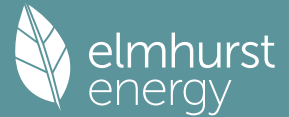


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Property Reference	UNIT 42				Issued on Date	28/06/2023
Assessment Reference	UNIT 42	Prop Type Ref				
Property	Alexander House, UNIT 42, 205-207 King's Road, RG1 4LS					
SAP Rating	80 C	DER	6.42	TER	17.51	
Environmental	96 A	% DER < TER				63.34
CO ₂ Emissions (t/year)	0.25	DFEE	48.58	TFEE	47.35	
Compliance Check	See BREL	% DFEE < TFEE				-2.60
% DPER < TPER	26.97	DPER	67.61	TPER	92.58	
Assessor Details	Mr. Ondrej Gajdos				Assessor ID	W452-0001
Client						

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)
Ground floor	41.2000 (1b)	x 2.5000 (2b)	= 103.0000 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.2000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 103.0000 (5)

2. Ventilation rate

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

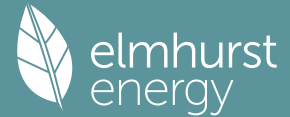
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour
Pressure test	0.0000 / (5) = 0.0000 (8)
Pressure Test Method	Yes
Measured/design AP50	Blower Door
Infiltration rate	4.0000 (17)
Number of sides sheltered	0.2000 (18)
	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.1550 (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	0.1976	0.1938	0.1899	0.1705	0.1666	0.1473	0.1473	0.1434	0.1550	0.1666	0.1744	0.1821 (22b)
Mechanical extract ventilation - centralised												
If mechanical ventilation												0.5000 (23a)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.5000 (23b)
Effective ac	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000	0.5000 (25)

3. Heat losses and heat loss parameter

Element	Gross m ²	Openings m ²	NetArea m ²	U-value W/m ² K	A x U W/K	K-value kJ/m ² K	A x K kJ/K
1 (Uw = 1.30)			6.5000	1.2357	8.0323		(27)
2 (Uw = 1.30)			6.5000	1.2357	8.0323		(27)
1			2.1000	1.0000	2.1000		(26)
top floor exposed new	28.5000	13.0000	15.5000	0.1800	2.7900	18.0000	279.0000 (29a)

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corridor new	31.5000	2.1000	29.4000	0.2400	7.0560	60.0000	1764.0000 (29a)
flat roof new	22.1000		22.1000	0.1300	2.8730	9.0000	198.9000 (30)
roof terrace new	17.6000		17.6000	0.1300	2.2880	9.0000	158.4000 (30)
Total net area of external elements Aum(A, m2)			99.7000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =	33.1716			(33)
pw			10.7500	0.0000	0.0000	20.0000	215.0000 (32)
pf			39.7000			30.0000	1191.0000 (32d)
iw			56.5000			9.0000	508.5000 (32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 4314.8000 (34)
 Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 104.7282 (35)

List of Thermal Bridges							
K1 Element	Length	Psi-value	Total				
E2 Other lintels (including other steel lintels)	6.2000	0.0500	0.3100				
E3 Sill	5.2000	0.0500	0.2600				
E4 Jamb	14.2000	0.0500	0.7100				
E20 Exposed floor (normal)	2.9000	0.3200	0.9280				
E7 Party floor between dwellings (in blocks of flats)	9.3000	0.0700	0.6510				
E14 Flat roof	13.4000	0.0800	1.0720				
E15 Flat roof with parapet	10.7000	0.1500	1.6050				
E16 Corner (normal)	7.5000	0.0900	0.6750				
E17 Corner (inverted - internal area greater than external area)	2.5000	-0.0900	-0.2250				
E18 Party wall between dwellings	5.0000	0.0600	0.3000				
E24 Eaves (insulation at ceiling level - inverted)	3.1000	0.2400	0.7440				
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			7.0300 (36)				
Point Thermal bridges			0.0000 (36a) =				
Total fabric heat loss			(33) + (36) + (36a) =	40.2016 (37)			

Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)													
(38)m	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(38)
Heat transfer coeff	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	16.9950	
Average = Sum(39)m / 12 =	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	57.1966	(39)
HLP	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	(40)
HLP (average)	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	1.3883	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

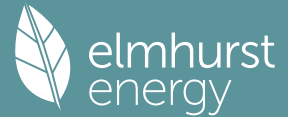
4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4386 (42)
Hot water usage for mixer showers	48.3397	47.6133	46.5547	44.5293	43.0346	41.3677	40.4203	41.4708	42.6224	44.4122	46.4811	48.1545	(42a)
Hot water usage for baths	20.9109	20.6003	20.1630	19.3567	18.7529	18.0834	17.7217	18.1560	18.6288	19.3452	20.1682	20.8402	(42b)
Hot water usage for other uses	29.3625	28.2948	27.2271	26.1593	25.0916	24.0239	24.0239	25.0916	26.1593	27.2271	28.2948	29.3625	(42c)
Average daily hot water use (litres/day)													90.6485 (43)
Daily hot water use	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Energy conte	98.6132	96.5084	93.9448	90.0453	86.8791	83.4750	82.1659	84.7184	87.4106	90.9845	94.9441	98.3573	(44)
Energy content (annual)	156.1791	137.4267	144.3896	123.2675	116.9559	102.6422	99.3725	104.8991	107.7861	123.4651	135.2652	154.0037	(45)
Distribution loss (46)m = 0.15 x (45)m	23.4269	20.6140	21.6584	18.4901	17.5434	15.3963	14.9059	15.7349	16.1679	18.5198	20.2898	23.1006	(46)
Water storage loss:													
Store volume													150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):													1.1500 (48)
Temperature factor from Table 2b													0.5400 (49)
Enter (49) or (54) in (55)													0.6210 (55)
Total storage loss	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510	(56)
If cylinder contains dedicated solar storage	19.2510	17.3880	19.2510	18.6300	19.2510	18.6300	19.2510	19.2510	18.6300	19.2510	18.6300	19.2510	(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	198.6925	175.8259	186.9030	164.4095	159.4693	143.7842	141.8859	147.4125	148.9281	165.9785	176.4072	196.5171	(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	198.6925	175.8259	186.9030	164.4095	159.4693	143.7842	141.8859	147.4125	148.9281	165.9785	176.4072	196.5171	(64)
12Total per year (kWh/year)													2006.2138 (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	85.9403	76.4137	82.0203	73.9000	72.8986	67.0421	67.0521	68.8897	68.7525	75.0629	77.8893	85.2169	(65)

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

Metabolic gains (Table 5), Watts

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(66)m	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	62.8277	69.5592	62.8277	64.9219	62.8277	64.9219	62.8277	62.8277	64.9219	62.8277	64.9219	62.8277	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.5629	125.8554	122.5982	115.6639	106.9106	98.6838	93.1877	91.8952	95.1524	102.0867	110.8400	119.0668	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	(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)	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	(71)
Water heating gains (Table 5)	115.5111	113.7109	110.2423	102.6389	97.9819	93.1141	90.1238	92.5937	95.4895	100.8909	108.1796	114.5389	(72)
Total internal gains	347.4804	353.7043	340.2469	327.8035	312.2990	301.2985	290.7179	291.8952	300.1426	310.3840	328.5202	341.0121	(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
West			6.5000		19.6403		0.6300		0.8000		0.7700		44.5887 (80)
West			6.5000		19.6403		0.6300		0.8000		0.7700		44.5887 (80)
Solar gains	89.1773	174.4498	287.2939	419.0010	513.5015	525.6602	500.4499	429.8791	334.1347	206.9993	111.1936	73.3351	(83)
Total gains	436.6577	528.1541	627.5408	746.8046	825.8005	826.9587	791.1678	721.7743	634.2773	517.3834	439.7138	414.3472	(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, n _{li,m} (see Table 9a)													
tau	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	20.9550	
alpha	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	2.3970	
util living area	0.9106	0.8674	0.7963	0.6783	0.5412	0.4053	0.3039	0.3432	0.5280	0.7531	0.8753	0.9197	(86)
Living	18.5160	18.9385	19.5313	20.1736	20.6211	20.8625	20.9499	20.9315	20.7339	20.0857	19.1727	18.4167	
Non living	16.9537	17.4733	18.1927	18.9443	19.4370	19.6770	19.7487	19.7378	19.5699	18.8747	17.7772	16.8307	
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	19.7293	18.9385	19.5313	20.1736	20.6211	20.8625	20.9499	20.9315	20.7339	20.0857	19.1727	18.7781	(87)
Th 2	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	19.7723	(88)
util rest of house	0.8975	0.8492	0.7694	0.6387	0.4881	0.3376	0.2241	0.2589	0.4557	0.7105	0.8547	0.9077	(89)
MIT 2	18.6487	17.4733	18.1927	18.9443	19.4370	19.6770	19.7487	19.7378	19.5699	18.8747	17.7772	17.3608	(90)
Living area fraction									f _{LA} = Living area / (4) =			0.5413	(91)
MIT	19.2336	18.2664	18.9172	19.6096	20.0779	20.3187	20.3989	20.3839	20.1999	19.5302	18.5325	18.1279	(92)
Temperature adjustment												0.0000	
adjusted MIT	19.2336	18.2664	18.9172	19.6096	20.0779	20.3187	20.3989	20.3839	20.1999	19.5302	18.5325	18.1279	(93)

8. Space heating requirement

Utilisation	0.8910	0.8219	0.7479	0.6331	0.5019	0.3685	0.2655	0.3018	0.4821	0.7011	0.8291	0.8877	(94)
Useful gains	389.0491	434.0883	469.3411	472.7752	414.4321	304.7278	210.0768	217.8317	305.7697	362.7245	364.5570	367.7989	(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	854.1494	764.5133	710.2244	612.5558	479.1894	327.0887	217.2830	227.8645	348.8959	510.7767	653.9018	796.6304	(97)
Space heating kWh	346.0347	222.0456	179.2172	100.6420	48.1795	0.0000	0.0000	0.0000	0.0000	110.1508	208.3282	319.0506	(98a)
Space heating requirement - total per year (kWh/year)												1533.6486	
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	346.0347	222.0456	179.2172	100.6420	48.1795	0.0000	0.0000	0.0000	0.0000	110.1508	208.3282	319.0506	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1533.6486	
Space heating per m ²										(98c) / (4) =		37.2245	(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 %)	234.5298	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

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	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	346.0347	222.0456	179.2172	100.6420	48.1795	0.0000	0.0000	0.0000	0.0000	110.1508	208.3282	319.0506	(98)
Space heating efficiency (main heating system 1)	234.5298	234.5298	234.5298	234.5298	234.5298	0.0000	0.0000	0.0000	0.0000	234.5298	234.5298	234.5298	(210)
Space heating fuel (main heating system)	147.5440	94.6769	76.4155	42.9122	20.5430	0.0000	0.0000	0.0000	0.0000	46.9666	88.8280	136.0384	(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	198.6925	175.8259	186.9030	164.4095	159.4693	143.7842	141.8859	147.4125	148.9281	165.9785	176.4072	196.5171	(64)
Efficiency of water heater	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	191.4621	(216)
Fuel for water heating, kWh/month	103.7764	91.8333	97.6188	85.8705	83.2903	75.0980	74.1065	76.9931	77.7846	86.6900	92.1369	102.6402	(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	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	13.0543	10.4727	9.4295	6.9084	5.3363	4.3598	4.8679	6.3275	8.2188	10.7836	12.1800	13.4172	(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												653.9248	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												191.4621	
Water heating fuel used												1047.8388	(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)												105.3561	(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												1807.1196	(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	653.9248	0.1555	101.7124	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1047.8388	0.1409	147.6018	(264)
Space and water heating			249.3142	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	105.3561	0.1443	15.2061	(268)
Total CO2, kg/year			264.5204	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			6.4200	(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	653.9248	1.5758	1030.4460	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1047.8388	1.5209	1593.6148	(278)
Space and water heating			2624.0608	(279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(281)
Energy for lighting	105.3561	1.5338	161.5986	(282)
Total Primary energy kWh/year			2785.6595	(286)
Dwelling Primary energy Rate (DPER)			67.6100	(287)

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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)
Ground floor	41.2000 (1b)	x 2.5000 (2b)	= 103.0000 (1b) - (4)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	41.2000		
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 103.0000 (5)

2. Ventilation rate

	m ³ per hour
Number of open chimneys	0 * 80 = 0.0000 (6a)
Number of open flues	0 * 20 = 0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 = 0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 = 0.0000 (6d)
Number of flues attached to other heater	0 * 35 = 0.0000 (6e)
Number of blocked chimneys	0 * 20 = 0.0000 (6f)
Number of intermittent extract fans	2 * 10 = 20.0000 (7a)
Number of passive vents	0 * 10 = 0.0000 (7b)
Number of flueless gas fires	0 * 40 = 0.0000 (7c)
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	Air changes per hour 20.0000 / (5) = 0.1942 (8)
Pressure test	Yes
Pressure Test Method	Blower Door
Measured/design AP50	5.0000 (17)
Infiltration rate	0.4442 (18)
Number of sides sheltered	3 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 0.7750 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.3442 (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	0.4389	0.4303	0.4217	0.3787	0.3701	0.3270	0.3270	0.3184	0.3442	0.3701	0.3873	0.4045 (22b)
Effective ac	0.5963	0.5926	0.5889	0.5717	0.5685	0.5535	0.5535	0.5507	0.5592	0.5685	0.5750	0.5818 (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
TER Opaque door			2.1000	1.0000	2.1000		(26)
TER Opening Type (Uw = 1.20)			8.2000	1.1450	9.3893		(27)
top floor exposed new	28.5000	8.2000	20.3000	0.1800	3.6540		(29a)
corridor new	31.5000	2.1000	29.4000	0.1800	5.2920		(29a)
flat roof new	22.1000		22.1000	0.1100	2.4310		(30)
roof terrace new	17.6000		17.6000	0.1100	1.9360		(30)
Total net area of external elements Aum(A, m ²)			99.7000				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		24.8023		(33)
pw			10.7500	0.0000	0.0000		(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m²K 104.7282 (35)

List of Thermal Bridges

K1 Element	Length	Psi-value	Total
E2 Other lintels (including other steel lintels)	6.2000	0.0500	0.3100
E3 Sill	5.2000	0.0500	0.2600
E4 Jamb	14.2000	0.0500	0.7100
E20 Exposed floor (normal)	2.9000	0.3200	0.9280
E7 Party floor between dwellings (in blocks of flats)	9.3000	0.0700	0.6510
E14 Flat roof	13.4000	0.0800	1.0720
E15 Flat roof with parapet	10.7000	0.5600	5.9920
E16 Corner (normal)	7.5000	0.0900	0.6750
E17 Corner (inverted - internal area greater than external area)	2.5000	-0.0900	-0.2250
E18 Party wall between dwellings	5.0000	0.0600	0.3000
E24 Eaves (insulation at ceiling level - inverted)	3.1000	0.2400	0.7440
Thermal bridges (Sum(L x Psi) calculated using Appendix K)			11.4170 (36)
Point Thermal bridges			(36a) = 0.0000
Total fabric heat loss			(33) + (36) + (36a) = 36.2193 (37)

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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	20.2688	20.1417	20.0171	19.4318	19.3223	18.8125	18.8125	18.7181	19.0089	19.3223	19.5438	19.7754	(38)
Heat transfer coeff	56.4881	56.3610	56.2364	55.6511	55.5416	55.0318	55.0318	54.9374	55.2282	55.5416	55.7631	55.9947	(39)
Average = Sum(39)m / 12 =												55.6506	
HLP	1.3711	1.3680	1.3650	1.3508	1.3481	1.3357	1.3357	1.3334	1.3405	1.3481	1.3535	1.3591	(40)
HLP (average)												1.3507	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy													1.4386 (42)
Hot water usage for mixer showers	48.3397	47.6133	46.5547	44.5293	43.0346	41.3677	40.4203	41.4708	42.6224	44.4122	46.4811	48.1545	(42a)
Hot water usage for baths	20.9109	20.6003	20.1630	19.3567	18.7529	18.0834	17.7217	18.1560	18.6288	19.3452	20.1682	20.8402	(42b)
Hot water usage for other uses	29.3625	28.2948	27.2271	26.1593	25.0916	24.0239	24.0239	25.0916	26.1593	27.2271	28.2948	29.3625	(42c)
Average daily hot water use (litres/day)												90.6485	(43)
Daily hot water use	98.6132	96.5084	93.9448	90.0453	86.8791	83.4750	82.1659	84.7184	87.4106	90.9845	94.9441	98.3573	(44)
Energy conte	156.1791	137.4267	144.3896	123.2675	116.9559	102.6422	99.3725	104.8991	107.7861	123.4651	135.2652	154.0037	(45)
Energy content (annual)										Total = Sum(45)m =		1505.6528	
Distribution loss (46)m = 0.15 x (45)m	23.4269	20.6140	21.6584	18.4901	17.5434	15.3963	14.9059	15.7349	16.1679	18.5198	20.2898	23.1006	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.3938	(48)
Temperature factor from Table 2b												0.5400	(49)
Enter (49) or (54) in (55)												0.7527	(55)
Total storage loss	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(56)
If cylinder contains dedicated solar storage	23.3325	21.0745	23.3325	22.5798	23.3325	22.5798	23.3325	23.3325	22.5798	23.3325	22.5798	23.3325	(57)
Primary loss	23.2624	21.0112	23.2624	22.5120	23.2624	22.5120	23.2624	23.2624	22.5120	23.2624	22.5120	23.2624	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	202.7740	179.5124	190.9845	168.3593	163.5508	147.7340	145.9674	151.4940	152.8779	170.0600	180.3571	200.5986	(62)
WWHRS	-22.0989	-19.5445	-20.4658	-16.9465	-15.7935	-13.5146	-12.6678	-13.4710	-13.9828	-16.4841	-18.6745	-21.6897	(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	180.6751	159.9680	170.5187	151.4128	147.7573	134.2194	133.2996	138.0231	138.8951	153.5758	161.6825	178.9089	(64)
Total per year (kWh/year)										Total per year (kWh/year) = Sum(64)m =		1848.9364	(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	89.2055	79.3630	85.2855	77.0599	76.1638	70.2020	70.3173	72.1549	71.9123	78.3281	81.0492	88.4821	(65)

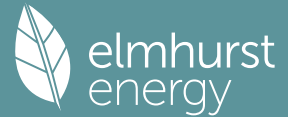
5. Internal gains (see Table 5 and 5a)

Metabolic gains (Table 5), Watts													
(66)m	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	71.9292	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	63.3028	70.0853	63.3028	65.4129	63.3028	65.4129	63.3028	63.3028	65.4129	63.3028	65.4129	63.3028	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	124.5629	125.8554	122.5982	115.6639	106.9106	98.6838	93.1877	91.8952	95.1524	102.0867	110.8400	119.0668	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	30.1929	(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)	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	-57.5433	(71)
Water heating gains (Table 5)	119.8998	118.0996	114.6310	107.0277	102.3707	97.5028	94.5125	96.9824	99.8782	105.2796	112.5683	118.9276	(72)
Total internal gains	355.3443	361.6191	348.1108	335.6833	320.1629	306.1782	295.5818	296.7591	305.0223	318.2479	336.3999	348.8760	(73)

6. Solar gains

[Jan]	Area m2	Solar flux Table 6a W/m2	Specific data g or Table 6b	FF Specific data or Table 6c	Access factor Table 6d	Gains W
West	8.2000	19.6403	0.6300	0.7000	0.7700	49.2190 (80)

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Solar gains	49.2190	96.2829	158.5641	231.2563	283.4133	290.1240	276.2099	237.2602	184.4167	114.2477	61.3703	40.4753 (83)
Total gains	404.5633	457.9019	506.6749	566.9396	603.5762	596.3022	571.7916	534.0193	489.4390	432.4956	397.7703	389.3514 (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, n _{l,m} (see Table 9a)												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	21.2178	21.2657	21.3128	21.5370	21.5794	21.7793	21.7793	21.8167	21.7019	21.5794	21.4937	21.4048
alpha	2.4145	2.4177	2.4209	2.4358	2.4386	2.4520	2.4520	2.4544	2.4468	2.4386	2.4329	2.4270
util living area	0.9217	0.8951	0.8511	0.7671	0.6522	0.5113	0.3922	0.4303	0.6169	0.8032	0.8931	0.9276 (86)
MIT	18.4448	18.7692	19.2759	19.9249	20.4456	20.7856	20.9189	20.8960	20.6421	19.9611	19.1090	18.3943 (87)
Th 2	19.7856	19.7880	19.7903	19.8013	19.8034	19.8130	19.8130	19.8147	19.8093	19.8034	19.7992	19.7948 (88)
util rest of house	0.9100	0.8798	0.8291	0.7325	0.5998	0.4360	0.2970	0.3333	0.5441	0.7658	0.8750	0.9167 (89)
MIT 2	16.8740	17.2782	17.9055	18.6944	19.2936	19.6566	19.7723	19.7589	19.5248	18.7614	17.7181	16.8163 (90)
Living area fraction									fLA = Living area / (4) =			0.5413 (91)
MIT	17.7242	18.0853	18.6472	19.3604	19.9171	20.2677	20.3929	20.3744	20.1295	19.4108	18.4710	17.6704 (92)
Temperature adjustment												0.0000
adjusted MIT	17.7242	18.0853	18.6472	19.3604	19.9171	20.2677	20.3929	20.3744	20.1295	19.4108	18.4710	17.6704 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.8841	0.8528	0.8043	0.7183	0.6051	0.4661	0.3448	0.3807	0.5650	0.7516	0.8499	0.8916 (94)
Useful gains	357.6752	390.5144	407.5016	407.2112	365.2411	277.9073	197.1750	203.2862	276.5506	325.0482	338.0485	347.1267 (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	758.3084	743.1339	683.1157	582.1353	456.3907	311.9030	208.7320	218.3419	333.0006	489.3637	634.0798	754.2722 (97)
Space heating kWh	298.0711	236.9603	205.0568	125.9454	67.8153	0.0000	0.0000	0.0000	0.0000	122.2507	213.1426	302.9162 (98a)
Space heating requirement - total per year (kWh/year)												1572.1585
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	298.0711	236.9603	205.0568	125.9454	67.8153	0.0000	0.0000	0.0000	0.0000	122.2507	213.1426	302.9162 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												1572.1585
Space heating per m ²										(98c) / (4) =		38.1592 (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	298.0711	236.9603	205.0568	125.9454	67.8153	0.0000	0.0000	0.0000	0.0000	122.2507	213.1426	302.9162 (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)	322.9373	256.7284	222.1634	136.4522	73.4727	0.0000	0.0000	0.0000	0.0000	132.4493	230.9237	328.1866 (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	180.6751	159.9680	170.5187	151.4128	147.7573	134.2194	133.2996	138.0231	138.8951	153.5758	161.6825	178.9089 (64)
Efficiency of water heater	85.1747	84.9393	84.4745	83.6498	82.4281	79.8000	79.8000	79.8000	79.8000	83.5533	84.6804	79.8000 (216)
Fuel for water heating, kWh/month	212.1230	188.3322	201.8583	181.0080	179.2560	168.1947	167.0421	172.9612	174.0540	183.8059	190.9327	209.9113 (219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (221)
Pumps and Fa	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	13.1531	10.5519	9.5008	6.9607	5.3766	4.3928	4.9048	6.3754	8.2810	10.8651	12.2721	13.5186 (232)
Electricity generated by PVs (Appendix M) (negative quantity)	-19.8260	-28.2425	-41.0430	-46.7183	-50.9274	-47.8065	-47.2824	-44.3985	-39.3435	-32.6161	-21.9246	-17.1121 (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)

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Electricity generated by PVs (Appendix M) (negative quantity)												
(233b)m	-10.3364	-21.8370	-43.5486	-65.5935	-86.8731	-87.2745	-86.1827	-72.8522	-53.2861	-31.2167	-13.8032	-8.1616 (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	(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	(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	(235d)
Annual totals kWh/year												
Space heating fuel - main system 1												1703.3136 (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												2229.4795 (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)												106.1529 (232)
Energy saving/generation technologies (Appendices M ,N and Q)												
PV generation												-1018.2066 (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												3106.7394 (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	1703.3136	0.2100	357.6959 (261)
Total CO2 associated with community systems			0.0000 (373)
Water heating (other fuel)	2229.4795	0.2100	468.1907 (264)
Space and water heating			825.8866 (265)
Pumps, fans and electric keep-hot	86.0000	0.1387	11.9293 (267)
Energy for lighting	106.1529	0.1443	15.3211 (268)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-437.2409	0.1343	-58.7265
PV Unit electricity exported	-580.9657	0.1258	-73.1035
Total			-131.8300 (269)
Total CO2, kg/year			721.3069 (272)
EPC Target Carbon Dioxide Emission Rate (TER)			17.5100 (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	1703.3136	1.1300	1924.7444 (275)
Total CO2 associated with community systems			0.0000 (473)
Water heating (other fuel)	2229.4795	1.1300	2519.3118 (278)
Space and water heating			4444.0562 (279)
Pumps, fans and electric keep-hot	86.0000	1.5128	130.1008 (281)
Energy for lighting	106.1529	1.5338	162.8208 (282)
Energy saving/generation technologies			
PV Unit electricity used in dwelling	-437.2409	1.4964	-654.2772
PV Unit electricity exported	-580.9657	0.4619	-268.3395
Total			-922.6167 (283)
Total Primary energy kWh/year			3814.3611 (286)
Target Primary Energy Rate (TPER)			92.5800 (287)