

SAP 10 WORKSHEET (Version 10.2, December 2021)

CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

Date 15/10/2025



Complete Energy Consultancy Ltd

The Exchange
Brickrow
Stroud
Tel: [REDACTED]

Property			
UPRN	UPRN-0000000000		Project Type
Address	New Unit, 16 Cherry Lane, Bristol, BS1 3NG		Dwelling Type
			New dwelling created by change of use
			Ground-floor flat

1 Overall dwelling dimensions			
Ground floor	54.8000	2.3500	128.7800 (1b) – (3b)
Total floor area			54.8000 (4)
Dwelling volume (m ³)			128.7800 (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													20 (7a)
Number of passive vents													0 (7b)
Number of flueless gas fires													0 (7c)
Infiltration due to chimneys, flues and fans													0.1553 (8)
q50 measured in this dwelling													15.0000 (17)
Infiltration rate													0.9053 (18)
Number of sides sheltered													2 (19)
Shelter factor													0.8500 (20)
Infiltration rate incorporating shelter factor													0.7695 (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	0.9811	0.9619	0.9426	0.8465	0.8272	0.7310	0.7310	0.7118	0.7695	0.8272	0.8657	0.9042	(22b)
Effective ach	0.9813	0.9626	0.9443	0.8582	0.8421	0.7672	0.7672	0.7533	0.7961	0.8421	0.8747	0.9088	(25)

3. Heat losses and heat loss parameter

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							Net area	U-value	A x U	K Value	A x K			
							(m²)	(W/m²K)	(W/K)	kJ/m²K)	(kJ/K)			
Windows (1)									10.0800	1.3258	13.3636	(27)		
groundFloor							54.8000	0.2500	13.7000	110.0000	6028.0000	(28a)		
exposeWall							.9200	0.3000	1.7760	9.0000	53.2800	(29a)		
Total area of external elements:											70.8000	(31)		
partyWall									55.0000	70.0000	3850.0000	(32)		
Fabric heat loss:											28.8396	(33)		
partyCeiling									4.8000	30.0000	1644.0000	(32b)		
Heat capacity:											11575.2800	(34)		
Thermal mass parameter:											250.0000	(35)		
Thermal bridges:											14.1600	(36)		
Total fabric heat loss :											42.9996	(37)		
		Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec		
Vent loss	41.7027	40.9085	40.1300	36.4732	35.7891	32.6042	32.6042	32.0144	33.8310	35.7891	37.1731	38.6201	(38)	
Heat transfer coeff	84.7024	83.9081	83.1296	79.4729	78.7887	75.6038	75.6038	75.0140	76.8306	78.7887	80.1728	81.6197	(39)	
Heat transfer coeff (average)													79.4696	(39)
HLP	1.5457	1.5312	1.5170	1.4502	1.4378	1.3796	1.3796	1.3689	1.4020	1.4378	1.4630	1.4894	(40)	
HLP (average)													1.4502	(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 pump calculation Output power													5400.0000	
Design heat loss													1923.1642	
Plant size ratio													2.8079	
Service provision							space	and	water	heating	all	year		
DHW vessel										integral	within	package		
Heating duration													variable	
Secondary fraction													0.0000	
Space heating thermal efficiency													301.6054	
Summer thermal efficiency													296.1150	
Net space heating specific electricity generated													0.0000	
Net water heating specific electricity generated													0.0000	
Net annual electricity generated													0.0000	

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Heat losses and heat loss parameter	complete
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4. Water heating energy requirements												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Assumed occupancy												1.8315 (42)
Average daily hot water use (litres/day)												95.3553 (43)
Mixer shower usage	70.5059	69.4463	67.9023	64.9482	62.7681	60.3369	58.9550	60.4873	62.1670	64.7774	67.7950	70.2358 (42a)
Bath usage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42b)
Other usage	33.3864	32.1723	30.9583	29.7442	28.5302	27.3161	27.3161	28.5302	29.7442	30.9583	32.1723	33.3864 (42c)
Daily hot water use	103.8923	101.6187	98.8606	94.6924	91.2983	87.6530	86.2711	89.0174	91.9112	95.7356	99.9673	103.6221 (44)
Energy content	164.5400	144.7036	151.9451	129.6292	122.9050	107.7796	104.3374	110.2222	113.3357	129.9123	142.4217	162.2472 (45)
Energy content(annual)												1583.9789 (45)
Distribution loss	24.6810	21.7055	22.7918	19.4444	18.4358	16.1669	15.6506	16.5333	17.0004	19.4869	21.3633	24.3371 (46)
Cylinder volume												200.0000 (47)
Measured cylinder loss (kWh/day)												1.5900 (48)
Temperature factor												0.5400 (49)
Energy lost from water storage (kWh/day)												0.8586 (50)
Energy lost from cylinder in kWh/day												0.8586 (55)
Total storage loss	26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166 (56)
Net storage loss	26.6166	24.0408	26.6166	25.7580	26.6166	25.7580	26.6166	26.6166	25.7580	26.6166	25.7580	26.6166 (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	191.1566	168.7444	178.5617	155.3872	149.5216	133.5376	130.9540	136.8388	139.0937	156.5289	168.1797	188.8638 (62)
WWHRS 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 (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.	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (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	191.1566	168.7444	178.5617	155.3872	149.5216	133.5376	130.9540	136.8388	139.0937	156.5289	168.1797	188.8638 (64)
Output from water heater(annual)												1897.3679 (64)

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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	0.0000	(64a)
Heat gains (kWh)	54.7095	48.1140	50.5217	43.1017	40.8659	35.8367	34.6922	36.6489	37.6841	43.1959	47.3552	53.9472	(65)	

5. Internal gains													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	91.5748	(66)
Lighting	81.9794	90.7630	81.9794	84.7121	81.9794	84.7121	81.9794	81.9794	84.7121	81.9794	84.7121	81.9794	(67)
Appliances	159.6700	161.3269	157.1517	148.2630	137.0427	126.4971	119.4521	117.7952	121.9704	130.8591	142.0794	152.6250	(68)
Cooking	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	32.1575	(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	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	-73.2599	(71)
Water heating	73.5343	71.5981	67.9056	59.8635	54.9273	49.7732	46.6293	49.2592	52.3390	58.0589	65.7711	72.5097	(72)
Total internal	365.6563	374.1605	357.5091	343.3110	324.4219	311.4549	298.5332	299.5063	309.4940	321.3700	343.0351	357.5866	(73)

6. Solar gains													
Windows (1)										10.0800	1.3258	13.3636	(27)
groundFloor							54.8000	0.2500	13.7000	110.0000	6028.0000		(28a)
exposeWall							.9200	0.3000	1.7760	9.0000	53.2800		(29a)
Total area of external elements:												70.8000	(31)
partyWall										55.0000	70.0000	3850.0000	(32)
Fabric heat loss:												28.8396	(33)
partyCeiling										4.8000	30.0000	1644.0000	(32b)
Heat capacity:												11575.2800	(34)
Thermal mass parameter:												250.0000	(35)
Thermal bridges:												14.1600	(36)
Total fabric heat loss :												42.9996	(37)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	113.3463	193.0707	264.1677	327.3166	366.6219	363.9707	350.9066	321.5831	286.0378	213.3843	135.7628	97.0008	(83)
Total gains	479.0026	567.2312	621.6769	670.6277	691.0438	675.4256	649.4398	621.0894	595.5319	534.7542	478.7979	454.5874	(84)

7. Mean internal temperature													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	

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Living room temperature during heating periods Th1	21.0000 (85)											
Heating system responsiveness	0.7500											
tau	44.9286	45.3538	45.7786	47.8850	48.3008	50.3355	50.3355	50.7312	49.5318	48.3008	47.4669	46.6254
alpha	3.9952	4.0236	4.0519	4.1923	4.2201	4.3557	4.3557	4.3821	4.3021	4.2201	4.1645	4.1084
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	0.9912	0.9821	0.9657	0.9211	0.8313	0.6593	0.4983	0.5360	0.7614	0.9357	0.9829	0.9928 (86)
MIT 1	20.3026	19.8342	20.0917	20.4479	20.7062	20.8747	20.9163	20.9122	20.8206	20.4820	20.0322	19.8421 (87)
th2	19.6534	19.6642	19.6748	19.7250	19.7345	19.7790	19.7790	19.7873	19.7618	19.7345	19.7154	19.6955 (88)
util rest	0.9882	0.9761	0.9538	0.8931	0.7714	0.5558	0.3670	0.4043	0.6676	0.9069	0.9761	0.9904 (89)
MIT 2	19.0349	18.3596	18.6907	19.1639	19.4618	19.6587	19.6843	19.6913	19.6022	19.2206	18.6512	18.4325 (90)
Living area fraction =	0.2974 (91)											
MIT	19.4119	18.7982	19.1074	19.5458	19.8319	20.0204	20.0507	20.0545	19.9646	19.5958	19.0620	18.8518 (92)
Temperature adjustment	0.0000											
adjusted MIT	19.4119	18.7982	19.1074	19.5458	19.8319	20.0204	20.0507	20.0545	19.9646	19.5958	19.0620	18.8518 (93)

8. Space heated requirement												
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9876	0.9710	0.9472	0.8883	0.7767	0.5777	0.3972	0.4344	0.6848	0.9029	0.9715	0.9883 (94)
Useful gains W	473.0529	550.7584	588.8570	595.7194	536.7215	390.1661	257.9276	269.8306	407.7966	482.8387	465.1323	449.2511 (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	1280.0177	1166.1752	1048.0488	846.0525	640.7031	409.8010	260.8886	274.1355	450.5817	708.7702	959.0245	1195.8727 (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	600.3818	413.5601	341.6387	180.2399	77.3623	0.0000	0.0000	0.0000	0.0000	168.0930	355.6024	555.4865 (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	600.3818	413.5601	341.6387	180.2399	77.3623	0.0000	0.0000	0.0000	0.0000	168.0930	355.6024	555.4865 (98)
Space heating per m2	49.1307 (99)											

9. Energy requirements												
Fraction of space heat from secondary	0.0000 (201)											
Fraction of space heat from main system	1.0000 (202)											

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Fraction of total space heat from main system 1	1.0000												(204)
Efficiency of main heating system 1	301.6054												(206)
Efficiency of secondary heating system	100.0000												(208)
Efficiency of water heater	296.1150												(216)
micro-CHP export	0.0000												(235d)
Space heating fuel - main system 1	892.6779												(211)
Water heating fuel	640.7537												(219)
Electricity for pumps and fans	0.0000												(231)
Electricity for lighting	127.9183												(232)
PV generation	-0.0000												(233)
Micro-CHP generation	0.0000												(235)
Total delivered energy for all uses	1661.3499												(238)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating efficiency (main heating system)	301.6054	301.6054	301.6054	301.6054	301.6054	0.0000	0.0000	0.0000	0.0000	301.6054	301.6054	301.6054	(210)
Space heating fuel (main heating system)	199.0620	137.1196	113.2734	59.7602	25.6502	0.0000	0.0000	0.0000	0.0000	55.7328	117.9032	184.1766	(211)
Water heating requirement	191.1566	168.7444	178.5617	155.3872	149.5216	133.5376	130.9540	136.8388	139.0937	156.5289	168.1797	188.8638	(64)
Water heating efficiency	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	296.1150	(217)
Water heating fuel detail	64.5548	56.9861	60.3015	52.4753	50.4944	45.0965	44.2240	46.2114	46.9729	52.8609	56.7954	63.7806	(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	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)
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	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)
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)

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12. Carbon dioxide emissions				
Space heating - main system	892.6779	0.1360	139.0524	(261)
Water heating	640.7537	0.1360	90.4238	(264)
Space and water heating			229.4762	(265)
Energy for lighting	0.0000	0.1360	18.4626	(268)
Electricity generated - PVs	-0.0000	1.6660	-0.0000	(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			247.9388	(272)

13. Primary energy				
Space heating - main system	892.6779	18.1590	1407.4509	(275)
Water heating	640.7537	18.1590	975.1151	(278)
Space and water heating			2382.5660	(279)
Pumps and fans	0.0000	1.5133	0.0000	(281)
Energy for lighting	127.9183	1.5133	196.2053	(282)
Electricity generated - PVs	-0.0000	18.1590	-0.0000	(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			2578.7714	(286)
EI value			96.6710	
Dwelling Carbon Dioxide Emission Rate (DER)			4.52	(273) / (384)
Dwelling Primary Energy Rate (DPER)			47.06	(287) / (484)