SAP 10.02 Input Data (House) 15/06/2026

Full RefNo	001431
Inspection date	25/06/2025 00:00:00
Regs Region	England
SAP Region	Thames Valley
Property address	28 Distillery Wharf, 28 Distillery Wharf London
Postcode	W6 9BF
Dwelling Orientation	North
Property Type	House, End-Terrace
Storeys	2
Property Age Band	A
Sheltered Sides	1
Sunlight Shade	Average or unknown
Measurements	Perimeter, Floor Area, Storey Height
1st Storey:	12.16, 24.00, 2.40
2nd Storey:	13.86, 24.00, 2.75
Living Area	14.4 m2, fraction: 30.0%
Thermal Mass	Enter TMP value
Thermal MassValue	250.00
External Walls	Nett Area, Gross Area, Kappa, Element, Construction, Type, ShelterFactor, UValueFinal
External walls Main	54.44, 63.90, 17, SolidWallDensePlasterInsul, Solid, 0.0, 1.40, Gross
External walls Main alt.	13.40, 3.40, 17, SolidWallDensePlasterInsul, Solid, 0.0, 1.40, Gross
Party Walls	Area, Kappa, Element, Construction, Type, ShelterFactor, UValueFinal
Party walls Main	36.36, 0, Other, Solid, 0, 0.00
External Roofs	Nett Area, Gross Area, Kappa, Construction, Element, UValueFinal
External roof Main	24.00, 24.00, 9, Plasterboard, insulated slope, 0.21
Heat Loss Floors	Area, Kappa, Construction, Element, Type, ShelterFactor, UValueFinal
Ground floor Main	24.00, 0.00, Other, Ground Floor - Solid, 0.00, 0.70
Description	Data Source, Type, Glazing, Glazing Gap, Argon Filled, Solar Trans, Frame Type, Frame Factor, U Value
Doors uninsulated 1	Manufacturer, Solid Door, , , , , , ,
Windows 1	Manufacturer, Window, Double glazed, , , 0.76, , 0.7,
Openings	Opening Type, Location, Orientation, Pitch, Width, Height, Count, Area
Doors uninsulated	Solid Door, External walls Main, East, , 3.7, 1, 1, 3.70
Windows 1(Main)	Window, External walls Main, North, , 1.44, 1, 1, 1.44
Windows 2(Main)	Window, External walls Main, East, , 1.44, 1, 1, 1.44
Windows 2(Main)	Window, External walls Main, South, , 1.44, 1, 1, 1.44
Windows 2(Main)	Window, External walls Main, West, , 1.44, 1, 1, 1.44
Conservatory	None
Draught Proofing	100
Draught Lobby	No
Thermal Bridges	
Bridging	User Input
Y	0.15
Description	RDSAP conversion
List of Bridges	Junction with, Bridge Type, Source Type, Imported, Length, Psi, Adjusted, Result, Reference
0.	External wall, E22 Basement floor, Table K1 - Default, No, 1.00, 0.220, 0.220, 0.22, TER
Pressure Test	False
Pressure Test Method	Blower Door
Designed AP50	15.00
AsBuilt AP50	0.00
Property Tested	True
Mechanical Ventilation	None
Open Chimneys	0
Open Flues	0
Chimneys/Flues Attached to Closed Fire	0
Flues Attached to Solid Fuel Boiler	0
Flues Attached to Other Heater	0
Blocked chimneys	0
Intermittent Fans	0
Passive Vents	0
Flueless Gas Fires	0
Cooling System	None
Lightings	Name, Power, Efficacy, Capacity, Count
LED lights	9, 100.0, 900, 6
Percentage of LEL Fittings	100.00
Electricity Tariff	7 Hour Off Peak
Main Heating 1	
Description	
Percentage	100
FuelType	Electricity
SAP Code	409
Boiler Efficiency Type	SAP Table
MHS Controls	2404 Controls for high heat retention storage heaters
Boiler Interlock	No
Ctrl SAP Code	2404
Main Heating 2	None
Smoke Control Area	Unknown
Community Heating	None
Secondary Heating	
Description	Electricity Electric Panel, convector or radiant heaters
SAP Code	691
Efficiency	100
Water Heating	
Type	Independent
WHS	903 Electric immersion
Low Water Usage	No
SAP Code	903
Immersion Heater Type	Dual
Cold Water Source	From mains
Total number of baths in	property2
Hot Water Cylinder	
Cylinder Type	HotWaterCylinder
Cylinder Insulation Type	Foam
Cylinder Volume	110.00
Cylinder in Heated Space	Yes
Showers	Description, Type, Flow rate, Rated power, Connected, Connected WWHRS
Shower 01	Vented hot water system, 7.00, , No,
Flue Gas Heat Recovery System	None
Waste Water Heat Recovery	none
PV Unit	None
Terrain Type	Urban
Wind Turbine	None
Small Scale Hydro	None
Special Features	None

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)
Main dwelling					
Ground floor	24.0000 (1b)	x	2.4000 (2b)	=	57.6000 (1b) - (3b)
First floor	24.0000 (1c)	x	2.7500 (2c)	=	66.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000				(4)

Dwelling volume (3a)+(3b)+(3c)+(3d)+(3e)...(3n) = 123.6000 (5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Number of storeys in the dwelling (ns)		2 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0.0000 (12)
If no draught lobby, enter 0.05, else enter 0		0.0500 (13)
Percentage of windows and doors draught stripped		100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] =	0.0500 (15)
Pressure test		No
Infiltration rate		0.5500 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5088 (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	0.6487	0.6359	0.6232	0.5596	0.5469	0.4833	0.4833	0.4706	0.5088	0.5469	0.5723	0.5978	(22b)
Effective ac	0.7104	0.7022	0.6942	0.6566	0.6496	0.6168	0.6168	0.6107	0.6294	0.6496	0.6638	0.6787	(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								
Doors uninsulated 1			3.7000	3.0000	11.1000			(26)
Windows 1			5.7600	2.5180	14.5036			(27)
Ground floor Main			24.0000	0.7000	16.8000			(28a)
External walls Main	63.9000	9.4600	54.4400	1.4000	76.2160			(29a)
External walls Main alt.1	3.4000		3.4000	1.4000	4.7600			(29a)
External roof Main	24.0000		24.0000	0.2100	5.0400			(30)
Total net area of external elements Aum(A, m2)			115.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		128.4196			(33)
Main dwelling								
Party walls Main			36.3600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000	(35)
Thermal bridges (User defined value 0.150 * total exposed area)							17.2950	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		145.7146	(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	28.9749	28.6417	28.3151	26.7810	26.4940	25.1579	25.1579	24.9104	25.6725	26.4940	27.0746	27.6816	(38)
Heat transfer coeff	174.6895	174.3563	174.0297	172.4956	172.2086	170.8725	170.8725	170.6250	171.3871	172.2086	172.7892	173.3962	(39)
Average = Sum(39)m / 12 =												172.4942	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.6394	3.6324	3.6256	3.5937	3.5877	3.5598	3.5598	3.5547	3.5706	3.5877	3.5998	3.6124	(40)
HLP (average)												3.5936	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6314 (42)

Hot water usage for mixer showers

45.1263	44.4481	43.4599	41.5692	40.1738	38.6178	37.7333	38.7140	39.7891	41.4598	43.3912	44.9534	(42a)

Hot water usage for baths

23.4750	23.1264	22.6354	21.7302	21.0524	20.3008	19.8948	20.3823	20.9131	21.7174	22.6412	23.3957	(42b)

Hot water usage for other uses

32.9866	31.7871	30.5876	29.3881	28.1886	26.9891	26.9891	28.1886	29.3881	30.5876	31.7871	32.9866	(42c)

Average daily hot water use (litres/day) 93.3578 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	101.5880	99.3617	96.6830	92.6875	89.4148	85.9076	84.6171	87.2849	90.0903	93.7648	97.8196	101.3357	(44)
Energy conte	160.8905	141.4897	148.5981	126.8845	120.3695	105.6334	102.3371	108.0770	111.0904	127.2380	139.3619	158.6672	(45)
Energy content (annual)										Total = Sum(45)m =		1550.6372	

Distribution loss (46)m = 0.15 x (45)m

24.1336	21.2235	22.2897	19.0327	18.0554	15.8450	15.3506	16.2115	16.6636	19.0857	20.9043	23.8001	(46)

Water storage loss (or HIU loss):

Store volume 110.0000 (47)

b) If manufacturer declared loss factor is not known :

Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0181 (51)

Volume factor from Table 2a 1.0294 (52)

Temperature factor from Table 2b 0.6000 (53)

Enter (49) or (54) in (55) 1.2294 (55)

Total storage loss

38.1124	34.4241	38.1124	36.8830	38.1124	36.8830	38.1124	38.1124	36.8830	38.1124	36.8830	38.1124	(56)

If cylinder contains dedicated solar storage

38.1124	34.4241	38.1124	36.8830	38.1124	36.8830	38.1124	38.1124	36.8830	38.1124	36.8830	38.1124	(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

199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796	(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

199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796	(64)

Total per year (kWh/year) = Sum(64)m = 1999.3798 (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

83.9860	74.5846	79.8988	71.6955	70.5128	64.6295	64.5170	66.4255	66.4439	72.7965	75.8442	83.2468	(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	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

17.5653	15.6014	12.6879	9.6055	7.1803	6.0619	6.5501	8.5140	11.4275	14.5098	16.9351	18.0535	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

212.0023	214.2022	208.6585	196.8565	181.9587	167.9568	158.6027	156.4028	161.9465	173.7485	188.6463	202.6482	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199 (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)												
	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566 (71)
Water heating gains (Table 5)												
	112.8844	110.9890	107.3908	99.5770	94.7752	89.7632	86.7164	89.2816	92.2832	97.8448	105.3392	111.8908 (72)
Total internal gains												
	421.5002	419.8407	407.7854	385.0873	362.9623	342.8300	330.9174	333.2466	344.7054	365.1513	389.9688	411.6407 (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	1.4400	10.6334	0.7600	0.7000	0.7700	5.6452 (74)
East	1.4400	19.6403	0.7600	0.7000	0.7700	10.4269 (76)
South	1.4400	46.7521	0.7600	0.7000	0.7700	24.8204 (78)
West	1.4400	19.6403	0.7600	0.7000	0.7700	10.4269 (80)

Solar gains	51.3193	92.2320	137.2945	185.9502	220.7307	224.0764	214.0164	187.6669	154.2674	105.0922	62.3869	43.3023 (83)
Total gains	472.8195	512.0727	545.0799	571.0375	583.6931	566.9065	544.9338	520.9135	498.9728	470.2435	452.3557	454.9430 (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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
tau	19.0815	19.1179	19.1538	19.3242	19.3564	19.5077	19.5077	19.5360	19.4491	19.3564	19.2913	19.2238
alpha	2.2721	2.2745	2.2769	2.2883	2.2904	2.3005	2.3005	2.3024	2.2966	2.2904	2.2861	2.2816
util living area												
	0.9865	0.9829	0.9759	0.9620	0.9347	0.8801	0.7994	0.8236	0.9154	0.9651	0.9821	0.9878 (86)
MIT	17.8799	18.0583	18.4406	18.9921	19.5869	20.1556	20.5013	20.4519	19.9938	19.2391	18.4750	17.8543 (87)
Th 2	18.4644	18.4671	18.4698	18.4825	18.4849	18.4962	18.4962	18.4983	18.4918	18.4849	18.4801	18.4750 (88)
util rest of house												
	0.9811	0.9757	0.9647	0.9407	0.8863	0.7508	0.5057	0.5597	0.8233	0.9406	0.9730	0.9828 (89)
MIT 2	15.1565	15.3848	15.8725	16.5760	17.3148	17.9776	18.2829	18.2563	17.8116	16.8949	15.9243	15.1288 (90)
Living area fraction										fLA = Living area / (4) =		0.3000 (91)
MIT	15.9735	16.1868	16.6429	17.3008	17.9964	18.6310	18.9485	18.9150	18.4663	17.5982	16.6895	15.9464 (92)
Temperature adjustment												0.0000
adjusted MIT	15.9735	16.1868	16.6429	17.3008	17.9964	18.6310	18.9485	18.9150	18.4663	17.5982	16.6895	15.9464 (93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Utilisation	0.9720	0.9650	0.9514	0.9245	0.8715	0.7616	0.5854	0.6273	0.8218	0.9260	0.9621	0.9744 (94)
Useful gains	459.5908	494.1298	518.5688	527.9409	508.6815	431.7338	318.9847	326.7607	410.0466	435.4526	435.2090	443.2998 (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												
	2039.2454	1967.9312	1765.1697	1449.1018	1084.2957	688.7818	401.2855	429.1173	748.3201	1205.1456	1656.9627	2036.7892 (97)
Space heating kWh												
	1175.2631	990.3945	927.4711	663.2359	428.2570	0.0000	0.0000	0.0000	0.0000	572.6516	879.6626	1185.5562 (98a)
Space heating requirement - total per year (kWh/year)												6822.4921
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												
	1175.2631	990.3945	927.4711	663.2359	428.2570	0.0000	0.0000	0.0000	0.0000	572.6516	879.6626	1185.5562 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												6822.4921
Space heating per m2											(98c) / (4) =	142.1353 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.1000 (201)
Fraction of space heat from main system(s)												0.9000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												
	1175.2631	990.3945	927.4711	663.2359	428.2570	0.0000	0.0000	0.0000	0.0000	572.6516	879.6626	1185.5562 (98)
Space heating efficiency (main heating system 1)												
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)												
	1057.7368	891.3551	834.7240	596.9123	385.4313	0.0000	0.0000	0.0000	0.0000	515.3865	791.6964	1067.0005 (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)												
	117.5263	99.0395	92.7471	66.3236	42.8257	0.0000	0.0000	0.0000	0.0000	57.2652	87.9663	118.5556 (215)
Water heating												
Water heating requirement												
	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796 (64)
Efficiency of water heater												100.0000 (216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (217)
Fuel for water heating, kWh/month												
	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796 (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	15.3748	12.3342	11.1056	8.1365	6.2848	5.1348	5.7332	7.4523	9.6798	12.7004	14.3450	15.8021 (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												6140.2429 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												682.2492 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1999.3798 (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)												124.0836 (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	8945.9555 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1 (high-rate cost)	0.0000	5.5000	0.0000	(240)
Space heating - main system 1 (low-rate cost)	6140.2429	0.0550	337.7134	(240)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary (1.00*15.29 + 0.00*5.50)	682.2492	15.2900	104.3159	(242)
Water heating (electric off-peak tariff)				
High-rate fraction			0.1309	(243)
Low-rate fraction			0.8691	(244)
High-rate cost	261.6525	15.2900	40.0067	(245)
Low-rate cost	1737.7274	5.5000	95.5750	(246)
Energy for instantaneous electric shower(s)	0.0000	14.3110	0.0000	(247a)
Pumps, fans and electric keep-hot (0.90*15.29 + 0.10*5.50)	0.0000	0.0000	0.0000	(249)
Energy for lighting (0.90*15.29 + 0.10*5.50)	124.0836	14.3110	17.7576	(250)
Additional standing charges			24.0000	(251)
Total energy cost			619.3685	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.4200 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.7971 (257)
SAP value		60.9798
SAP rating (Section 12)		61 (258)
SAP band		D

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 (high-rate cost)	0.0000	0.0000	0.0000	(261)
Space heating - main system 1 (low-rate cost)	6140.2429	0.1352	830.3362	(261)
Total CO2 associated with community systems			0.0000	(373)
Space heating - secondary	682.2492	0.1611	109.8870	(263)
Water heating - high rate cost	261.6525	0.1479	38.6918	(264)
Water heating - low rate cost	1737.7274	0.1241	215.6657	(264)
Space and water heating			1194.5807	(265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000	(267)
Energy for lighting	124.0836	0.1490	18.4909	(268)
Total CO2, kg/year			1213.0716	(272)
CO2 emissions per m2			25.2700	(273)
EI value			82.5213	
EI rating			83	(274)
EI band			B	

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Main dwelling						
Ground floor	24.0000 (1b)	x	2.4000 (2b)	=	57.6000 (1b) - (3b)	
First floor	24.0000 (1c)	x	2.7500 (2c)	=	66.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		123.6000	(5)

2. Ventilation rate

	m3 per hour	
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Number of storeys in the dwelling (ns)		2 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0.0000 (12)
If no draught lobby, enter 0.05, else enter 0		0.0500 (13)
Percentage of windows and doors draught stripped		100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] =	0.0500 (15)
Pressure test		No
Infiltration rate		0.5500 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5088 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	3.8000	3.7000	3.7000	3.5000	3.5000	3.1000	3.3000	3.0000	3.0000	3.1000	3.1000	3.5000	(22)
Wind factor	0.9500	0.9250	0.9250	0.8750	0.8750	0.7750	0.8250	0.7500	0.7500	0.7750	0.7750	0.8750	(22a)
Adj infilt rate	0.4833	0.4706	0.4706	0.4452	0.4452	0.3943	0.4197	0.3816	0.3816	0.3943	0.3943	0.4452	(22b)
Effective ac	0.6168	0.6107	0.6107	0.5991	0.5991	0.5777	0.5881	0.5728	0.5728	0.5777	0.5777	0.5991	(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								
Doors uninsulated 1			3.7000	3.0000	11.1000			(26)
Windows 1			5.7600	2.5180	14.5036			(27)
Ground floor Main			24.0000	0.7000	16.8000			(28a)
External walls Main	63.9000	9.4600	54.4400	1.4000	76.2160			(29a)
External walls Main alt.1	3.4000		3.4000	1.4000	4.7600			(29a)
External roof Main	24.0000		24.0000	0.2100	5.0400			(30)
Total net area of external elements Aum(A, m2)			115.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		128.4196			(33)
Main dwelling								
Party walls Main			36.3600	0.0000	0.0000			(32)

Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 250.0000 (35)
Thermal bridges (User defined value 0.150 * total exposed area) 17.2950 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 145.7146 (37)
Ventilation heat loss calculated monthly (38)m = 0.33 x (25)m x (5)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.1579	24.9104	24.9104	24.4354	24.4354	23.5644	23.9867	23.3632	23.3632	23.5644	23.5644	24.4354	(38)

Heat transfer coeff

	170.8725	170.6250	170.6250	170.1500	170.1500	169.2790	169.7013	169.0778	169.0778	169.2790	169.2790	170.1500	(39)

Average = Sum(39)m / 12 = 169.8555

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.5598	3.5547	3.5547	3.5448	3.5448	3.5266	3.5354	3.5225	3.5225	3.5266	3.5266	3.5448	(40)

HLP (average) 3.5387

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6314 (42)
Hot water usage for mixer showers

	45.1263	44.4481	43.4599	41.5692	40.1738	38.6178	37.7333	38.7140	39.7891	41.4598	43.3912	44.9534	(42a)

Hot water usage for baths

	23.4750	23.1264	22.6354	21.7302	21.0524	20.3008	19.8948	20.3823	20.9131	21.7174	22.6412	23.3957	(42b)

Hot water usage for other uses

	32.9866	31.7871	30.5876	29.3881	28.1886	26.9891	26.9891	28.1886	29.3881	30.5876	31.7871	32.9866	(42c)

Average daily hot water use (litres/day) 93.3578 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	101.5880	99.3617	96.6830	92.6875	89.4148	85.9076	84.6171	87.2849	90.0903	93.7648	97.8196	101.3357	(44)
Energy conte	160.8905	141.4897	148.5981	126.8845	120.3695	105.6334	102.3371	108.0770	111.0904	127.2380	139.3619	158.6672	(45)

Energy content (annual) Total = Sum(45)m = 1550.6372

Distribution loss (46)m = 0.15 x (45)m													
	24.1336	21.2235	22.2897	19.0327	18.0554	15.8450	15.3506	16.2115	16.6636	19.0857	20.9043	23.8001	(46)

Water storage loss (or HIU loss):
Store volume 110.0000 (47)
b) If manufacturer declared loss factor is not known :
Hot water storage loss factor from Table 2 (kWh/litre/day) 0.0181 (51)
Volume factor from Table 2a 1.0294 (52)
Temperature factor from Table 2b 0.6000 (53)
Enter (49) or (54) in (55) 1.2294 (55)
Total storage loss

	38.1124	34.4241	38.1124	36.8830	38.1124	36.8830	38.1124	38.1124	36.8830	38.1124	36.8830	38.1124	(56)

If cylinder contains dedicated solar storage

	38.1124	34.4241	38.1124	36.8830	38.1124	36.8830	38.1124	38.1124	36.8830	38.1124	36.8830	38.1124	(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

	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796	(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

	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796	(64)

Total per year (kWh/year) = Sum(64)m = 1999.3798 (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

	83.9860	74.5846	79.8988	71.6955	70.5128	64.6295	64.5170	66.4255	66.4439	72.7965	75.8442	83.2468	(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	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	17.5653	15.6014	12.6879	9.6055	7.1803	6.0619	6.5501	8.5140	11.4275	14.5098	16.9351	18.0535	(67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	212.0023	214.2022	208.6585	196.8565	181.9587	167.9568	158.6027	156.4028	161.9465	173.7485	188.6463	202.6482	(68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	(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)

	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	(71)

Water heating gains (Table 5)

	112.8844	110.9890	107.3908	99.5770	94.7752	89.7632	86.7164	89.2816	92.2832	97.8448	105.3392	111.8908	(72)

Total internal gains

	421.5002	419.8407	407.7854	385.0873	362.9623	342.8300	330.9174	333.2466	344.7054	365.1513	389.9688	411.6407	(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	1.4400	11.5683	0.7600	0.7000	0.7700	6.1415	(74)
East	1.4400	21.5704	0.7600	0.7000	0.7700	11.4516	(76)
South	1.4400	49.1384	0.7600	0.7000	0.7700	26.0873	(78)
West	1.4400	21.5704	0.7600	0.7000	0.7700	11.4516	(80)

Solar gains	55.1319	89.0840	133.4745	187.2388	216.7984	235.1623	223.9581	201.0718	164.8890	110.9665	69.2373	47.6411	(83)
Total gains	476.6321	508.9247	541.2599	572.3261	579.7607	577.9924	554.8755	534.3184	509.5944	476.1177	459.2061	459.2818	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	19.5077	19.5360	19.5360	19.5906	19.5906	19.6914	19.6424	19.7148	19.7148	19.6914	19.6914	19.5906	
alpha	2.3005	2.3024	2.3024	2.3060	2.3060	2.3128	2.3095	2.3143	2.3143	2.3128	2.3128	2.3060	
util living area													
	0.9839	0.9799	0.9703	0.9487	0.8999	0.7738	0.5848	0.6278	0.8619	0.9502	0.9770	0.9851	(86)
MIT	18.2089	18.3761	18.7906	19.3683	19.9980	20.5445	20.7912	20.7646	20.3246	19.6012	18.8155	18.1973	(87)
Th 2	18.4962	18.4983	18.4983	18.5023	18.5023	18.5098	18.5062	18.5115	18.5115	18.5098	18.5098	18.5023	(88)
util rest of house													
	0.9767	0.9707	0.9548	0.9148	0.8059	0.4647	1.0000	0.0353	0.6737	0.9081	0.9639	0.9784	(89)
MIT 2	15.5912	15.8047	16.3306	17.0561	17.8081	18.3139	19.2828	18.3762	18.1648	17.3573	16.3716	15.5797	(90)

Living area fraction fLA = Living area / (4) = 0.3000 (91)

MIT	16.3765	16.5761	17.0686	17.7497	18.4651	18.9831	19.7353	19.0927	18.8127	18.0304	17.1048	16.3650	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.3765	16.5761	17.0686	17.7497	18.4651	18.9831	19.7353	19.0927	18.8127	18.0304	17.1048	16.3650	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9665	0.9589	0.9402	0.8986	0.8038	0.5501	0.3269	0.2141	0.7095	0.8947	0.9515	0.9688	(94)
Useful gains	460.6801	488.0307	508.9084	514.2710	465.9954	317.9287	181.3916	114.3753	361.5331	425.9793	436.9393	444.9657	(95)
Ext temp.	5.6000	6.2000	8.0000	10.6000	13.7000	16.7000	18.6000	18.4000	15.7000	12.2000	8.5000	5.6000	(96)

Heat loss rate W

	1841.4096	1770.4267	1547.3298	1216.5266	810.7791	386.4840	192.6605	117.1200	526.2901	986.9705	1456.6085	1831.6628 (97)
Space heating kWh												
	1027.2627	861.7701	772.5855	505.6240	256.5191	0.0000	0.0000	0.0000	0.0000	417.3775	734.1618	1031.7027 (98a)
Space heating requirement - total per year (kWh/year)												5607.0035
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												
	1027.2627	861.7701	772.5855	505.6240	256.5191	0.0000	0.0000	0.0000	0.0000	417.3775	734.1618	1031.7027 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5607.0035
Space heating per m2											(98c) / (4) =	116.8126 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.1000 (201)
Fraction of space heat from main system(s)												0.9000 (202)
Efficiency of main space heating system 1 (in %)												100.0000 (206)
Efficiency of main space heating system 2 (in %)												0.0000 (207)
Efficiency of secondary/supplementary heating system, %												100.0000 (208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												
	1027.2627	861.7701	772.5855	505.6240	256.5191	0.0000	0.0000	0.0000	0.0000	417.3775	734.1618	1031.7027 (98)
Space heating efficiency (main heating system 1)												
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000 (210)
Space heating fuel (main heating system)												
	924.5365	775.5931	695.3270	455.0616	230.8672	0.0000	0.0000	0.0000	0.0000	375.6397	660.7456	928.5324 (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)												
	102.7263	86.1770	77.2586	50.5624	25.6519	0.0000	0.0000	0.0000	0.0000	41.7377	73.4162	103.1703 (215)
Water heating												
Water heating requirement												
	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796 (64)
Efficiency of water heater												100.0000 (216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000 (217)
Fuel for water heating, kWh/month												
	199.0029	175.9138	186.7105	163.7675	158.4819	142.5164	140.4495	146.1893	147.9733	165.3504	176.2449	196.7796 (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	15.3748	12.3342	11.1056	8.1365	6.2848	5.1348	5.7332	7.4523	9.6798	12.7004	14.3450	15.8021 (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												5046.3031 (211)
Space heating fuel - main system 2												0.0000 (213)
Space heating fuel - secondary												560.7003 (215)
Efficiency of water heater												100.0000
Water heating fuel used												1999.3798 (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)												124.0836 (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												7730.4669 (238)

10a. Fuel costs - using BEDF prices (595)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year
Space heating - main system 1 (high-rate cost)	0.0000	15.3000	0.0000 (240)
Space heating - main system 1 (low-rate cost)	5046.3031	0.1530	772.0844 (240)
Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary (1.00*33.70 + 0.00*15.30)	560.7003	33.7000	188.9560 (242)
Water heating (electric off-peak tariff)			
High-rate fraction			0.1309 (243)
Low-rate fraction			0.8691 (244)
High-rate cost	261.6525	33.7000	88.1769 (245)
Low-rate cost	1737.7274	15.3000	265.8723 (246)
Energy for instantaneous electric shower(s)	0.0000	31.8600	0.0000 (247a)
Pumps, fans and electric keep-hot (0.90*33.70 + 0.10*15.30)	0.0000	0.0000	0.0000 (249)
Energy for lighting (0.90*33.70 + 0.10*15.30)	124.0836	31.8600	39.5330 (250)
Additional standing charges			3.0000 (251)
Total energy cost			1357.6226 (255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year
Space heating - main system 1 (high-rate cost)	0.0000	0.0000	0.0000 (261)
Space heating - main system 1 (low-rate cost)	5046.3031	0.1360	686.2194 (261)
Total CO2 associated with community systems			0.0000 (373)
Space heating - secondary	560.7003	0.1620	90.8173 (263)
Water heating - high rate cost	261.6525	0.1479	38.6918 (264)
Water heating - low rate cost	1737.7274	0.1241	215.6657 (264)
Space and water heating			1031.3942 (265)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (267)
Energy for lighting	124.0836	0.1490	18.4909 (268)
Total CO2, kg/year			1049.8851 (272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year
Space heating - main system 1 (high-rate cost)	0.0000	0.0000	0.0000 (275)
Space heating - main system 1 (low-rate cost)	5046.3031	1.4918	7528.0648 (275)

Total CO2 associated with community systems			0.0000 (473)
Space heating - secondary	560.7003	1.6040	899.3753 (277)
Water heating - high rate cost	261.6525	1.5528	406.2841 (278)
Water heating - low rate cost	1737.7274	1.4441	2509.4875 (278)
Space and water heating			11343.2118 (279)
Pumps, fans and electric keep-hot	0.0000	0.0000	0.0000 (281)
Energy for lighting	124.0836	1.5547	192.9182 (282)
Total Primary energy kWh/year			11536.1300 (286)

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF ENERGY RATING FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)
Main dwelling					
Ground floor	24.0000 (1b)	x	2.4000 (2b)	=	57.6000 (1b) - (3b)
First floor	24.0000 (1c)	x	2.7500 (2c)	=	66.0000 (1c) - (3c)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000				(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		123.6000 (5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
		Air changes per hour
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Number of storeys in the dwelling (ns)		2 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0.0000 (12)
If no draught lobby, enter 0.05, else enter 0		0.0500 (13)
Percentage of windows and doors draught stripped		100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] =	0.0500 (15)
Pressure test		No
Infiltration rate		0.5500 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5088 (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	0.6487	0.6359	0.6232	0.5596	0.5469	0.4833	0.4833	0.4706	0.5088	0.5469	0.5723	0.5978	(22b)
Effective ac	0.7104	0.7022	0.6942	0.6566	0.6496	0.6168	0.6168	0.6107	0.6294	0.6496	0.6638	0.6787	(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								
Doors insulated 1			3.7000	1.4000	5.1800			(26)
Windows 1			5.7600	2.5180	14.5036			(27)
Ground floor Main			24.0000	0.2500	6.0000			(28a)
External walls Main	63.9000	9.4600	54.4400	0.3000	16.3320			(29a)
External walls Main alt.1	3.4000		3.4000	0.3000	1.0200			(29a)
External roof Main	24.0000		24.0000	0.2100	5.0400			(30)
Total net area of external elements Aum(A, m2)			115.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.0756			(33)
Main dwelling								
Party walls Main			36.3600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000	(35)
Thermal bridges (User defined value 0.150 * total exposed area)							17.2950	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		65.3706	(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	28.9749	28.6417	28.3151	26.7810	26.4940	25.1579	25.1579	24.9104	25.6725	26.4940	27.0746	27.6816	(38)
Heat transfer coeff	94.3455	94.0123	93.6857	92.1516	91.8646	90.5285	90.5285	90.2810	91.0431	91.8646	92.4452	93.0522	(39)
Average = Sum(39)m / 12 =												92.1502	
HLP	1.9655	1.9586	1.9518	1.9198	1.9138	1.8860	1.8860	1.8809	1.8967	1.9138	1.9259	1.9386	(40)
HLP (average)												1.9198	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6314 (42)
Hot water usage for mixer showers	45.1263	44.4481	43.4599	41.5692	40.1738	38.6178	37.7333	38.7140	39.7891	41.4598	43.3912	44.9534 (42a)
Hot water usage for baths	23.4750	23.1264	22.6354	21.7302	21.0524	20.3008	19.8948	20.3823	20.9131	21.7174	22.6412	23.3957 (42b)
Hot water usage for other uses	32.9866	31.7871	30.5876	29.3881	28.1886	26.9891	26.9891	28.1886	29.3881	30.5876	31.7871	32.9866 (42c)
Average daily hot water use (litres/day)												93.3578 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	101.5880	99.3617	96.6830	92.6875	89.4148	85.9076	84.6171	87.2849	90.0903	93.7648	97.8196	101.3357	(44)
Energy conte	160.8905	141.4897	148.5981	126.8845	120.3695	105.6334	102.3371	108.0770	111.0904	127.2380	139.3619	158.6672	(45)
Energy content (annual)										Total = Sum(45)m =		1550.6372	
Distribution loss (46)m = 0.15 x (45)m	24.1336	21.2235	22.2897	19.0327	18.0554	15.8450	15.3506	16.2115	16.6636	19.0857	20.9043	23.8001	(46)
Water storage loss (or HIU loss):													
Store volume												160.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												0.9086	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.3245	(55)
Total storage loss	41.0588	37.0854	41.0588	39.7344	41.0588	39.7344	41.0588	41.0588	39.7344	41.0588	39.7344	41.0588	(56)
If cylinder contains dedicated solar storage	27.4581	24.8009	27.4581	26.5724	27.4581	26.5724	27.4581	27.4581	26.5724	27.4581	26.5724	27.4581	(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	188.3486	166.2905	176.0562	153.4569	147.8276	132.2058	129.7952	135.5351	137.6627	154.6961	165.9343	186.1253	(62)

WWHRS	-27.0830	-23.9524	-25.0816	-20.7686	-19.3556	-16.5627	-15.5249	-16.5091	-17.1364	-20.2019	-22.8863	-26.5815	(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)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												4.0000	(H3)
Collector 2nd order heat loss coefficient												0.0100	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												0.9400	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												6.5667	(H11)
Dedicated solar storage volume												53.0000	(H12)
If combined cylinder, total volume of cylinder												160.0000	(H13)
Effective solar volume												85.1000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.2752	(H16)
Heat delivered to hot water												354.0448	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												354.0448	
Solar input	0.0000	0.0000	-29.5426	-47.6661	-66.1321	-60.9715	-60.6950	-51.6360	-31.4455	-5.9560	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													
	161.2656	142.3381	121.4320	85.0222	62.3399	54.6716	53.5753	67.3899	89.0808	128.5382	143.0480	159.5439	(64)
											Total per year (kWh/year) = Sum(64)m =	1268.2455	(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													
	75.4626	66.8860	71.3754	63.4470	61.9893	56.3810	55.9936	57.9021	58.1954	64.2731	67.5957	74.7233	(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	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	17.5653	15.6014	12.6879	9.6055	7.1803	6.0619	6.5501	8.5140	11.4275	14.5098	16.9351	18.0535	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	212.0023	214.2022	208.6585	196.8565	181.9587	167.9568	158.6027	156.4028	161.9465	173.7485	188.6463	202.6482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	(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)													
	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	(71)
Water heating gains (Table 5)													
	101.4282	99.5328	95.9346	88.1208	83.3190	78.3069	75.2602	77.8254	80.8270	86.3886	93.8830	100.4346	(72)
Total internal gains													
	410.0440	408.3845	396.3291	373.6310	351.5061	331.3738	319.4612	321.7904	333.2492	353.6951	378.5126	400.1844	(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	1.4400	10.6334	0.7600	0.7000	0.7700	5.6452	(74)
East	1.4400	19.6403	0.7600	0.7000	0.7700	10.4269	(76)
South	1.4400	46.7521	0.7600	0.7000	0.7700	24.8204	(78)
West	1.4400	19.6403	0.7600	0.7000	0.7700	10.4269	(80)

Solar gains	51.3193	92.2320	137.2945	185.9502	220.7307	224.0764	214.0164	187.6669	154.2674	105.0922	62.3869	43.3023	(83)
Total gains	461.3633	500.6165	533.6237	559.5813	572.2369	555.4502	533.4776	509.4573	487.5166	458.7873	440.8994	443.4868	(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, ni1,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	35.3311	35.4564	35.5800	36.1723	36.2853	36.8208	36.8208	36.9218	36.6127	36.2853	36.0574	35.8222	
alpha	3.3554	3.3638	3.3720	3.4115	3.4190	3.4547	3.4547	3.4615	3.4408	3.4190	3.4038	3.3881	
util living area													
	0.9885	0.9837	0.9736	0.9502	0.8989	0.7916	0.6519	0.6910	0.8615	0.9559	0.9826	0.9899	(86)
MIT	19.1851	19.3366	19.6191	20.0138	20.3948	20.7086	20.8491	20.8291	20.6009	20.1174	19.5943	19.1710	(87)
Th 2	19.3564	19.3611	19.3657	19.3873	19.3914	19.4104	19.4104	19.4139	19.4031	19.3914	19.3832	19.3746	(88)
util rest of house													
	0.9844	0.9778	0.9632	0.9283	0.8475	0.6736	0.4568	0.5039	0.7710	0.9319	0.9752	0.9864	(89)
MIT 2	17.3334	17.5286	17.8890	18.3960	18.8529	19.1949	19.2973	19.2915	19.0954	18.5341	17.8731	17.3276	(90)
Living area fraction											fLA = Living area / (4) =	0.3000	(91)
MIT	17.8889	18.0710	18.4081	18.8813	19.3155	19.6490	19.7628	19.7527	19.5471	19.0091	18.3894	17.8806	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.8889	18.0710	18.4081	18.8813	19.3155	19.6490	19.7628	19.7527	19.5471	19.0091	18.3894	17.8806	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9790	0.9711	0.9548	0.9191	0.8444	0.6948	0.5058	0.5500	0.7814	0.9240	0.9685	0.9815	(94)
Useful gains	451.6789	486.1620	509.5086	514.3065	483.1909	385.9476	269.8395	280.2252	380.9417	423.9267	427.0309	435.2920	(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													
	1282.0500	1238.2361	1115.6145	919.7957	699.5946	457.0819	286.3243	302.6896	495.9202	772.4940	1043.6549	1273.0130	(97)
Space heating kWh													
	617.7961	505.3938	450.9428	291.9522	161.0043	0.0000	0.0000	0.0000	0.0000	259.3341	443.9693	623.2644	(98a)
Space heating requirement - total per year (kWh/year)												3353.6571	
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													
	617.7961	505.3938	450.9428	291.9522	161.0043	0.0000	0.0000	0.0000	0.0000	259.3341	443.9693	623.2644	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3353.6571	
Space heating per m2											(98c) / (4) =	69.8679	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.1000	(201)
Fraction of space heat from main system(s)												0.9000	(202)
Efficiency of main space heating system 1 (in %)												100.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												100.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	617.7961	505.3938	450.9428	291.9522	161.0043	0.0000	0.0000	0.0000	0.0000	259.3341	443.9693	623.2644	(98)
Space heating efficiency (main heating system 1)													
	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)													
	556.0165	454.8544	405.8485	262.7570	144.9039	0.0000	0.0000	0.0000	0.0000	233.4007	399.5724	560.9380	(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)
61.7796 50.5394 45.0943 29.1952 16.1004 0.0000 0.0000 0.0000 0.0000 25.9334 44.3969 62.3264 (215)
Water heating
Water heating requirement
161.2656 142.3381 121.4320 85.0222 62.3399 54.6716 53.5753 67.3899 89.0808 128.5382 143.0480 159.5439 (64)
Efficiency of water heater 100.0000 (216)
(217)m 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 100.0000 (217)
Fuel for water heating, kWh/month
161.2656 142.3381 121.4320 85.0222 62.3399 54.6716 53.5753 67.3899 89.0808 128.5382 143.0480 159.5439 (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 6.7945 6.1370 6.7945 6.5753 6.7945 6.5753 6.7945 6.7945 6.5753 6.7945 6.5753 6.7945 (231)
Lighting 15.3748 12.3342 11.1056 8.1365 6.2848 5.1348 5.7332 7.4523 9.6798 12.7004 14.3450 15.8021 (232)
Electricity generated by PVs (Appendix M) (negative quantity)
(233a)m -32.6750 -46.2615 -65.9013 -72.1069 -74.5265 -65.6486 -64.8613 -62.1001 -56.6554 -51.4050 -35.7381 -28.2508 (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 -17.4115 -37.3185 -76.4449 -118.6651 -161.1563 -166.0652 -163.7902 -137.6739 -99.8077 -55.4409 -23.6717 -13.6631 (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 3018.2914 (211)
Space heating fuel - main system 2 0.0000 (213)
Space heating fuel - secondary 335.3657 (215)
Efficiency of water heater 100.0000
Water heating fuel used 1268.2455 (219)
Space cooling fuel 0.0000 (221)
Electricity for pumps and fans:
pump for solar water heating 80.0000 (230g)
Total electricity for the above, kWh/year 80.0000 (231)
Electricity for lighting (calculated in Appendix L) 124.0836 (232)
Energy saving/generation technologies (Appendices M ,N and Q)
PV generation -1727.2394 (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 3098.7468 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1 (high-rate cost)	0.0000	5.5000	0.0000	(240)
Space heating - main system 1 (low-rate cost)	3018.2914	0.0550	166.0060	(240)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary (1.00*15.29 + 0.00*5.50)	335.3657	15.2900	51.2774	(242)
Water heating (electric off-peak tariff)				
High-rate fraction			0.1341	(243)
Low-rate fraction			0.8659	(244)
High-rate cost	170.1243	15.2900	26.0120	(245)
Low-rate cost	1098.1212	5.5000	60.3967	(246)
Energy for instantaneous electric shower(s)	0.0000	14.3110	0.0000	(247a)
Pumps, fans and electric keep-hot (0.90*15.29 + 0.10*5.50)	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	14.3110	11.4488	(249)
Energy for lighting (0.90*15.29 + 0.10*5.50)	124.0836	14.3110	17.7576	(250)
Additional standing charges			24.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-656.1303	14.3110	-93.8988	
PV Unit electricity exported	-1071.1091	13.1900	-141.2793	
Total			-235.1781	(252)
Total energy cost			121.7204	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12): 0.4200 (256)
Energy cost factor (ECF) [(255) x (256)] / [(4) + 45.0] = 0.5497 (257)
SAP value 92.3316
SAP rating (Section 12) 92 (258)
SAP band A

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 (high-rate cost)	0.0000	0.0000	0.0000	(261)
Space heating - main system 1 (low-rate cost)	3018.2914	0.1359	410.2769	(261)
Total CO2 associated with community systems			0.0000	(373)
Space heating - secondary	335.3657	0.1619	54.2973	(263)
Water heating - high rate cost	170.1243	0.1523	25.9050	(264)
Water heating - low rate cost	1098.1212	0.1278	140.3441	(264)
Space and water heating			630.8233	(265)
Pumps, fans and electric keep-hot	80.0000	0.1432	11.4562	(267)
Energy for lighting	124.0836	0.1490	18.4909	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-656.1303	0.1399	-91.7730	
PV Unit electricity exported	-1071.1091	0.1248	-133.6231	
Total			-225.3961	(269)
Total CO2, kg/year			435.3743	(272)
CO2 emissions per m2			9.0700	(273)
EI value			93.7269	
EI rating			94	(274)
EI band			A	

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY FOR IMPROVED DWELLING

1. Overall dwelling characteristics

	Area (m2)	Storey height (m)	Volume (m3)	
Main dwelling				
Ground floor	24.0000 (1b)	x 2.4000 (2b)	= 57.6000 (1b) - (3b)	
First floor	24.0000 (1c)	x 2.7500 (2c)	= 66.0000 (1c) - (3c)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.0000			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	123.6000	(5)

2. Ventilation rate

		m3 per hour
Number of open chimneys	0 * 80 =	0.0000 (6a)
Number of open flues	0 * 20 =	0.0000 (6b)
Number of chimneys / flues attached to closed fire	0 * 10 =	0.0000 (6c)
Number of flues attached to solid fuel boiler	0 * 20 =	0.0000 (6d)
Number of flues attached to other heater	0 * 35 =	0.0000 (6e)
Number of blocked chimneys	0 * 20 =	0.0000 (6f)
Number of intermittent extract fans	0 * 10 =	0.0000 (7a)
Number of passive vents	0 * 10 =	0.0000 (7b)
Number of flueless gas fires	0 * 40 =	0.0000 (7c)
	Air changes per hour	
Infiltration due to chimneys, flues and fans = (6a)+(6b)+(6c)+(6d)+(6e)+(6f)+(6g)+(7a)+(7b)+(7c) =	0.0000 / (5) =	0.0000 (8)
Number of storeys in the dwelling (ns)		2 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.1000 (10)
Structural infiltration: 0.25 for steel or timber frame or 0.35 for masonry construction		0.3500 (11)
If suspended wooden floor, enter 0.2 (unsealed) or 0.1 (sealed), else enter 0		0.0000 (12)
If no draught lobby, enter 0.05, else enter 0		0.0500 (13)
Percentage of windows and doors draught stripped		100.0000 (14)
Window infiltration	0.25 - [0.2 * (14) / 100] =	0.0500 (15)
Pressure test		No
Infiltration rate		0.5500 (18)
Number of sides sheltered		1 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	0.9250 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5088 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	3.8000	3.7000	3.7000	3.5000	3.5000	3.1000	3.3000	3.0000	3.0000	3.1000	3.1000	3.5000	(22)
Wind factor	0.9500	0.9250	0.9250	0.8750	0.8750	0.7750	0.8250	0.7500	0.7500	0.7750	0.7750	0.8750	(22a)
Adj infilt rate	0.4833	0.4706	0.4706	0.4452	0.4452	0.3943	0.4197	0.3816	0.3816	0.3943	0.3943	0.4452	(22b)
Effective ac	0.6168	0.6107	0.6107	0.5991	0.5991	0.5777	0.5881	0.5728	0.5728	0.5777	0.5777	0.5991	(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								
Doors insulated 1			3.7000	1.4000	5.1800			(26)
Windows 1			5.7600	2.5180	14.5036			(27)
Ground floor Main			24.0000	0.2500	6.0000			(28a)
External walls Main	63.9000	9.4600	54.4400	0.3000	16.3320			(29a)
External walls Main alt.1	3.4000		3.4000	0.3000	1.0200			(29a)
External roof Main	24.0000		24.0000	0.2100	5.0400			(30)
Total net area of external elements Aum(A, m2)			115.3000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		48.0756			(33)
Main dwelling								
Party walls Main			36.3600	0.0000	0.0000			(32)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							250.0000	(35)
Thermal bridges (User defined value 0.150 * total exposed area)							17.2950	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		65.3706	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	25.1579	24.9104	24.9104	24.4354	24.4354	23.5644	23.9867	23.3632	23.3632	23.5644	23.5644	24.4354	(38)
Heat transfer coeff	90.5285	90.2810	90.2810	89.8060	89.8060	88.9350	89.3573	88.7338	88.7338	88.9350	88.9350	89.8060	(39)
Average = Sum(39)m / 12 =												89.5115	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.8860	1.8809	1.8809	1.8710	1.8710	1.8528	1.8616	1.8486	1.8486	1.8528	1.8528	1.8710	(40)
HLP (average)												1.8648	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6314 (42)
Hot water usage for mixer showers	45.1263	44.4481	43.4599	41.5692	40.1738	38.6178	37.7333	38.7140	39.7891	41.4598	43.3912	44.9534 (42a)
Hot water usage for baths	23.4750	23.1264	22.6354	21.7302	21.0524	20.3008	19.8948	20.3823	20.9131	21.7174	22.6412	23.3957 (42b)
Hot water usage for other uses	32.9866	31.7871	30.5876	29.3881	28.1886	26.9891	26.9891	28.1886	29.3881	30.5876	31.7871	32.9866 (42c)
Average daily hot water use (litres/day)												93.3578 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	101.5880	99.3617	96.6830	92.6875	89.4148	85.9076	84.6171	87.2849	90.0903	93.7648	97.8196	101.3357	(44)
Energy conte	160.8905	141.4897	148.5981	126.8845	120.3695	105.6334	102.3371	108.0770	111.0904	127.2380	139.3619	158.6672	(45)
Energy content (annual)										Total = Sum(45)m =		1550.6372	
Distribution loss (46)m = 0.15 x (45)m	24.1336	21.2235	22.2897	19.0327	18.0554	15.8450	15.3506	16.2115	16.6636	19.0857	20.9043	23.8001	(46)
Water storage loss (or HIU loss):													
Store volume												160.0000	(47)
b) If manufacturer declared loss factor is not known :													
Hot water storage loss factor from Table 2 (kWh/litre/day)												0.0152	(51)
Volume factor from Table 2a												0.9086	(52)
Temperature factor from Table 2b												0.6000	(53)
Enter (49) or (54) in (55)												1.3245	(55)
Total storage loss	41.0588	37.0854	41.0588	39.7344	41.0588	39.7344	41.0588	41.0588	39.7344	41.0588	39.7344	41.0588	(56)
If cylinder contains dedicated solar storage	27.4581	24.8009	27.4581	26.5724	27.4581	26.5724	27.4581	27.4581	26.5724	27.4581	26.5724	27.4581	(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	188.3486	166.2905	176.0562	153.4569	147.8276	132.2058	129.7952	135.5351	137.6627	154.6961	165.9343	186.1253	(62)
WWHRS	-27.0830	-23.9524	-25.0816	-20.7686	-19.3556	-16.5627	-15.5249	-16.5091	-17.1364	-20.2019	-22.8863	-26.5815	(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)
Aperture area of solar collector												3.0000	(H1)
Zero-loss collector efficiency												0.8000	(H2)
Collector linear heat loss coefficient												4.0000	(H3)
Collector 2nd order heat loss coefficient												0.0100	(H4)
Collector loop efficiency												0.9000	(H5)
Incidence angle modifier												0.9400	(H6)
Overshading factor												0.8000	(H8)
Overall heat loss coefficient of system												6.5000	(H10)
Heat loss coefficient of collector loop												6.5667	(H11)
Dedicated solar storage volume												53.0000	(H12)
If combined cylinder, total volume of cylinder												160.0000	(H13)
Effective solar volume												85.1000	(H14)
Reference volume												225.0000	(H15)
Storage tank correction coefficient												1.2752	(H16)
Heat delivered to hot water												387.2816	(H24)
Heat delivered to space heating												0.0000	(H29)
Solar input												387.2816	
Solar input	0.0000	0.0000	-29.8316	-50.2857	-66.7227	-66.4550	-65.6704	-58.9021	-37.9788	-11.4354	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	161.2656	142.3381	121.1430	82.4026	61.7494	49.1881	48.6000	60.1238	82.5475	123.0588	143.0480	159.5439	(64)

Total per year (kWh/year) = Sum(64)m = 1235.0087 (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

	75.4626	66.8860	71.3754	63.4470	61.9893	56.3810	55.9936	57.9021	58.1954	64.2731	67.5957	74.7233 (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	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	97.8848	(66)

Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5

	17.5653	15.6014	12.6879	9.6055	7.1803	6.0619	6.5501	8.5140	11.4275	14.5098	16.9351	18.0535 (67)

Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5

	212.0023	214.2022	208.6585	196.8565	181.9587	167.9568	158.6027	156.4028	161.9465	173.7485	188.6463	202.6482 (68)

Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5

	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199	46.4199 (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)

	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566	-65.2566 (71)

Water heating gains (Table 5)

	101.4282	99.5328	95.9346	88.1208	83.3190	78.3069	75.2602	77.8254	80.8270	86.3886	93.8830	100.4346 (72)

Total internal gains

	410.0440	408.3845	396.3291	373.6310	351.5061	331.3738	319.4612	321.7904	333.2492	353.6951	378.5126	400.1844 (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	1.4400	11.5683	0.7600	0.7000	0.7700	6.1415	(74)
East	1.4400	21.5704	0.7600	0.7000	0.7700	11.4516	(76)
South	1.4400	49.1384	0.7600	0.7000	0.7700	26.0873	(78)
West	1.4400	21.5704	0.7600	0.7000	0.7700	11.4516	(80)

Solar gains	55.1319	89.0840	133.4745	187.2388	216.7984	235.1623	223.9581	201.0718	164.8890	110.9665	69.2373	47.6411	(83)
Total gains	465.1759	497.4685	529.8036	560.8698	568.3045	566.5361	543.4193	522.8622	498.1382	464.6615	447.7499	447.8256	(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, ni1,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	36.8208	36.9218	36.9218	37.1171	37.1171	37.4806	37.3034	37.5656	37.5656	37.4806	37.4806	37.1171	
alpha	3.4547	3.4615	3.4615	3.4745	3.4745	3.4987	3.4869	3.5044	3.5044	3.4987	3.4987	3.4745	
util living area	0.9849	0.9792	0.9640	0.9244	0.8284	0.6081	0.3852	0.4269	0.7551	0.9275	0.9748	0.9865	(86)
MIT	19.4541	19.5901	19.8836	20.2729	20.6373	20.8696	20.9212	20.9178	20.7805	20.3726	19.8601	19.4426	(87)
Th 2	19.4104	19.4139	19.4139	19.4207	19.4207	19.4333	19.4272	19.4362	19.4362	19.4333	19.4333	19.4207	(88)
util rest of house	0.9791	0.9712	0.9488	0.8882	0.7358	0.4161	0.1359	0.1755	0.6019	0.8842	0.9631	0.9813	(89)
MIT 2	17.7122	17.8865	18.2548	18.7340	19.1361	19.3279	19.3364	19.3456	19.2815	18.8705	18.2431	17.7051	(90)
Living area fraction									fLA = Living area / (4) =			0.3000	(91)
MIT	18.2348	18.3976	18.7434	19.1956	19.5864	19.7904	19.8118	19.8172	19.7312	19.3211	18.7282	18.2263	(92)
Temperature adjustment												0.0000	
adjusted MIT	18.2348	18.3976	18.7434	19.1956	19.5864	19.7904	19.8118	19.8172	19.7312	19.3211	18.7282	18.2263	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9730	0.9639	0.9400	0.8815	0.7476	0.4645	0.1987	0.2393	0.6362	0.8801	0.9556	0.9756	(94)
Useful gains	452.6162	479.5251	498.0224	494.4006	424.8774	263.1303	107.9727	125.1080	316.9354	408.9488	427.8908	436.9135	(95)
Ext temp.	5.6000	6.2000	8.0000	10.6000	13.7000	16.7000	18.6000	18.4000	15.7000	12.2000	8.5000	5.6000	(96)
Heat loss rate W	1143.8071	1101.2080	969.9265	771.9387	528.6355	274.8474	108.2857	125.7568	357.7028	633.3180	909.6452	1133.9205	(97)
Space heating kWh	514.2460	417.7709	351.0966	199.8274	77.1960	0.0000	0.0000	0.0000	0.0000	166.9307	346.8632	518.5732	(98a)
Space heating requirement - total per year (kWh/year)												2592.5041	
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	514.2460	417.7709	351.0966	199.8274	77.1960	0.0000	0.0000	0.0000	0.0000	166.9307	346.8632	518.5732	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2592.5041	
Space heating per m2											(98c) / (4) =	54.0105	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.1000	(201)
Fraction of space heat from main system(s)	0.9000	(202)
Efficiency of main space heating system 1 (in %)	100.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	100.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	514.2460	417.7709	351.0966	199.8274	77.1960	0.0000	0.0000	0.0000	0.0000	166.9307	346.8632	518.5732	(98)
Space heating efficiency (main heating system 1)	100.0000	100.0000	100.0000	100.0000	100.0000	0.0000	0.0000	0.0000	0.0000	100.0000	100.0000	100.0000	(210)
Space heating fuel (main heating system)	462.8214	375.9938	315.9870	179.8447	69.4764	0.0000	0.0000	0.0000	0.0000	150.2376	312.1769	466.7158	(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)	51.4246	41.7771	35.1097	19.9827	7.7196	0.0000	0.0000	0.0000	0.0000	16.6931	34.6863	51.8573	(215)
Water heating													
Water heating requirement	161.2656	142.3381	121.1430	82.4026	61.7494	49.1881	48.6000	60.1238	82.5475	123.0588	143.0480	159.5439	(64)
Efficiency of water heater												100.0000	(216)
(217)m	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	100.0000	(217)
Fuel for water heating, kWh/month	161.2656	142.3381	121.1430	82.4026	61.7494	49.1881	48.6000	60.1238	82.5475	123.0588	143.0480	159.5439	(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	6.7945	6.1370	6.7945	6.5753	6.7945	6.5753	6.7945	6.7945	6.5753	6.7945	6.5753	6.7945	(231)
Lighting	15.3748	12.3342	11.1056	8.1365	6.2848	5.1348	5.7332	7.4523	9.6798	12.7004	14.3450	15.8021	(232)
Electricity generated by PVs (Appendix M) (negative quantity)													
(233a)m	-34.4388	-44.8678	-63.9354	-70.7720	-72.0125	-66.5477	-65.7105	-63.5912	-58.3958	-52.3528	-38.3218	-30.3912	(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	-19.7546	-36.3937	-75.1259	-121.7690	-159.5955	-176.6060	-173.6010	-150.7716	-109.4892	-61.1530	-28.0777	-16.0554	(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	2333.2537 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	259.2504 (215)
Efficiency of water heater	100.0000
Water heating fuel used	1235.0087 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
pump for solar water heating	80.0000 (230g)
Total electricity for the above, kWh/year	80.0000 (231)
Electricity for lighting (calculated in Appendix L)	124.0836 (232)
Energy saving/generation technologies (Appendices M ,N and Q)	
PV generation	-1789.7300 (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	2241.8663 (238)

10a. Fuel costs - using BEDF prices (595)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1 (high-rate cost)	0.0000	15.3000	0.0000	(240)
Space heating - main system 1 (low-rate cost)	2333.2537	0.1530	356.9878	(240)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary (1.00*33.70 + 0.00*15.30)	259.2504	33.7000	87.3674	(242)
Water heating (electric off-peak tariff)				
High-rate fraction			0.1341	(243)
Low-rate fraction			0.8659	(244)
High-rate cost	165.6658	33.7000	55.8294	(245)
Low-rate cost	1069.3428	15.3000	163.6095	(246)
Energy for instantaneous electric shower(s)	0.0000	31.8600	0.0000	(247a)
Pumps, fans and electric keep-hot (0.90*33.70 + 0.10*15.30)	0.0000	0.0000	0.0000	(249)
Pump for solar water heating	80.0000	31.8600	25.4880	(249)
Energy for lighting (0.90*33.70 + 0.10*15.30)	124.0836	31.8600	39.5330	(250)
Additional standing charges			3.0000	(251)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-661.3375	31.8600	-210.7021	
PV Unit electricity exported	-1128.3925	5.8100	-65.5596	
Total			-276.2617	(252)
Total energy cost			455.5533	(255)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1 (high-rate cost)	0.0000	0.0000	0.0000	(261)
Space heating - main system 1 (low-rate cost)	2333.2537	0.1369	319.3317	(261)
Total CO2 associated with community systems			0.0000	(373)
Space heating - secondary	259.2504	0.1630	42.2627	(263)
Water heating - high rate cost	165.6658	0.1529	25.3328	(264)
Water heating - low rate cost	1069.3428	0.1283	137.2470	(264)
Space and water heating			524.1742	(265)
Pumps, fans and electric keep-hot	80.0000	0.1432	11.4562	(267)
Energy for lighting	124.0836	0.1490	18.4909	(268)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-661.3375	0.1398	-92.4854	
PV Unit electricity exported	-1128.3925	0.1243	-140.2565	
Total			-232.7419	(269)
Total CO2, kg/year			321.3794	(272)

13a. Primary energy - Individual heating systems including micro-CHP

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1 (high-rate cost)	0.0000	0.0000	0.0000	(275)
Space heating - main system 1 (low-rate cost)	2333.2537	1.4953	3488.8909	(275)
Total CO2 associated with community systems			0.0000	(473)
Space heating - secondary	259.2504	1.6078	416.8159	(277)
Water heating - high rate cost	165.6658	1.5710	260.2655	(278)
Water heating - low rate cost	1069.3428	1.4611	1562.4602	(278)
Space and water heating			5728.4324	(279)
Pumps, fans and electric keep-hot	80.0000	1.5335	122.6788	(281)
Energy for lighting	124.0836	1.5547	192.9182	(282)
Energy saving/generation technologies				
PV Unit electricity used in dwelling	-661.3375	1.5212	-1006.0561	
PV Unit electricity exported	-1128.3925	0.4561	-514.6589	
Total			-1520.7151	(283)
Total Primary energy kWh/year			4523.3144	(286)