	797.5695	847.3674	888.4797	899.0934	873.9236	842.4974	815.6584	798.9295	745.0798	689.3740	664.1106 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation factor for gains for living area, nil _m (see Table 9a)													21.0000 (85)
tau	62.8232	62.9837	63.1418	63.8951	64.0381	64.7120	64.7120	64.8384	64.4508	64.0381	63.7496	63.4507	
alpha	5.1882	5.1989	5.2095	5.2597	5.2692	5.3141	5.3141	5.3226	5.2967	5.2692	5.2500	5.2300	
util living area	0.9930	0.9850	0.9702	0.9288	0.8354	0.6589	0.4878	0.5233	0.7476	0.9343	0.9846	0.9944	(86)
MIT	19.8508	20.0448	20.2843	20.5896	20.8309	20.9639	20.9938	20.9911	20.9288	20.6337	20.1939	19.8206	(87)
Th 2	19.9367	19.9391	19.9414	19.9526	19.9547	19.9644	19.9644	19.9662	19.9607	19.9547	19.9504	19.9460	(88)
util rest of house	0.9907	0.9800	0.9600	0.9039	0.7807	0.5663	0.3762	0.4103	0.6617	0.9062	0.9786	0.9925	(89)
MIT 2	18.6224	18.8694	19.1711	19.5495	19.8177	19.9451	19.9626	19.9634	19.9169	19.6094	19.0685	18.5910	(90)
Living area fraction									f _{LA} = Living area / (4) =			0.3840	(91)
MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.0941	19.3207	19.5986	19.9489	20.2068	20.3363	20.3586	20.3580	20.3055	20.0027	19.5007	19.0632	(93)

8. Space heating requirement

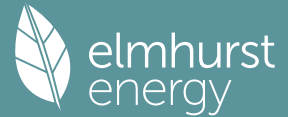
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9881	0.9762	0.9559	0.9038	0.7952	0.6009	0.4193	0.4539	0.6921	0.9078	0.9752	0.9903	(94)
Useful gains	686.0600	778.6149	809.9894	802.9879	714.9493	525.1599	353.2320	370.2666	552.9384	676.3591	672.3054	657.6761	(95)
Ext temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	(96)
Heat loss rate W	1440.6570	1400.7211	1269.1111	1057.9006	812.6811	542.3007	355.3317	373.4559	589.0314	898.2756	1190.0395	1433.0710	(97)
Space heating kWh	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98a)
Space heating requirement - total per year (kWh/year)												2692.0799	
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	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2692.0799	
Space heating per m ²										(98c) / (4) =		32.5997	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from main system(s)													0.0000 (201)
Efficiency of main space heating system 1 (in %)													1.0000 (202)
Efficiency of main space heating system 2 (in %)													92.3000 (206)
Efficiency of secondary/supplementary heating system, %													0.0000 (207)
													0.0000 (208)
Space heating requirement	561.4201	418.0554	341.5866	183.5372	72.7125	0.0000	0.0000	0.0000	0.0000	165.1058	372.7685	576.8938	(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)	608.2558	452.9311	370.0829	198.8485	78.7784	0.0000	0.0000	0.0000	0.0000	178.8796	403.8662	625.0204	(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)

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Water heating												
Water heating requirement												
	234.8572	207.7068	220.9215	195.1316	189.6973	171.5451	169.8654	176.3461	177.9624	197.6825	209.2222	232.4346 (64)
Efficiency of water heater												79.8000 (216)
(217)m	85.9412	85.5957	85.0335	83.9226	82.1059	79.8000	79.8000	79.8000	79.8000	83.6588	85.3399	86.0140 (217)
Fuel for water heating, kWh/month												
	273.2766	242.6604	259.8053	232.5138	231.0399	214.9688	212.8639	220.9851	223.0106	236.2962	245.1633	270.2289 (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	24.7422	19.8491	17.8719	13.0937	10.1140	8.2632	9.2263	11.9927	15.5774	20.4383	23.0850	25.4299 (232)
Electricity generated by PVs (Appendix M) (negative quantity)												
(233a)m	-38.4104	-54.0349	-77.5014	-86.9400	-93.5740	-87.2702	-86.1839	-81.4455	-73.0581	-61.6894	-42.1838	-33.2212 (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	-22.0462	-46.3429	-92.0514	-138.1743	-182.6291	-183.4821	-181.3293	-153.5682	-112.6059	-66.2549	-29.4278	-17.4367 (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												2916.6630 (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												2862.8126 (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)												199.6839 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-2040.8617 (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												4024.2977 (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	2916.6630	0.2100	612.4992 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2862.8126	0.2100	601.1906 (264)
Space and water heating			1213.6899 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	199.6839	0.1443	28.8206 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	0.1346	-109.7968
PV Unit electricity exported	-1225.3489	0.1259	-154.2864
Total			-264.0832 (269)
Total CO2, kg/year			990.3565 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			11.9900 (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	2916.6630	1.1300	3295.8292 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2862.8126	1.1300	3234.9782 (278)
Space and water heating			6530.8074 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	199.6839	1.5338	306.2818 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-815.5128	1.4976	-1221.3054
PV Unit electricity exported	-1225.3489	0.4622	-566.3381
Total			-1787.6436 (283)
Total Primary energy kWh/year			5179.5464 (286)
Target Primary Energy Rate (TPER)			62.7200 (287)