SAP 10 WORKSHEET (Version 10.2, December 2021)
CALCULATION OF TARGET EMISSIONS

Date 11/07/2025

Complete Energy Consultancy Ltd
The Exchange
Brickrow
Stroud
Tel: 07771 964593

Property			
UPRN	UPRN-0000000000	Project Type	New dwelling as designed
Address	New Unit, 61 Cotman Walk, Bristol, BS7 9UG	Dwelling Type	Detached house

1 Overall dwelling dimensions				
Ground floor	40.4000	2.3000	92.9200	(1b) - (3b)
First floor	36.1000	2.2900	82.6690	(1c) - (3c)
Total floor area			76.5000	(4)
Dwelling volume (mÂ³)			175.5890	(5)

2 Ventilation rate		
Number of chimneys	0	(6a)
Number of open flues	0	(6b)
Number of chimneys\/flues to closed fires	0	(6c)
Number of flues to solid fuel boilers	0	(6d)
Number of flues attached to other heaters	0	(6d)
Number of blocked chimneys	0	(6f)
Number of intermittent fans	30	(7a)
Number of passive vents	0	(7b)
Number of flueless gas fires	0	(7c)
Infiltration due to chimneys, flues and fans	0.1709	(8)
Predicted Design q50(assumed)	5.0000	(17)
Infiltration rate	0.4209	(18)
Number of sides sheltered	2	(19)
Shelter factor	0.8500	(20)
Infiltration rate incorporating shelter factor	0.3577	(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	0.4561	0.4472	0.4382	0.3935	0.3846	0.3398	0.3398	0.3309	0.3577	0.3846	0.4024	0.4203	(22b)
Effective ach	0.6040	0.6000	0.5960	0.5774	0.5739	0.5577	0.5577	0.5547	0.5640	0.5739	0.5810	0.5883	(25)

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Calculated by Argyle Calculation Engine (ACE) | SAP Engine version v10.2.2.0
JPA Designer 10 2.0.51.2

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3. Heat losses and heat loss parameter

	Net area (m²)	U-value (W/m²K)	A x U (W/K)	K Value kJ/m²K	A x K (kJ/K)	
Doors (1)			2.7300	1.0000	2.7300	(26)
Windows (1)			10.5200	1.1450	12.0458	(27)
roof window Pitch 0			0.4600	1.5918	0.7322	(27)
groundFloor	40.4000	0.1300	5.2520	75.0000	3030.0000	(28a)
exposeWall	8.2700	0.1800	17.6886	9.0000	884.4300	(29a)
exposeWall	.4800	0.1800	0.2664	9.0000	13.3200	(29a)
exposedRoof	2.0000	0.1100	0.2200	9.0000	18.0000	(30)
exposedRoof	19.5400	0.1100	2.1494	9.0000	175.8600	(30)
exposedRoof	23.0000	0.1100	2.5300	9.0000	207.0000	(30)
Total area of external elements:					198.4000	(31)
Fabric heat loss:					43.6144	(33)
Heat capacity:					4978.4100	(34)
Thermal mass parameter:					100.0000	(35)
Thermal bridges:					11.1360	(36)
Total fabric heat loss :					54.7504	(37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Vent loss	34.9992	34.7652	34.5358	33.4583	33.2567	32.3182	32.3182	32.1444	32.6797	33.2567	33.6645	34.0909	(38)
Heat transfer coeff	89.7496	89.5156	89.2862	88.2087	88.0071	87.0686	87.0686	86.8948	87.4301	88.0071	88.4149	88.8413	(39)
Heat transfer coeff (average)												88.2077	(39)
HLP	1.1732	1.1701	1.1671	1.1531	1.1504	1.1382	1.1382	1.1359	1.1429	1.1504	1.1558	1.1613	(40)
HLP (average)												1.1530	(40)
Days in month	31.0000	28.0000	31.0000	30.0000	31.0000	30.0000	31.0000	31.0000	30.0000	31.0000	30.0000	31.0000	(41)
Heat losses and heat loss parameter												complete	

4. Water heating energy requirements

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Assumed occupancy												2.3931	(42)
Average daily hot water use (litres\/day)												120.6716	(43)

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Mixer shower usage	64.3441	63.3771	61.9681	59.2721	57.2825	55.0638	53.8026	55.2010	56.7339	59.1162	61.8701	64.0976	(42a)
Bath usage	27.7933	27.3805	26.7992	25.7275	24.9250	24.0351	23.5545	24.1317	24.7601	25.7123	26.8061	27.6993	(42b)
Other usage	39.1377	37.7145	36.2913	34.8682	33.4450	32.0218	32.0218	33.4450	34.8682	36.2913	37.7145	39.1377	(42c)
Daily hot water use	131.2751	128.4722	125.0586	119.8677	115.6525	111.1207	109.3789	112.7776	116.3622	121.1198	126.3907	130.9346	(44)
Energy content	207.9076	182.9426	192.2105	164.0929	155.6904	136.6358	132.2843	139.6423	143.4862	164.3585	180.0668	205.0119	(45)
Energy content(annual)												2004.3299	(45)
Distribution loss	31.1861	27.4414	28.8316	24.6139	23.3536	20.4954	19.8426	20.9463	21.5229	24.6538	27.0100	30.7518	(46)
Cylinder volume												210.0000	(47)
Measured cylinder loss (kWh\/day)												1.7016	(48)
Temperature factor												0.5400	(49)
Energy lost from water storage (kWh\/day)												0.9188	(50)
Energy lost from cylinder in kWh\/day												0.9188	(55)
Total storage loss	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(56)
Net storage loss	28.4842	25.7277	28.4842	27.5653	28.4842	27.5653	28.4842	28.4842	27.5653	28.4842	27.5653	28.4842	(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	259.6542	229.6815	243.9571	214.1703	207.4370	186.7132	184.0308	191.3889	193.5636	216.1051	230.1441	256.7585	(62)
WWHRS Saving	-29.4154	-26.0152	-27.2417	-22.5572	-21.0225	-17.9891	-16.8619	-17.9309	-18.6122	-21.9417	-24.8573	-28.8707	(63a)
PV Diverter Saving	-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 Saving	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)
WW heat rec.	-29.4154	-26.0152	-27.2417	-22.5572	-21.0225	-17.9891	-16.8619	-17.9309	-18.6122	-21.9417	-24.8573	-28.8707	(63)
Flue gas heat rec.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(G6)
Fghrs PV	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Output from w\/h	230.2388	203.6663	216.7154	191.6131	186.4145	168.7241	167.1689	173.4579	174.9514	194.1633	205.2868	227.8878	(64)
Output from water heater(annual)												2340.2884	(64)
Instantaneous electric 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	(64a)
Heat gains (kWh)	110.5266	98.2195	105.3073	94.6228	93.1643	85.4933	85.3818	87.8283	87.7710	96.0465	99.9341	109.5637	(65)

5. Internal gains

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	119.6549	(66)

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Lighting	113.8744	126.0752	113.8744	117.6702	113.8744	117.6702	113.8744	113.8744	117.6702	113.8744	117.6702	113.8744	(67)
Appliances	211.9705	214.1701	208.6272	196.8270	181.9314	167.9317	158.5790	156.3794	161.9223	173.7225	188.6181	202.6178	(68)
Cooking	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	34.9655	(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	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	-95.7239	(71)
Water heating	148.5572	146.1600	141.5420	131.4205	125.2209	118.7407	114.7605	118.0488	121.9042	129.0947	138.7973	147.2631	(72)
Total internal	536.2986	548.3018	525.9401	507.8142	482.9232	463.2390	446.1103	447.1990	460.3932	478.5880	506.9820	525.6517	(73)

6. Solar gains

Doors (1)			2.7300	1.0000	2.7300	(26)
Windows (1)			10.5200	1.1450	12.0458	(27)
roof window Pitch 0			0.4600	1.5918	0.7322	(27)
groundFloor	40.4000	0.1300	5.2520	75.0000	3030.0000	(28a)
exposeWall	8.2700	0.1800	17.6886	9.0000	884.4300	(29a)
exposeWall	.4800	0.1800	0.2664	9.0000	13.3200	(29a)
exposedRoof	2.0000	0.1100	0.2200	9.0000	18.0000	(30)
exposedRoof	19.5400	0.1100	2.1494	9.0000	175.8600	(30)
exposedRoof	23.0000	0.1100	2.5300	9.0000	207.0000	(30)
Total area of external elements:					198.4000	(31)
Fabric heat loss:					43.6144	(33)
Heat capacity:					4978.4100	(34)
Thermal mass parameter:					100.0000	(35)
Thermal bridges:					11.1360	(36)
Total fabric heat loss :					54.7504	(37)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	83.7467	150.1975	224.8774	310.0037	375.0678	384.3881	365.5994	315.3595	254.1632	171.2880	101.6997	70.7612	(83)
Total gains	620.0453	698.4992	750.8175	817.8179	857.9910	847.6271	811.7096	762.5586	714.5563	649.8760	608.6818	596.4129	(84)

7. Mean internal temperature

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Living room temperature during heating periods Th1												21.0000	(85)
Heating system responsiveness												1.0000	

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tau	23.6770	23.7389	23.7999	24.0906	24.1458	24.4060	24.4060	24.4549	24.3051	24.1458	24.0344	23.9191	
alpha	2.5785	2.5826	2.5867	2.6060	2.6097	2.6271	2.6271	2.6303	2.6203	2.6097	2.6023	2.5946	
external 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	
util living area	0.9371	0.9142	0.8804	0.8108	0.7057	0.5617	0.4349	0.4737	0.6601	0.8328	0.9119	0.9423	(86)
MIT 1	18.5731	18.8753	19.3210	19.9235	20.4324	20.7828	20.9194	20.8970	20.6484	20.0030	19.2072	18.5292	(87)
th2	19.9415	19.9440	19.9464	19.9577	19.9599	19.9698	19.9698	19.9716	19.9660	19.9599	19.9556	19.9511	(88)
util rest	0.9283	0.9024	0.8634	0.7830	0.6608	0.4930	0.3451	0.3834	0.5962	0.8023	0.8978	0.9342	(89)
MIT 2	17.1310	17.5106	18.0683	18.8128	19.4127	19.7992	19.9242	19.9098	19.6682	18.9258	17.9409	17.0816	(90)
Living area fraction =												0.1940	(91)
MIT	17.4108	17.7753	18.3113	19.0283	19.6105	19.9900	20.1173	20.1013	19.8583	19.1348	18.1866	17.3624	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.4108	17.7753	18.3113	19.0283	19.6105	19.9900	20.1173	20.1013	19.8583	19.1348	18.1866	17.3624	(93)

8. Space heated requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8991	0.8704	0.8302	0.7538	0.6440	0.4944	0.3586	0.3954	0.5888	0.7731	0.8663	0.9063	(94)
Useful gains W	557.5056	607.9488	623.3026	616.4889	552.5119	419.1001	291.0721	301.5513	420.7577	502.3887	527.2858	540.5038	(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	1176.6849	1152.5431	1054.5837	893.4029	696.1784	469.3018	306.2455	321.6242	503.4513	751.1226	980.2163	1169.3629	(97)
Month fraction	1.0000	1.0000	1.0000	1.0000	1.0000	0.0000	0.0000	0.0000	0.0000	1.0000	1.0000	1.0000	(97a)
Space heating requirement for	460.6694	365.9674	320.8731	199.3781	106.8879	0.0000	0.0000	0.0000	0.0000	185.0580	326.1100	467.8712	(98a)
Solar space heating contribution	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)
Total space heating requirement	460.6694	365.9674	320.8731	199.3781	106.8879	0.0000	0.0000	0.0000	0.0000	185.0580	326.1100	467.8712	(98)
Space heating per m2												31.8015	(99)

9. Energy requirements

Fraction of space heat from secondary	0.0000	(201)
Fraction of space heat from main system	1.0000	(202)
Fraction of total space heat from main system 1	1.0000	(204)

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Efficiency of main heating system 1	92.3000	(206)
Efficiency of water heater	79.8000	(216)
micro-CHP export	0.0000	(235d)
Space heating fuel - main system 1	2635.7693	(211)
Water heating fuel	2811.6122	(219)
central heating pump	41.0000	(230c)
boiler flue fan	45.0000	(230e)
Electricity for pumps and fans	86.0000	(231)
Electricity for lighting	190.9565	(232)
PV generation	-1996.8712	(233)
Micro-CHP generation	0.0000	(235)
Total delivered energy for all uses	3727.4669	(238)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (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 fuel (main heating system)	499.1001	396.4977	347.6415	216.0109	115.8048	0.0000	0.0000	0.0000	0.0000	200.4962	353.3152	506.9027	(211)
Water heating requirement	230.2388	203.6663	216.7154	191.6131	186.4145	168.7241	167.1689	173.4579	174.9514	194.1633	205.2868	227.8878	(64)
Water heating efficiency	85.5835	85.3580	84.9383	84.1490	82.8605	79.8000	79.8000	79.8000	79.8000	83.9522	85.0926	85.6365	(217)
Water heating fuel detail	269.0225	238.6023	255.1446	227.7069	224.9740	211.4337	209.4849	217.3658	219.2373	231.2785	241.2512	266.1105	(219)
Space cooling fuel total	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)
PV Generation in dwelling	37.3064	52.3385	74.8679	83.7598	89.9716	83.8591	82.8298	78.3734	70.4416	59.6659	40.9266	32.2845	(233a)
Wind Generation in dwelling	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)
Hydro Generation in dwelling	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)
micro-CHP in dwelling	-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)
PV Generation export	21.8471	45.8757	91.0303	136.5022	180.2780	181.0571	178.9173	151.5746	111.2205	65.5207	29.1414	17.2815	(233b)
Wind Generation export	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)
Hydro Generation export	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)

12. Carbon dioxide emmissions

Space heating - main system	2635.7693	0.2100	553.5116	(261)

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Water heating	2811.6122	0.2100	590.4386	(264)
Space and water heating			1143.9501	(265)
Pumps and fans	86.0000	0.1388	11.9293	(267)
Energy for lighting	0.0000	0.1360	27.5609	(268)
Electricity generated - PVs	-1996.8712	1.6660	-258.3733	(269)
Electricity generated - wind	-0.0000	1.6660	-0.0000	(269)
Electricity generated - hydro	-0.0000	1.6660	-0.0000	(269)
Electricity generated - mCHP	-0.0000	1.6660	-0.0000	(269)
Total kg\/year			925.0670	(272)

13. Primary energy				
Space heating - main system	2635.7693	13.5600	2978.4194	(275)
Water heating	2811.6122	13.5600	3177.1218	(278)
Space and water heating			6155.5412	(279)
Pumps and fans	86.0000	1.5133	130.1008	(281)
Energy for lighting	190.9565	1.5133	292.8955	(282)
Electricity generated - PVs	-1996.8712	18.1590	-1737.7037	(283)
Electricity generated - wind	-0.0000	18.1590	-0.0000	(283)
Electricity generated - hydro	-0.0000	18.1590	-0.0000	(283)
Electricity generated - mCHP	-0.0000	18.1590	-0.0000	(283)
Total kg\/year			4840.8338	(286)
EI value			89.7976	
Target Carbon Dioxide EmissionRate(TER)			12.09	(273)
Target Primary Energy Rate (TPER)			63.28	(287)

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