Building Performance Evaluation and Carbon Emissions Assessment

In Compliance with Building Regulation Approved Document Part L

11 Imperial Drive, North Harrow, HA2 7BP
Phone: 077 14866 707
E: Info@airtightbuildingsolutions.co.uk
W: www.airtightbuildingsolutions.co.uk

Site Address:	**200 Tilehurst Road, Reading, RG30 2LY**
Project Type:	**Extension to an existing residential property**
Client / Performed for:	**Rasual Akhtar**
Report Date:	**17 September 2024**
Issued by:	**Sammit Pancholi**
Report No:	**108231024-01**
Report Issued Date:	**23 October 2024**

Disclaimer

This report presents calculation using the Standard Assessment Procedure (SAP) to determine the 'CO_2 Emissions (t/year)' for the existing and proposed development located at **200 Tilehurst Road, Reading, RG30 2LY**.

It serves as a technical resource for the client and its appointed professionals to inform building design, construction, and subsequent submission to local building control authorities for development approval. The calculations are based upon information provided by the client, including architectural drawings, material specifications, and construction details. While we have exercised due diligence in reviewing this information, any inherent inaccuracies or omissions could impact the presented results.

Third-Party Data Reliance:

The calculations may utilize thermal conductivity values and other data sourced from third-party sources. While we rely on the accuracy and reliability of such data, absolute correctness cannot be guaranteed.

Responsibility and Liability:

This report serves solely as informational material and does not constitute a warranty or guarantee of building performance. We expressly disclaim liability for any actions taken by the client, or third parties based on the presented information.

The client is responsible for ensuring the report's information remains accurate and reflects any design or construction adjustments throughout the project lifecycle. Changes to building fabric elements or construction details may necessitate U-value recalculations.

The material presented within this report is confidential. This report has been prepared for the exclusive use of the client and shall not be distributed or made available to any other company or person without the knowledge and written consent of Airtight Building Solutions Ltd and the client. All works undertaken by Airtight Building Solutions Ltd are carried out in accordance with Airtight Building Solutions Ltd.'s terms and conditions found at www.airtightbuildingsolutions.co.uk.

Airtight Building Solutions Ltd
Phone: 077 14866 707 | E: Info@airtightbuildingsolutions.co.uk |
www.airtightbuildingsolutions.co.uk

Evaluation Report Summary

Airtight Building Solutions Ltd has been requested to carry out a calculation using Standard Assessment Procedure (SAP) to determine the 'CO_2 Emissions (t/year)' for the existing and proposed development located at **200 Tilehurst Road, Reading, RG30 2LY**.

The proposed development achieves a lower 'CO_2 Emissions (t/year)' than the existing development, by incorporating passive strategies such as improving the building fabric and adopting high-efficiency heating and hot water systems.

The purpose of this design note is to provide a review of the building performance of the development after incorporating all improvement strategies.

OBJECTIVES

1.1 To evaluate the building fabric to comply with Approved Document Part L1(a), at the following property: **200 Tilehurst Road, Reading, RG30 2LY**

ASSESSMENT DETAILS

2.1	Type of property:	Extension to existing dwelling
2.2	Age of property:	N/A
2.3	Evaluated by:	Airtight Building Solutions Ltd. 11 Imperial Drive North Harrow HA2 7BP
2.6	Client:	Rasual Akhtar

2.7 Description of building elements assessed: External walls, floor, roof, glazing, heating and hot water systems.

Airtight Building Solutions Ltd
Phone: 077 14866 707 | E: Info@airtightbuildingsolutions.co.uk |
www.airtightbuildingsolutions.co.uk

PLANNING CONDITION AND CALCULATION METHODOLOGY

3.1 The client was requested to submit and receive approval by the Local Planning Authority demonstrating that the dwellings hereby permitted have achieved a minimum of a 19% improvement in the dwelling emission rate over the target emission rate as defined in The Building Regulations for England Approved Document L1a: Conservation of Fuel and Power in New Dwellings (2013 edition).

As this is an extension to an existing residential property, a 'design stage' SAP assessment cannot be performed as requested in the first condition by the council. This is because, if the project is a conversion/extension in an existing dwelling, the SAP calculation generates only 'Dwelling Emission Rate (DER)' as a result in the final report and does not generate the metric 'Target Emission Rate (TER)'. Hence, there is no way to show a minimum of a 19% improvement in the dwelling emission rate over the target emission rate.

For existing dwellings, a single metric called 'CO_2 Emissions (t/year)' is provided, but with no target metric to compare with. Hence, the performance of the existing dwelling was compared to the proposed dwelling with extension and the 'CO_2 Emissions (t/year) values' compared. This was discussed with the council and planning authority as a substitute to 'DER<TER metric' indicating improved construction, after whose approval, the calculations were carried out based on the details provided by the client, using the SAP methodology.

Airtight Building Solutions Ltd
Phone: 077 14866 707 | E: Info@airtightbuildingsolutions.co.uk |
www.airtightbuildingsolutions.co.uk

IMPROVEMENTS AND RESULTS

4.1 **Table 4.1** shows the fabric related improvements incorporated on **existing elements** in dwelling to achieve reduction in CO_2 Emissions (t/year) in the dwelling.

Table 4.1 Comparison of existing dwelling with renovated fabric U-values

Table 4.1			
Element type	**Existing U-value W/ (m2 ·K)**	**Proposed U-value W/ (m2 ·K)**	**Improvement made to fabric**
External Wall	**1.96**	**0.31**	**60mm Celotex internal insulation is added**

4.2 **Table 4.2 Comparison of notional dwelling values with proposed dwelling U- values** shows the fabric related improvements incorporated through **new elements** in extension to dwelling to achieve reduction in CO_2 Emissions (t/year) in the dwelling.

Table 4.2 Comparison of notional dwelling values with proposed dwelling U- values

Table 4.2			
Element type	**Notional U-value W/ (m2 ·K)**	**Proposed U-value W/ (m2 ·K)**	**Improvement made to fabric**
External Cavity Wall	**0.18**	**0.12**	**60mm Celotex internal insulation is added**
External Roof	**0.15**	**0.16**	**150mm Celotex added between and under joists/rafter**
External Floor	**0.18**	**0.12**	**175mm Celotex is added over beam and block**
All Glazing	**1.4**	**1.2**	**High-Performance double-glazed windows added**

Airtight Building Solutions Ltd
Phone: 077 14866 707 | E: Info@airtightbuildingsolutions.co.uk |
www.airtightbuildingsolutions.co.uk

4.3 Results

Table 4.3 Resultant reduction in CO2 Emissions (t/year).

Table 4.3			
Dwelling	**Existing/Notional CO_2 Emissions (t/Year)**	**Proposed Dwelling CO_2 Emissions (t/Year)**	**Percentage Reduction in Emissions (%)**
Flat 1	**1.93**	**1.56**	**19.17**
Flat 2	**2.05**	**1.68**	**18.04**
Flat 3	**1.81**	**0.99**	**45.30**
Flat 4	**1.71**	**0.96**	**43.85**
Flat 5	**1.19**	**1.03**	**13.44**
Flat 6	**1.52**	**1.47**	**3.28**
Total Average Reduction in **CO_2 Emissions (t/Year)** for dwelling			**23.84%**

Table 4.3 shows cumulative impact of incorporating fabric improvements for all flats along with more efficient boiler for flats 1 to 4 have resulted in the reduction of CO_2 Emissions released by the dwelling with the extension and additional flats by 23.84 **%.**

Airtight Building Solutions Ltd
Phone: 077 14866 707 | E: Info@airtightbuildingsolutions.co.uk |
www.airtightbuildingsolutions.co.uk

Full SAP Calculation Printout

Property Reference	Flat 1, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 1, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	69 C	**DER**	43.31	**TER**	
Environmental	70 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.93	**DFEE**	105.83	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	237.60	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7918	(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) = 0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		65.5427			(33)
Party Ceiling 1			46.8400			20.0000	936.8000	(32b)

Internal Wall TImber						97.2800					9.0000	875.5200	(32c)
Internal Wall Brick						10.9000					75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			7017.2200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												143.7660	(35)
Thermal bridges (Default value 0.200 * total exposed area)												31.0400	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	96.5827	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	140.1535	139.3654	138.5929	134.9645	134.2856	131.1254	131.1254	130.5401	132.3427	134.2856	135.6590	137.0947	(39)
Average = Sum(39)m / 12 =												134.9612	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.8714	2.8553	2.8394	2.7651	2.7512	2.6864	2.6864	2.6745	2.7114	2.7512	2.7793	2.8087	(40)
HLP (average)												2.7650	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6551	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)
Hot water usage for other uses	31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)
Average daily hot water use (litres/day)												82.9783	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)											Total = Sum(45)m =	1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(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	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
										Total per year (kWh/year) = Sum(64)m =		2733.9701	(64)
12Total per year (kWh/year)												2734	(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	129.1647	115.5761	125.7623	118.2062	119.2462	58.2197	57.2261	60.3076	59.7846	120.8774	121.4801	129.0341	(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	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	72.7039	80.4936	72.7039	75.1274	72.7039	75.1274	72.7039	72.7039	75.1274	72.7039	75.1274	72.7039	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.1437	145.6394	141.8702	133.8458	123.7166	114.1965	107.8365	106.3407	110.1100	118.1343	128.2636	137.7837	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	(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)	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)	173.6084	171.9882	169.0353	164.1753	160.2771	80.8606	76.9168	81.0586	83.0342	162.4696	168.7224	173.4330	(72)
Total internal gains	438.2829	445.9482	431.4363	420.9754	404.5245	318.0114	305.2841	307.9301	316.0985	401.1347	419.9403	431.7475	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	536.7973	620.4738	685.9825	759.3523	802.0347	720.1231	689.9002	647.7247	599.7953	598.4724	539.2122	515.2032	(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	13.9078	13.9865	14.0644	14.4425	14.5155	14.8654	14.8654	14.9320	14.7286	14.5155	14.3686	14.2181	
alpha	1.9272	1.9324	1.9376	1.9628	1.9677	1.9910	1.9910	1.9955	1.9819	1.9677	1.9579	1.9479	
util living area	0.9543	0.9382	0.9143	0.8673	0.7953	0.7151	0.6047	0.6406	0.7912	0.8827	0.9369	0.9575	(86)
MIT	16.9026	17.2643	17.8823	18.7695	19.5977	20.2462	20.6286	20.5676	19.9853	19.0070	17.8493	16.8933	(87)
Th 2	19.5643	19.5724	19.5803	19.6175	19.6244	19.6568	19.6568	19.6628	19.6443	19.6244	19.6103	19.5956	(88)
util rest of house	0.9469	0.9283	0.8997	0.8426	0.7514	0.6379	0.4781	0.5212	0.7290	0.8560	0.9252	0.9508	(89)
MIT 2	15.9090	16.2701	16.8837	17.7712	18.5652	19.1831	19.4918	19.4569	18.9584	18.0187	16.8755	15.9179	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.2367	16.5980	17.2130	18.1005	18.9057	19.5337	19.8668	19.8232	19.2971	18.3447	17.1967	16.2396	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.2367	16.5980	17.2130	18.1005	18.9057	19.5337	19.8668	19.8232	19.2971	18.3447	17.1967	16.2396	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9212	0.8982	0.8656	0.8071	0.7230	0.6294	0.5009	0.5379	0.7090	0.8224	0.8957	0.9264	(94)
Useful gains	494.5085	557.3341	593.7766	612.8904	579.9027	453.2701	345.5881	348.4199	425.2468	492.2054	482.9462	477.2896	(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	1672.9773	1630.2993	1484.7526	1241.7345	967.6278	646.9379	428.3577	446.8702	687.7976	1040.0063	1369.7054	1650.5661	(97)
Space heating kWh	876.7808	721.0326	662.8862	452.7677	288.4675	0.0000	0.0000	0.0000	0.0000	407.5638	638.4666	872.9177	(98a)
Space heating requirement - total per year (kWh/year)												4920.8829	
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	876.7808	721.0326	662.8862	452.7677	288.4675	0.0000	0.0000	0.0000	0.0000	407.5638	638.4666	872.9177	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4920.8829	
Space heating per m2											(98c) / (4) =	100.8171	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)

Fraction of space heat from main system(s) 1.0000 (202)

Efficiency of main space heating system 1 (in %) 79.0000 (206)

Efficiency of main space heating system 2 (in %) 0.0000 (207)

Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	876.7808	721.0326	662.8862	452.7677	288.4675	0.0000	0.0000	0.0000	0.0000	407.5638	638.4666	872.9177	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1109.8491	912.6995	839.0964	573.1237	365.1487	0.0000	0.0000	0.0000	0.0000	515.9036	808.1856	1104.9592	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
Efficiency of water heater												76.4000	(216)
(217)m	77.0359	76.9162	76.6633	76.1397	75.3064	71.4000	71.4000	71.4000	71.4000	75.9172	76.6598	77.0316	(217)
Fuel for water heating, kWh/month	360.7480	322.0870	349.1540	326.3925	329.4216	226.9200	222.1244	235.1043	233.5120	333.2334	337.0221	360.2589	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	30.8536	24.7519	22.2864	16.3279	12.6122	10.3042	11.5052	14.9549	19.4250	25.4867	28.7871	31.7111	(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 6228.9657 (211)

Space heating fuel - main system 2 0.0000 (213)

Space heating fuel - secondary 0.0000 (215)

Efficiency of water heater 76.4000

Water heating fuel used 3635.9783 (219)

Space cooling fuel 0.0000 (221)

Electricity for pumps and fans:

main heating flue fan 45.0000 (230e)

Total electricity for the above, kWh/year 45.0000 (231)

Electricity for lighting (calculated in Appendix L) 249.0063 (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	10158.9503	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	6228.9657	0.2100	1308.0828	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3635.9783	0.2100	763.5554	(264)
Space and water heating			2071.6382	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	249.0063	0.1443	35.9393	(268)
Total CO2, kg/year			2113.8196	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			43.3100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	6228.9657	1.1300	7038.7313	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3635.9783	1.1300	4108.6554	(278)
Space and water heating			11147.3867	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	249.0063	1.5338	381.9342	(282)
Total Primary energy kWh/year			11597.3969	(286)
Dwelling Primary energy Rate (DPER)			237.6000	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7918	(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) =	0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	65.5427			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	96.5827 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	140.1535	139.3654	138.5929	134.9645	134.2856	131.1254	131.1254	130.5401	132.3427	134.2856	135.6590	137.0947	(39)
Average = Sum(39)m / 12 =												134.9612	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.8714	2.8553	2.8394	2.7651	2.7512	2.6864	2.6864	2.6745	2.7114	2.7512	2.7793	2.8087	(40)
HLP (average)												2.7650	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6551	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

21.9713	21.6396	21.1678	20.4612	19.8244	18.9477	18.2827	19.0959	19.5227	20.3914	21.2945	21.9539	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	49.0818	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	53.5514	52.0714	50.4512	48.5962	46.8110	44.7860	44.1210	46.0826	47.6578	49.6748	51.7262	53.5340	(44)
Energy conte	78.8370	68.9010	72.0937	63.4788	60.3208	51.7936	48.7550	54.2401	55.2807	64.0110	69.9097	78.6186	(45)
Energy content (annual)										Total = Sum(45)m =		766.2399	

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

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

67.0114	58.5659	61.2797	53.9570	51.2726	44.0245	41.4417	46.1041	46.9886	54.4093	59.4233	66.8258	(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

67.0114	58.5659	61.2797	53.9570	51.2726	44.0245	41.4417	46.1041	46.9886	54.4093	59.4233	66.8258	(64)

Total per year (kWh/year) = Sum(64)m =	651.3039	(64)
12Total per year (kWh/year)	651	(64)

Electric shower(s)

41.6197	37.0835	40.4938	38.6427	39.3678	37.5531	38.8049	39.3678	38.6427	40.4938	39.7323	41.6197	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =	473.4219	(64a)

Heat gains from water heating, kWh/month

27.1578	23.9123	25.4434	23.1499	22.6601	20.3944	20.0616	21.3680	21.4078	23.7258	24.7889	27.1114	(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	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	72.7039	80.4936	72.7039	75.1274	72.7039	75.1274	72.7039	72.7039	75.1274	72.7039	75.1274	72.7039	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.1437	145.6394	141.8702	133.8458	123.7166	114.1965	107.8365	106.3407	110.1100	118.1343	128.2636	137.7837	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	(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)	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)	36.5024	35.5838	34.1981	32.1527	30.4572	28.3256	26.9646	28.7204	29.7331	31.8895	34.4290	36.4400	(72)
Total internal gains	301.1769	309.5438	296.5991	288.9528	274.7046	265.4763	255.3319	255.5920	262.7974	270.5546	285.6469	294.7545	(73)

---

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains

		m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W	
North		3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South		3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West		5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557 (83)
Total gains	399.6913	484.0695	551.1453	627.3297	672.2147	667.5880	639.9480	595.3865	546.4942	467.8923	404.9189	378.2102 (84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.8362	14.9200	15.0032	15.4066	15.4844	15.8576	15.8576	15.9287	15.7118	15.4844	15.3277	15.1672	
alpha	1.9891	1.9947	2.0002	2.0271	2.0323	2.0572	2.0572	2.0619	2.0475	2.0323	2.0218	2.0111	
util living area	0.9752	0.9628	0.9443	0.9063	0.8452	0.7461	0.6375	0.6763	0.8225	0.9252	0.9646	0.9778	(86)
MIT	16.7527	17.1178	17.7382	18.6355	19.4841	20.2311	20.6190	20.5530	19.9597	18.8540	17.6882	16.7408	(87)
Th 2	18.8157	18.8241	18.8324	18.8720	18.8796	18.9150	18.9150	18.9216	18.9012	18.8796	18.8644	18.8487	(88)
util rest of house	0.9682	0.9522	0.9271	0.8739	0.7812	0.6159	0.4145	0.4659	0.7210	0.8925	0.9526	0.9716	(89)
MIT 2	15.2288	15.5929	16.2080	17.1003	17.9020	18.5664	18.8286	18.8046	18.3596	17.3335	16.1835	15.2340	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	15.7314	16.0959	16.7127	17.6067	18.4239	19.1155	19.4192	19.3813	18.8874	17.8350	16.6798	15.7310	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.7314	16.0959	16.7127	17.6067	18.4239	19.1155	19.4192	19.3813	18.8874	17.8350	16.6798	15.7310	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9518	0.9311	0.9016	0.8464	0.7628	0.6318	0.4806	0.5242	0.7201	0.8682	0.9329	0.9566	(94)
Useful gains	380.4330	450.7302	496.9284	530.9819	512.7334	421.7650	307.5798	312.1218	393.5132	406.2202	377.7368	361.7802	(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	1602.1559	1560.3159	1415.4101	1175.0974	902.9208	592.0954	369.6637	389.1780	633.5791	971.5624	1299.5919	1580.8423	(97)
Space heating kWh	908.9618	745.6416	683.3504	463.7631	290.2994	0.0000	0.0000	0.0000	0.0000	420.6146	663.7357	906.9822	(98a)
Space heating requirement - total per year (kWh/year)												5083.3487	
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	908.9618	745.6416	683.3504	463.7631	290.2994	0.0000	0.0000	0.0000	0.0000	420.6146	663.7357	906.9822	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5083.3487	
Space heating per m2											(98c) / (4) =	104.1456	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1232.5785	970.3277	992.1051	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5009	0.5708	0.5375	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	617.4558	553.8973	533.2462	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	754.8185	724.0279	673.2234	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	98.9011	126.5771	104.1430	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	24.7253	31.6443	26.0358	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												82.4053	(107)
Energy for space heating												104.1456	(99)
Energy for space cooling												1.6883	(108)
Total												105.8339	(109)
Fabric Energy Efficiency (DFEE)												105.8	(109)

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)	
Ground floor		48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7918	(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) =	0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		65.5427			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		7485.6200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							153.3624	(35)
Thermal bridges (Default value 0.200 * total exposed area)							31.0400	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		96.5827	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	140.1535	139.3654	138.5929	134.9645	134.2856	131.1254	131.1254	130.5401	132.3427	134.2856	135.6590	137.0947	(39)
Average = Sum(39)m / 12 =												134.9612	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.8714	2.8553	2.8394	2.7651	2.7512	2.6864	2.6864	2.6745	2.7114	2.7512	2.7793	2.8087	(40)
HLP (average)												2.7650	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6551	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)
Hot water usage for other uses	31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)
Average daily hot water use (litres/day)												82.9783	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(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													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
										Total per year (kWh/year) = Sum(64)m =		2733.9701	(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													
	129.1647	115.5761	125.7623	118.2062	119.2462	58.2197	57.2261	60.3076	59.7846	120.8774	121.4801	129.0341	(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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	35.2494	31.3082	25.4616	19.2760	14.4091	12.1647	13.1444	17.0856	22.9323	29.1178	33.9848	36.2291	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)													
	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)													
	173.6084	171.9882	169.0353	164.1753	160.2771	80.8606	76.9168	81.0586	83.0342	162.4696	168.7224	173.4330	(72)
Total internal gains													
	503.6861	500.3572	485.9318	462.9097	439.0262	343.1563	330.6996	336.5501	349.9982	447.5957	473.8338	494.9978	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	602.2005	674.8828	740.4780	801.2865	836.5364	745.2680	715.3157	676.3447	633.6950	644.9334	593.1057	578.4535	(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	14.8362	14.9200	15.0032	15.4066	15.4844	15.8576	15.8576	15.9287	15.7118	15.4844	15.3277	15.1672	
alpha	1.9891	1.9947	2.0002	2.0271	2.0323	2.0572	2.0572	2.0619	2.0475	2.0323	2.0218	2.0111	
util living area													
	0.9492	0.9345	0.9098	0.8640	0.7921	0.7119	0.5984	0.6326	0.7843	0.8762	0.9318	0.9527	(86)
MIT	17.1486	17.4773	18.0738	18.9104	19.6945	20.3043	20.6644	20.6100	20.0663	19.1483	18.0471	17.1402	(87)
Th 2	19.5643	19.5724	19.5803	19.6175	19.6244	19.6568	19.6568	19.6628	19.6443	19.6244	19.6103	19.5956	(88)
util rest of house													
	0.9409	0.9238	0.8941	0.8382	0.7468	0.6329	0.4702	0.5111	0.7197	0.8477	0.9190	0.9451	(89)
MIT 2	16.1401	16.4684	17.0597	17.8965	18.6458	19.2253	19.5114	19.4815	19.0213	18.1432	17.0582	16.1503	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.4728	16.8012	17.3942	18.2309	18.9917	19.5812	19.8917	19.8537	19.3660	18.4747	17.3844	16.4768	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4728	16.8012	17.3942	18.2309	18.9917	19.5812	19.8917	19.8537	19.3660	18.4747	17.3844	16.4768	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9147	0.8942	0.8611	0.8049	0.7213	0.6276	0.4958	0.5312	0.7032	0.8161	0.8897	0.9202	(94)
Useful gains	550.8130	603.4582	637.6047	644.9526	603.4238	467.7457	354.6409	359.2547	445.6284	526.3577	527.6942	532.2881	(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													
	1706.0550	1658.6118	1509.8630	1259.3446	979.1747	653.1606	431.6240	450.8477	696.9110	1057.4588	1395.1748	1683.0864	(97)
Space heating kWh													
	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939	(98a)
Space heating requirement - total per year (kWh/year)												4815.3635	
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													
	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4815.3635	
Space heating per m2											(98c) / (4) =	98.6553	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939	(98)
Space heating efficiency (main heating system 1)													
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)													
	1087.9748	897.5484	821.4685	559.9522	353.8717	0.0000	0.0000	0.0000	0.0000	500.1762	790.6152	1083.7897	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
Efficiency of water heater												76.4000	(216)
(217)m	77.0068	76.8908	76.6288	76.0981	75.2468	71.4000	71.4000	71.4000	71.4000	75.8603	76.6241	77.0032	(217)
Fuel for water heating, kWh/month													
	360.8844	322.1934	349.3112	326.5709	329.6825	226.9200	222.1244	235.1043	233.5120	333.4833	337.1794	360.3915	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	30.8536	24.7519	22.2864	16.3279	12.6122	10.3042	11.5052	14.9549	19.4250	25.4867	28.7871	31.7111	(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	6095.3968	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3637.3574	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	249.0063	(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	10026.7605	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6095.3968	3.6400	221.8724	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3637.3574	3.6400	132.3998	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	249.0063	16.4900	41.0611	(250)
Additional standing charges			92.0000	(251)
Total energy cost			494.7539	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8986	(257)
SAP value		69.2230	
SAP rating (Section 12)		69	(258)
SAP band		C	

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	6095.3968	0.2100	1280.0333	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3637.3574	0.2100	763.8450	(264)
Space and water heating			2043.8784	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	249.0063	0.1443	35.9393	(268)
Total CO2, kg/year			2086.0597	(272)
CO2 emissions per m2			42.7400	(273)
EI value			70.2023	
EI rating			70	(274)
EI band			C	

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)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1418 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7918 (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) =	0.7324 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8056	0.7507	0.7507	0.7141	0.7141	0.6225	0.6225	0.6042	0.6225	0.6958	0.6775	0.7324	(22b)
Effective ac	0.8245	0.7818	0.7818	0.7550	0.7550	0.6938	0.6938	0.6825	0.6938	0.7421	0.7295	0.7682	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	65.5427			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)				(28)...(30) + (32) + (32a)...(32e) =			7485.6200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							153.3624	(35)
Thermal bridges (Default value 0.200 * total exposed area)							31.0400	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		96.5827	(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	38.3818	36.3920	36.3920	35.1435	35.1435	32.2954	32.2954	31.7726	32.2954	34.5427	33.9575	35.7600	(38)
Heat transfer coeff	134.9645	132.9747	132.9747	131.7262	131.7262	128.8781	128.8781	128.3553	128.8781	131.1254	130.5401	132.3427	(39)
Average = Sum(39)m / 12 =												131.1137	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7651	2.7243	2.7243	2.6988	2.6988	2.6404	2.6404	2.6297	2.6404	2.6864	2.6745	2.7114	(40)
HLP (average)												2.6862	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6551	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)
Hot water usage for other uses													
	31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)
Average daily hot water use (litres/day)												82.9783	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m													
	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(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													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
										Total per year (kWh/year) = Sum(64)m =		2733.9701	(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													
	129.1647	115.5761	125.7623	118.2062	119.2462	58.2197	57.2261	60.3076	59.7846	120.8774	121.4801	129.0341	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	35.2494	31.3082	25.4616	19.2760	14.4091	12.1647	13.1444	17.0856	22.9323	29.1178	33.9848	36.2291	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)													
	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)													
	173.6084	171.9882	169.0353	164.1753	160.2771	80.8606	76.9168	81.0586	83.0342	162.4696	168.7224	173.4330	(72)
Total internal gains													
	503.6861	500.3572	485.9318	462.9097	439.0262	343.1563	330.6996	336.5501	349.9982	447.5957	473.8338	494.9978	(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	3.3300	12.7500	0.6300	0.7000	0.7700	12.9755	(74)
South	3.8900	54.0600	0.6300	0.7000	0.7700	64.2684	(78)
West	5.3500	23.7835	0.6300	0.7000	0.7700	38.8867	(80)

Solar gains	116.1307	180.0364	261.5970	354.8866	407.8288	437.1101	413.6801	371.4049	311.4179	218.7315	138.5522	98.9221	(83)
Total gains	619.8167	680.3936	747.5288	817.7963	846.8550	780.2665	744.3797	707.9551	661.4161	666.3272	612.3860	593.9199	(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	15.4066	15.6371	15.6371	15.7853	15.7853	16.1342	16.1342	16.1999	16.1342	15.8576	15.9287	15.7118	
alpha	2.0271	2.0425	2.0425	2.0524	2.0524	2.0756	2.0756	2.0800	2.0756	2.0572	2.0619	2.0475	
util living area													
	0.9425	0.9279	0.8976	0.8429	0.7535	0.6356	0.4884	0.5251	0.7361	0.8516	0.9203	0.9462	(86)
MIT	17.4712	17.7999	18.4243	19.2027	19.9763	20.5452	20.8303	20.7941	20.2902	19.4416	18.3802	17.4802	(87)
Th 2	19.6175	19.6378	19.6378	19.6506	19.6506	19.6798	19.6798	19.6852	19.6798	19.6568	19.6628	19.6443	(88)
util rest of house													
	0.9331	0.9161	0.8797	0.8128	0.6982	0.5361	0.3312	0.3727	0.6577	0.8168	0.9052	0.9374	(89)
MIT 2	16.4902	16.8252	17.4376	18.1977	18.9213	19.4353	19.6309	19.6181	19.2389	18.4431	17.4165	16.5154	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.8138	17.1467	17.7631	18.5292	19.2693	19.8014	20.0265	20.0060	19.5857	18.7724	17.7344	16.8337	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8138	17.1467	17.7631	18.5292	19.2693	19.8014	20.0265	20.0060	19.5857	18.7724	17.7344	16.8337	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9058	0.8862	0.8468	0.7813	0.6796	0.5465	0.3768	0.4143	0.6510	0.7873	0.8751	0.9113	(94)
Useful gains	561.4029	602.9518	632.9754	638.9059	575.5386	426.4498	280.5117	293.3060	430.5855	524.5948	535.8979	541.2146	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1607.9357	1548.7175	1391.3255	1163.0380	865.3490	541.4712	312.7235	334.4957	616.7723	966.7105	1296.8371	1579.3319	(97)
Space heating kWh	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98a)
Space heating requirement - total per year (kWh/year)												4220.5510	
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	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4220.5510	
Space heating per m2											(98c) / (4) =	86.4690	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	985.5954	804.4995	714.1930	477.6900	272.9354	0.0000	0.0000	0.0000	0.0000	416.3723	693.5142	977.6700	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.8581	76.7200	76.3947	75.8082	74.7554	71.4000	71.4000	71.4000	71.4000	75.5179	76.4050	76.8478	(217)
Fuel for water heating, kWh/month	361.5826	322.9106	350.3815	327.8196	331.8495	226.9200	222.1244	235.1043	233.5120	334.9953	338.1462	361.1201	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	30.8536	24.7519	22.2864	16.3279	12.6122	10.3042	11.5052	14.9549	19.4250	25.4867	28.7871	31.7111	(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	5342.4697	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3646.4661	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	249.0063	(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	9282.9421	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5342.4697	5.6000	299.1783	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3646.4661	5.6000	204.2021	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	249.0063	26.0600	64.8910	(250)
Additional standing charges			99.0000	(251)
Total energy cost			678.9985	(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	5342.4697	0.2100	1121.9186	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3646.4661	0.2100	765.7579	(264)
Space and water heating			1887.6765	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	249.0063	0.1443	35.9393	(268)
Total CO2, kg/year			1929.8579	(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	5342.4697	1.1300	6036.9907	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3646.4661	1.1300	4120.5067	(278)
Space and water heating			10157.4975	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	249.0063	1.5338	381.9342	(282)
Total Primary energy kWh/year			10607.5077	(286)

SAP 10 EPC IMPROVEMENTS

Flat 1, Notional

Current energy efficiency rating: C 69
Current environmental impact rating: C 70

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 69
Potential environmental impact rating: C 70

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£77	£77	£0
Mains gas	£602	£602	£0
Space heating	£410	£410	£0
Water heating	£204	£204	£0
Lighting	£65	£65	£0
Total cost of fuels	£679	£679	£0
Total cost of uses	£679	£679	£0
Delivered energy	190 kWh/m²	190 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.9 tonnes	1.9 tonnes	0.0 tonnes
CO2 emissions per m²	40 kg/m²	40 kg/m²	0 kg/m²
Primary energy	217 kWh/m²	217 kWh/m²	0 kWh/m²

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)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7918	(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) =	0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		65.5427			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		7485.6200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							153.3624	(35)
Thermal bridges (Default value 0.200 * total exposed area)							31.0400	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		96.5827	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	140.1535	139.3654	138.5929	134.9645	134.2856	131.1254	131.1254	130.5401	132.3427	134.2856	135.6590	137.0947	(39)
Average = Sum(39)m / 12 =												134.9612	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.8714	2.8553	2.8394	2.7651	2.7512	2.6864	2.6864	2.6745	2.7114	2.7512	2.7793	2.8087	(40)
HLP (average)												2.7650	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6551	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	82.9783 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)

Water storage loss:	
Store volume	150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)
Temperature factor from Table 2b	0.7800 (49)
Enter (49) or (54) in (55)	1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(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													
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
									Total per year (kWh/year) = Sum(64)m =			2733.9701	(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													
	129.1647	115.5761	125.7623	118.2062	119.2462	58.2197	57.2261	60.3076	59.7846	120.8774	121.4801	129.0341	(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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	35.2494	31.3082	25.4616	19.2760	14.4091	12.1647	13.1444	17.0856	22.9323	29.1178	33.9848	36.2291	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)													
	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)													
	173.6084	171.9882	169.0353	164.1753	160.2771	80.8606	76.9168	81.0586	83.0342	162.4696	168.7224	173.4330	(72)
Total internal gains													
	503.6861	500.3572	485.9318	462.9097	439.0262	343.1563	330.6996	336.5501	349.9982	447.5957	473.8338	494.9978	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	602.2005	674.8828	740.4780	801.2865	836.5364	745.2680	715.3157	676.3447	633.6950	644.9334	593.1057	578.4535	(84)

---

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.8362	14.9200	15.0032	15.4066	15.4844	15.8576	15.8576	15.9287	15.7118	15.4844	15.3277	15.1672	
alpha	1.9891	1.9947	2.0002	2.0271	2.0323	2.0572	2.0572	2.0619	2.0475	2.0323	2.0218	2.0111	
util living area													
	0.9492	0.9345	0.9098	0.8640	0.7921	0.7119	0.5984	0.6326	0.7843	0.8762	0.9318	0.9527	(86)
MIT	17.1486	17.4773	18.0738	18.9104	19.6945	20.3043	20.6644	20.6100	20.0663	19.1483	18.0471	17.1402	(87)
Th 2	19.5643	19.5724	19.5803	19.6175	19.6244	19.6568	19.6568	19.6628	19.6443	19.6244	19.6103	19.5956	(88)
util rest of house													
	0.9409	0.9238	0.8941	0.8382	0.7468	0.6329	0.4702	0.5111	0.7197	0.8477	0.9190	0.9451	(89)
MIT 2	16.1401	16.4684	17.0597	17.8965	18.6458	19.2253	19.5114	19.4815	19.0213	18.1432	17.0582	16.1503	(90)
Living area fraction									fLA = Living area / (4) =			0.3299	(91)
MIT	16.4728	16.8012	17.3942	18.2309	18.9917	19.5812	19.8917	19.8537	19.3660	18.4747	17.3844	16.4768	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4728	16.8012	17.3942	18.2309	18.9917	19.5812	19.8917	19.8537	19.3660	18.4747	17.3844	16.4768	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9147	0.8942	0.8611	0.8049	0.7213	0.6276	0.4958	0.5312	0.7032	0.8161	0.8897	0.9202	(94)
Useful gains	550.8130	603.4582	637.6047	644.9526	603.4238	467.7457	354.6409	359.2547	445.6284	526.3577	527.6942	532.2881	(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													
	1706.0550	1658.6118	1509.8630	1259.3446	979.1747	653.1606	431.6240	450.8477	696.9110	1057.4588	1395.1748	1683.0864	(97)
Space heating kWh													
	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939	(98a)
Space heating requirement - total per year (kWh/year)												4815.3635	
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													
	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4815.3635	
Space heating per m2											(98c) / (4) =	98.6553	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												

	859.5001	709.0632	648.9602	442.3622	279.5586	0.0000	0.0000	0.0000	0.0000	395.1392	624.5860	856.1939 (98)
Space heating efficiency (main heating system 1)												
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)												
	1087.9748	897.5484	821.4685	559.9522	353.8717	0.0000	0.0000	0.0000	0.0000	500.1762	790.6152	1083.7897 (211)
Space heating efficiency (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement												
	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130 (64)
Efficiency of water heater												76.4000 (216)
(217)m	77.0068	76.8908	76.6288	76.0981	75.2468	71.4000	71.4000	71.4000	71.4000	75.8603	76.6241	77.0032 (217)
Fuel for water heating, kWh/month												
	360.8844	322.1934	349.3112	326.5709	329.6825	226.9200	222.1244	235.1043	233.5120	333.4833	337.1794	360.3915 (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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219 (231)
Lighting	30.8536	24.7519	22.2864	16.3279	12.6122	10.3042	11.5052	14.9549	19.4250	25.4867	28.7871	31.7111 (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	6095.3968 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	76.4000
Water heating fuel used	3637.3574 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	45.0000 (231)
Electricity for lighting (calculated in Appendix L)	249.0063 (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	10026.7605 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6095.3968	3.6400	221.8724	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3637.3574	3.6400	132.3998	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	249.0063	16.4900	41.0611	(250)
Additional standing charges			92.0000	(251)
Total energy cost			494.7539	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8986 (257)
SAP value		69.2230
SAP rating (Section 12)		69 (258)
SAP band		C

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	6095.3968	0.2100	1280.0333	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3637.3574	0.2100	763.8450	(264)
Space and water heating			2043.8784	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	249.0063	0.1443	35.9393	(268)
Total CO2, kg/year			2086.0597	(272)
CO2 emissions per m2			42.7400	(273)
EI value			70.2023	
EI rating			70	(274)
EI band			C	

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)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7918	(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) =	0.7324 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8056	0.7507	0.7507	0.7141	0.7141	0.6225	0.6225	0.6042	0.6225	0.6958	0.6775	0.7324	(22b)
Effective ac	0.8245	0.7818	0.7818	0.7550	0.7550	0.6938	0.6938	0.6825	0.6938	0.7421	0.7295	0.7682	(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	
Window (Uw = 1.40)			12.5700	1.3258	16.6648			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1800	3.5568	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1800	6.2604	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3000	9.2820	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1600	0.3152	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		65.5427			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	96.5827 (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	38.3818	36.3920	36.3920	35.1435	35.1435	32.2954	32.2954	31.7726	32.2954	34.5427	33.9575	35.7600	(38)
Heat transfer coeff	134.9645	132.9747	132.9747	131.7262	131.7262	128.8781	128.8781	128.3553	128.8781	131.1254	130.5401	132.3427	(39)
Average = Sum(39)m / 12 =												131.1137	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7651	2.7243	2.7243	2.6988	2.6988	2.6404	2.6404	2.6297	2.6404	2.6864	2.6745	2.7114	(40)
HLP (average)												2.6862	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.6551 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day) 82.9783 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)

Temperature factor from Table 2b 0.7800 (49)

Enter (49) or (54) in (55) 1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)

Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(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

277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)

Total per year (kWh/year) = Sum(64)m = 2733.9701 (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

129.1647	115.5761	125.7623	118.2062	119.2462	58.2197	57.2261	60.3076	59.7846	120.8774	121.4801	129.0341	(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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	35.2494	31.3082	25.4616	19.2760	14.4091	12.1647	13.1444	17.0856	22.9323	29.1178	33.9848	36.2291	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)	173.6084	171.9882	169.0353	164.1753	160.2771	80.8606	76.9168	81.0586	83.0342	162.4696	168.7224	173.4330	(72)
Total internal gains	503.6861	500.3572	485.9318	462.9097	439.0262	343.1563	330.6996	336.5501	349.9982	447.5957	473.8338	494.9978	(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	3.3300	12.7500	0.6300	0.7000	0.7700	12.9755	(74)
South	3.8900	54.0600	0.6300	0.7000	0.7700	64.2684	(78)
West	5.3500	23.7835	0.6300	0.7000	0.7700	38.8867	(80)

Solar gains	116.1307	180.0364	261.5970	354.8866	407.8288	437.1101	413.6801	371.4049	311.4179	218.7315	138.5522	98.9221	(83)
Total gains	619.8167	680.3936	747.5288	817.7963	846.8550	780.2665	744.3797	707.9551	661.4161	666.3272	612.3860	593.9199	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.4066	15.6371	15.6371	15.7853	15.7853	16.1342	16.1342	16.1999	16.1342	15.8576	15.9287	15.7118	
alpha	2.0271	2.0425	2.0425	2.0524	2.0524	2.0756	2.0756	2.0800	2.0756	2.0572	2.0619	2.0475	
util living area	0.9425	0.9279	0.8976	0.8429	0.7535	0.6356	0.4884	0.5251	0.7361	0.8516	0.9203	0.9462	(86)
MIT	17.4712	17.7999	18.4243	19.2027	19.9763	20.5452	20.8303	20.7941	20.2902	19.4416	18.3802	17.4802	(87)
Th 2	19.6175	19.6378	19.6378	19.6506	19.6506	19.6798	19.6798	19.6852	19.6798	19.6568	19.6628	19.6443	(88)
util rest of house	0.9331	0.9161	0.8797	0.8128	0.6982	0.5361	0.3312	0.3727	0.6577	0.8168	0.9052	0.9374	(89)
MIT 2	16.4902	16.8252	17.4376	18.1977	18.9213	19.4353	19.6309	19.6181	19.2389	18.4431	17.4165	16.5154	(90)
Living area fraction									fLA = Living area / (4) =			0.3299	(91)
MIT	16.8138	17.1467	17.7631	18.5292	19.2693	19.8014	20.0265	20.0060	19.5857	18.7724	17.7344	16.8337	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8138	17.1467	17.7631	18.5292	19.2693	19.8014	20.0265	20.0060	19.5857	18.7724	17.7344	16.8337	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Utilisation	0.9058	0.8862	0.8468	0.7813	0.6796	0.5465	0.3768	0.4143	0.6510	0.7873	0.8751	0.9113	(94)
Useful gains	561.4029	602.9518	632.9754	638.9059	575.5386	426.4498	280.5117	293.3060	430.5855	524.5948	535.8979	541.2146	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1607.9357	1548.7175	1391.3255	1163.0380	865.3490	541.4712	312.7235	334.4957	616.7723	966.7105	1296.8371	1579.3319	(97)
Space heating kWh	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98a)
Space heating requirement - total per year (kWh/year)												4220.5510	
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	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4220.5510	
Space heating per m2											(98c) / (4) =	86.4690	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	778.6204	635.5546	564.2124	377.3751	215.6189	0.0000	0.0000	0.0000	0.0000	328.9341	547.8762	772.3593	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	985.5954	804.4995	714.1930	477.6900	272.9354	0.0000	0.0000	0.0000	0.0000	416.3723	693.5142	977.6700	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	277.9055	247.7370	267.6729	248.5143	248.0756	162.0209	158.5969	167.8645	166.7276	252.9814	258.3606	277.5130	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.8581	76.7200	76.3947	75.8082	74.7554	71.4000	71.4000	71.4000	71.4000	75.5179	76.4050	76.8478	(217)
Fuel for water heating, kWh/month	361.5826	322.9106	350.3815	327.8196	331.8495	226.9200	222.1244	235.1043	233.5120	334.9953	338.1462	361.1201	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	30.8536	24.7519	22.2864	16.3279	12.6122	10.3042	11.5052	14.9549	19.4250	25.4867	28.7871	31.7111	(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												5342.4697	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3646.4661	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												249.0063	(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												9282.9421	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5342.4697	5.6000	299.1783	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3646.4661	5.6000	204.2021	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	249.0063	26.0600	64.8910	(250)
Additional standing charges			99.0000	(251)
Total energy cost			678.9985	(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	5342.4697	0.2100	1121.9186	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3646.4661	0.2100	765.7579	(264)
Space and water heating			1887.6765	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	249.0063	0.1443	35.9393	(268)
Total CO2, kg/year			1929.8579	(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	5342.4697	1.1300	6036.9907	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3646.4661	1.1300	4120.5067	(278)
Space and water heating			10157.4975	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	249.0063	1.5338	381.9342	(282)
Total Primary energy kWh/year			10607.5077	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 1, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 1, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	69 C	**DER**	43.31	**TER**	
Environmental	70 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.93	**DFEE**	105.83	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	237.60	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	East	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	153.36	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	36.00 m	48.81 m²	2.89 m

8.0 Living Area	16.10	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
New Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	41.01	34.78	0.00	None	6.23	Enter Gross Area
External Solid Brick	Solid Wall	Other	0.30	0.00	37.28	30.94	0.00	None	6.34	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	26.13	24.43	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	97.28
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	10.90

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.16	9.00	1.97	1.97	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	46.84

11.0 Heat Loss Floors

Summary for Input Data

elmhurst energy

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Ground Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	29.05
Heatloss Floor 2	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.18	None	0.00	75.00	19.76

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Door	SAP table	Solid Door				0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
GW16S	Window	External Solid Brick	South	1.00	
GW17S	Window	External Solid Brick	South	1.89	
GW18S	Window	External Solid Brick	South	1.00	
GW1W	Window	External Solid Brick	West	0.84	
GW2W	Window	External Solid Brick	West	0.77	
GW3W	Window	External Solid Brick	West	0.84	
GW4W	Window	New Cavity Wall	West	0.95	
GW5W	Window	New Cavity Wall	West	1.95	
GW6N	Window	New Cavity Wall	North	3.33	
GD1E	Door	Corridor Brick Wall	East	1.70	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Test Method	Blower Door	
22.0 Lighting		
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	20.00	25.00	500.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	10588	
Fuel Type	Mains gas	
In Winter	79.00	
In Summer	76.40	
Model Name	24 HE	
Manufacturer	Baxi Potterton	
System Type	Regular boiler	

Summary for Input Data

Controls SAP Code	2104
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Cold Water Source	From header tank	
Bath Count	1	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Flat 1, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 1, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	74 C	**DER**	35.38	**TER**	
Environmental	76 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.56	**DFEE**	101.79	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	193.12	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7918	(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) =	0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.3474			(33)
Party Ceiling 1			46.8400			20.0000	936.8000	(32b)

Internal Wall TImber						97.2800					9.0000	875.5200	(32c)
Internal Wall Brick						10.9000					75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)										(28)...(30) + (32) + (32a)...(32e) =		7017.2200	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												143.7660	(35)
Thermal bridges (Default value 0.200 * total exposed area)												31.0400	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		91.3874	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	134.9583	134.1702	133.3977	129.7692	129.0904	125.9301	125.9301	125.3449	127.1474	129.0904	130.4637	131.8995	(39)
Average = Sum(39)m / 12 =												129.7660	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7650	2.7488	2.7330	2.6587	2.6448	2.5800	2.5800	2.5680	2.6049	2.6448	2.6729	2.7023	(40)
HLP (average)												2.6586	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.6551	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)
Hot water usage for other uses													
	31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)
Average daily hot water use (litres/day)												82.9783	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)											Total = Sum(45)m =	1295.3956	
Distribution loss (46)m = 0.15 x (45)m													
	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	45.9180	40.5391	43.6569	40.7540	40.6629	37.6332	37.9849	39.6740	39.5212	42.6029	42.9813	45.8943	(61)
Total heat required for water heating calculated for each month													
	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(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													
	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
										Total per year (kWh/year) = Sum(64)m =		1793.2185	(64)
12Total per year (kWh/year)												1793	(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													
	55.5871	48.8851	51.6195	46.0814	44.3548	38.7521	36.8839	40.3877	40.7891	46.4711	49.9122	55.4507	(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	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	72.7039	80.4936	72.7039	75.1274	72.7039	75.1274	72.7039	72.7039	75.1274	72.7039	75.1274	72.7039	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	144.1437	145.6394	141.8702	133.8458	123.7166	114.1965	107.8365	106.3407	110.1100	118.1343	128.2636	137.7837	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	(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)													
	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)													
	74.7138	72.7457	69.3810	64.0020	59.6167	53.8224	49.5752	54.2846	56.6515	62.4611	69.3225	74.5305	(72)
Total internal gains													
	339.3883	346.7057	331.7820	320.8021	303.8641	290.9732	277.9425	281.1561	289.7158	301.1262	320.5403	332.8450	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	437.9027	521.2313	586.3282	659.1790	701.3743	693.0849	662.5586	620.9507	573.4126	498.4639	439.8123	416.3006	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.4432	14.5280	14.6122	15.0207	15.0997	15.4786	15.4786	15.5509	15.3305	15.0997	14.9408	14.7781	
alpha	1.9629	1.9685	1.9741	2.0014	2.0066	2.0319	2.0319	2.0367	2.0220	2.0066	1.9961	1.9852	
util living area	0.9674	0.9531	0.9320	0.8897	0.8235	0.7192	0.6088	0.6455	0.7973	0.9093	0.9545	0.9704	(86)
MIT	16.8110	17.1805	17.8032	18.7001	19.5395	20.2697	20.6419	20.5816	20.0072	18.9150	17.7510	16.8005	(87)
Th 2	19.6175	19.6256	19.6335	19.6707	19.6776	19.7100	19.7100	19.7160	19.6975	19.6776	19.6636	19.6488	(88)
util rest of house	0.9622	0.9455	0.9203	0.8689	0.7846	0.6450	0.4869	0.5307	0.7382	0.8880	0.9460	0.9657	(89)
MIT 2	15.8502	16.2205	16.8407	17.7419	18.5533	19.2434	19.5460	19.5109	19.0159	17.9681	16.8123	15.8579	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.1671	16.5371	17.1582	18.0579	18.8786	19.5819	19.9075	19.8641	19.3429	18.2804	17.1219	16.1688	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.1671	16.5371	17.1582	18.0579	18.8786	19.5819	19.9075	19.8641	19.3429	18.2804	17.1219	16.1688	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9418	0.9201	0.8898	0.8350	0.7549	0.6363	0.5083	0.5461	0.7180	0.8568	0.9216	0.9468	(94)
Useful gains	412.3965	479.5714	521.7429	550.3892	529.4788	440.9981	336.7649	339.0937	411.7138	427.0694	405.3266	394.1469	(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	1601.5677	1561.3570	1421.7762	1188.4200	926.6863	627.3749	416.5140	434.2075	666.6171	991.4693	1307.4934	1578.6810	(97)
Space heating kWh	884.7434	726.9599	669.6248	459.3822	295.5224	0.0000	0.0000	0.0000	0.0000	419.9135	649.5601	881.2934	(98a)
Space heating requirement - total per year (kWh/year)												4986.9998	
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	884.7434	726.9599	669.6248	459.3822	295.5224	0.0000	0.0000	0.0000	0.0000	419.9135	649.5601	881.2934	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4986.9998	
Space heating per m2											(98c) / (4) =	102.1717	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	884.7434	726.9599	669.6248	459.3822	295.5224	0.0000	0.0000	0.0000	0.0000	419.9135	649.5601	881.2934	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	1060.8434	871.6546	802.9075	550.8180	354.3434	0.0000	0.0000	0.0000	0.0000	503.4934	778.8490	1056.7067	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.8285	86.7390	86.5464	86.1301	85.3922	79.8000	79.8000	79.8000	79.8000	85.9578	86.5494	86.8265	(217)
Fuel for water heating, kWh/month	205.6610	181.0967	191.8954	172.6489	168.0333	157.7510	150.8195	164.5498	166.0150	174.8918	185.7625	205.1865	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.2199	13.0122	11.7160	8.5837	6.6303	5.4170	6.0484	7.8619	10.2118	13.3984	15.1335	16.6707	(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	5979.6161	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2124.3117	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	130.9037	(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	8279.8315	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5979.6161	0.2100	1255.7194	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2124.3117	0.2100	446.1055	(264)
Space and water heating			1701.8248	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	130.9037	0.1443	18.8934	(268)
Total CO2, kg/year			1726.9603	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			35.3800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5979.6161	1.1300	6756.9661	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2124.3117	1.1300	2400.4722	(278)
Space and water heating			9157.4384	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	130.9037	1.5338	200.7845	(282)
Total Primary energy kWh/year			9426.2988	(286)
Dwelling Primary energy Rate (DPER)			193.1200	(287)

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

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Ground floor		48.8100 (1b)	x	2.8900 (2b)	=	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	141.0609	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7918	(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) = 0.7324	(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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.3474			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	91.3874 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	134.9583	134.1702	133.3977	129.7692	129.0904	125.9301	125.9301	125.3449	127.1474	129.0904	130.4637	131.8995	(39)
Average = Sum(39)m / 12 =												129.7660	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7650	2.7488	2.7330	2.6587	2.6448	2.5800	2.5800	2.5680	2.6049	2.6448	2.6729	2.7023	(40)
HLP (average)												2.6586	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.6551 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

21.9713	21.6396	21.1678	20.4612	19.8244	18.9477	18.2827	19.0959	19.5227	20.3914	21.2945	21.9539	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	49.0818 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	53.5514	52.0714	50.4512	48.5962	46.8110	44.7860	44.1210	46.0826	47.6578	49.6748	51.7262	53.5340	(44)
Energy conte	78.8370	68.9010	72.0937	63.4788	60.3208	51.7936	48.7550	54.2401	55.2807	64.0110	69.9097	78.6186	(45)

Energy content (annual)	Total = Sum(45)m = 766.2399

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

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

67.0114	58.5659	61.2797	53.9570	51.2726	44.0245	41.4417	46.1041	46.9886	54.4093	59.4233	66.8258	(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

67.0114	58.5659	61.2797	53.9570	51.2726	44.0245	41.4417	46.1041	46.9886	54.4093	59.4233	66.8258	(64)

	Total per year (kWh/year) = Sum(64)m = 651.3039 (64)
12Total per year (kWh/year)	651 (64)

Electric shower(s)

41.6197	37.0835	40.4938	38.6427	39.3678	37.5531	38.8049	39.3678	38.6427	40.4938	39.7323	41.6197	(64a)

	Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m = 473.4219 (64a)

Heat gains from water heating, kWh/month

27.1578	23.9123	25.4434	23.1499	22.6601	20.3944	20.0616	21.3680	21.4078	23.7258	24.7889	27.1114	(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	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	82.7563	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	72.7039	80.4936	72.7039	75.1274	72.7039	75.1274	72.7039	72.7039	75.1274	72.7039	75.1274	72.7039	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	144.1437	145.6394	141.8702	133.8458	123.7166	114.1965	107.8365	106.3407	110.1100	118.1343	128.2636	137.7837	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	31.2756	(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)	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)	36.5024	35.5838	34.1981	32.1527	30.4572	28.3256	26.9646	28.7204	29.7331	31.8895	34.4290	36.4400	(72)
Total internal gains	301.1769	309.5438	296.5991	288.9528	274.7046	265.4763	255.3319	255.5920	262.7974	270.5546	285.6469	294.7545	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)

South			3.8900		46.7521		0.6300	0.7000		0.7700		55.5805	(78)
West			5.3500		19.6403		0.6300	0.7000		0.7700		32.1124	(80)
Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	399.6913	484.0695	551.1453	627.3297	672.2147	667.5880	639.9480	595.3865	546.4942	467.8923	404.9189	378.2102	(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	15.4073	15.4978	15.5875	16.0234	16.1076	16.5118	16.5118	16.5889	16.3538	16.1076	15.9381	15.7646	
alpha	2.0272	2.0332	2.0392	2.0682	2.0738	2.1008	2.1008	2.1059	2.0903	2.0738	2.0625	2.0510	
util living area	0.9752	0.9625	0.9435	0.9042	0.8411	0.7387	0.6276	0.6671	0.8175	0.9238	0.9644	0.9778	(86)
MIT	16.8597	17.2254	17.8397	18.7273	19.5570	20.2806	20.6493	20.5864	20.0145	18.9319	17.7842	16.8509	(87)
Th 2	18.8721	18.8808	18.8894	18.9304	18.9381	18.9747	18.9747	18.9815	18.9605	18.9381	18.9225	18.9062	(88)
util rest of house	0.9682	0.9520	0.9264	0.8719	0.7774	0.6106	0.4117	0.4626	0.7170	0.8911	0.9525	0.9716	(89)
MIT 2	15.3635	15.7283	16.3372	17.2203	18.0025	18.6451	18.8929	18.8705	18.4428	17.4400	16.3083	15.3726	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	15.8570	16.2222	16.8328	17.7174	18.5153	19.1846	19.4722	19.4365	18.9612	17.9321	16.7951	15.8602	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8570	16.2222	16.8328	17.7174	18.5153	19.1846	19.4722	19.4365	18.9612	17.9321	16.7951	15.8602	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9522	0.9312	0.9013	0.8452	0.7600	0.6272	0.4759	0.5196	0.7170	0.8675	0.9331	0.9569	(94)
Useful gains	380.5684	450.7896	496.7733	530.2050	510.9118	418.6955	304.5218	309.3440	391.8358	405.8970	377.8180	361.9277	(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	1559.7111	1519.0961	1378.3758	1144.2225	879.7837	577.3367	361.7008	380.6131	618.0872	946.5027	1264.8641	1537.9783	(97)
Space heating kWh	877.2822	717.9019	655.9123	442.0925	274.4407	0.0000	0.0000	0.0000	0.0000	402.2107	638.6731	874.9817	(98a)
Space heating requirement - total per year (kWh/year)												4883.4951	
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	877.2822	717.9019	655.9123	442.0925	274.4407	0.0000	0.0000	0.0000	0.0000	402.2107	638.6731	874.9817	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4883.4951	
Space heating per m2											(98c) / (4) =	100.0511	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1183.7432	931.8829	952.6212	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5183	0.5891	0.5555	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	613.5344	548.9306	529.1565	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	754.8185	724.0279	673.2234	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	101.7245	130.2723	107.1857	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	25.4311	32.5681	26.7964	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												84.7956	(107)
Energy for space heating												100.0511	(99)
Energy for space cooling												1.7373	(108)
Total												101.7884	(109)
Fabric Energy Efficiency (DFEE)												101.8	(109)

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)	
Ground floor		48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7918	(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) =	0.7324 (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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.3474			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	91.3874 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	134.9583	134.1702	133.3977	129.7692	129.0904	125.9301	125.9301	125.3449	127.1474	129.0904	130.4637	131.8995	(39)
Average = Sum(39)m / 12 =												129.7660	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7650	2.7488	2.7330	2.6587	2.6448	2.5800	2.5800	2.5680	2.6049	2.6448	2.6729	2.7023	(40)
HLP (average)												2.6586	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6551	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	82.9783	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	45.9180	40.5391	43.6569	40.7540	40.6629	37.6332	37.9849	39.6740	39.5212	42.6029	42.9813	45.8943	(61)
Total heat required for water heating calculated for each month	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(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													

	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563 (64)
										Total per year (kWh/year) = Sum(64)m =		1793.2185 (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												
	55.5871	48.8851	51.6195	46.0814	44.3548	38.7521	36.8839	40.3877	40.7891	46.4711	49.9122	55.4507 (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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	18.5308	16.4589	13.3853	10.1335	7.5749	6.3951	6.9101	8.9820	12.0556	15.3074	17.8659	19.0458	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)													
	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)													
	74.7138	72.7457	69.3810	64.0020	59.6167	53.8224	49.5752	54.2846	56.6515	62.4611	69.3225	74.5305	(72)
Total internal gains													
	388.0728	386.2653	374.2012	353.5938	331.5317	310.3484	297.1237	301.6725	312.7388	333.7768	358.3150	378.9120	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	486.5872	560.7910	628.7474	691.9707	729.0418	712.4601	681.7398	641.4670	596.4357	531.1144	477.5870	462.3676	(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	15.4073	15.4978	15.5875	16.0234	16.1076	16.5118	16.5118	16.5889	16.3538	16.1076	15.9381	15.7646	
alpha	2.0272	2.0332	2.0392	2.0682	2.0738	2.1008	2.1008	2.1059	2.0903	2.0738	2.0625	2.0510	
util living area													
	0.9646	0.9515	0.9294	0.8882	0.8220	0.7182	0.6052	0.6412	0.7948	0.9063	0.9522	0.9679	(86)
MIT	17.0364	17.3761	17.9836	18.8347	19.6339	20.3232	20.6745	20.6191	20.0769	19.0434	17.9294	17.0256	(87)
Th 2	19.6175	19.6256	19.6335	19.6707	19.6776	19.7100	19.7100	19.7160	19.6975	19.6776	19.6636	19.6488	(88)
util rest of house													
	0.9588	0.9434	0.9170	0.8666	0.7819	0.6424	0.4815	0.5244	0.7339	0.8839	0.9430	0.9627	(89)
MIT 2	16.0621	16.4025	17.0069	17.8623	18.6330	19.2827	19.5642	19.5333	19.0704	18.0818	16.9771	16.0695	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.3835	16.7237	17.3291	18.1831	18.9631	19.6259	19.9305	19.8914	19.4024	18.3990	17.2912	16.3849	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.3835	16.7237	17.3291	18.1831	18.9631	19.6259	19.9305	19.8914	19.4024	18.3990	17.2912	16.3849	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9380	0.9185	0.8875	0.8346	0.7549	0.6366	0.5056	0.5428	0.7168	0.8542	0.9189	0.9434	(94)
Useful gains	456.3980	515.0707	557.9888	577.5230	550.3324	453.5710	344.6749	348.2040	427.5346	453.6542	438.8665	436.2016	(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													
	1630.7628	1586.3829	1444.5758	1204.6560	937.5999	632.9126	419.4041	437.6302	674.1859	1006.7736	1329.5858	1607.1817	(97)
Space heating kWh													
	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98a)
Space heating requirement - total per year (kWh/year)												4916.9804	
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													
	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4916.9804	
Space heating per m2											(98c) / (4) =	100.7372	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	1047.6348	863.2155	790.9121	541.4097	345.4760	0.0000	0.0000	0.0000	0.0000	493.4302	768.9663	1044.6153	(211)

Space heating efficiency (main heating system 2)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)

Space heating fuel (main heating system 2)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)

Space heating fuel (secondary)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

Water heating

Water heating requirement

178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)

Efficiency of water heater

											79.8000	(216)
(217)m	86.8124	86.7259	86.5245	86.1012	85.3424	79.8000	79.8000	79.8000	79.8000	85.9224	86.5308	86.8116 (217)

Fuel for water heating, kWh/month

205.6993	181.1240	191.9442	172.7069	168.1313	157.7510	150.8195	164.5498	166.0150	174.9640	185.8025	205.2216	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219 (231)
Lighting	16.2199	13.0122	11.7160	8.5837	6.6303	5.4170	6.0484	7.8619	10.2118	13.3984	15.1335	16.6707 (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	5895.6600	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2124.7292	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	130.9037	(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	8196.2929	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5895.6600	3.6400	214.6020	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2124.7292	3.6400	77.3401	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	130.9037	16.4900	21.5860	(250)
Additional standing charges			92.0000	(251)
Total energy cost			412.9487	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.5847	(257)
SAP value		74.3119	
SAP rating (Section 12)		74	(258)
SAP band		C	

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	5895.6600	0.2100	1238.0886	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2124.7292	0.2100	446.1931	(264)
Space and water heating			1684.2817	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	130.9037	0.1443	18.8934	(268)
Total CO2, kg/year			1709.4172	(272)
CO2 emissions per m2			35.0200	(273)
EI value			75.5824	
EI rating			76	(274)
EI band			C	

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1418	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7918	(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) =	0.7324 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8056	0.7507	0.7507	0.7141	0.7141	0.6225	0.6225	0.6042	0.6225	0.6958	0.6775	0.7324	(22b)
Effective ac	0.8245	0.7818	0.7818	0.7550	0.7550	0.6938	0.6938	0.6825	0.6938	0.7421	0.7295	0.7682	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.3474			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	91.3874 (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	38.3818	36.3920	36.3920	35.1435	35.1435	32.2954	32.2954	31.7726	32.2954	34.5427	33.9575	35.7600	(38)
Heat transfer coeff	129.7692	127.7795	127.7795	126.5310	126.5310	123.6828	123.6828	123.1600	123.6828	125.9301	125.3449	127.1474	(39)
Average = Sum(39)m / 12 =												125.9184	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6587	2.6179	2.6179	2.5923	2.5923	2.5340	2.5340	2.5233	2.5340	2.5800	2.5680	2.6049	(40)
HLP (average)												2.5798	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6551	(42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

	31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802 (42c)

Average daily hot water use (litres/day) 82.9783 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	45.9180	40.5391	43.6569	40.7540	40.6629	37.6332	37.9849	39.6740	39.5212	42.6029	42.9813	45.8943	(61)
Total heat required for water heating calculated for each month	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(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	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
										Total per year (kWh/year) = Sum(64)m =		1793.2185	(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	55.5871	48.8851	51.6195	46.0814	44.3548	38.7521	36.8839	40.3877	40.7891	46.4711	49.9122	55.4507	(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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.5308	16.4589	13.3853	10.1335	7.5749	6.3951	6.9101	8.9820	12.0556	15.3074	17.8659	19.0458	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)
Water heating gains (Table 5)	74.7138	72.7457	69.3810	64.0020	59.6167	53.8224	49.5752	54.2846	56.6515	62.4611	69.3225	74.5305	(72)
Total internal gains	388.0728	386.2653	374.2012	353.5938	331.5317	310.3484	297.1237	301.6725	312.7388	333.7768	358.3150	378.9120	(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	3.3300	12.7500	0.6300	0.7000	0.7700	12.9755	(74)
South	3.8900	54.0600	0.6300	0.7000	0.7700	64.2684	(78)
West	5.3500	23.7835	0.6300	0.7000	0.7700	38.8867	(80)

Solar gains	116.1307	180.0364	261.5970	354.8866	407.8288	437.1101	413.6801	371.4049	311.4179	218.7315	138.5522	98.9221	(83)
Total gains	504.2035	566.3018	635.7982	708.4805	739.3605	747.4585	710.8038	673.0774	624.1567	552.5082	496.8672	477.8341	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	16.0234	16.2729	16.2729	16.4334	16.4334	16.8119	16.8119	16.8832	16.8119	16.5118	16.5889	16.3538	
alpha	2.0682	2.0849	2.0849	2.0956	2.0956	2.1208	2.1208	2.1255	2.1208	2.1008	2.1059	2.0903	
util living area	0.9594	0.9464	0.9194	0.8693	0.7859	0.6406	0.4931	0.5317	0.7463	0.8851	0.9431	0.9630	(86)
MIT	17.3618	17.7012	18.3374	19.1324	19.9235	20.5613	20.8375	20.8012	20.3016	19.3442	18.2660	17.3673	(87)
Th 2	19.6707	19.6911	19.6911	19.7038	19.7038	19.7330	19.7330	19.7384	19.7330	19.7100	19.7160	19.6975	(88)
util rest of house	0.9527	0.9375	0.9050	0.8436	0.7359	0.5448	0.3413	0.3845	0.6718	0.8569	0.9321	0.9569	(89)
MIT 2	16.4157	16.7627	17.3895	18.1707	18.9189	19.4918	19.6837	19.6705	19.2903	18.3920	17.3404	16.4373	(90)
Living area fraction										fLA = Living area / (4) =		0.3299	(91)
MIT	16.7278	17.0722	17.7021	18.4879	19.2502	19.8446	20.0643	20.0435	19.6238	18.7061	17.6457	16.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.7278	17.0722	17.7021	18.4879	19.2502	19.8446	20.0643	20.0435	19.6238	18.7061	17.6457	16.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9306	0.9120	0.8750	0.8124	0.7147	0.5544	0.3850	0.4242	0.6641	0.8277	0.9065	0.9362	(94)
Useful gains	469.1896	516.4813	556.3438	575.5956	528.4367	414.4112	273.6794	285.5355	414.5131	457.3194	450.4213	447.3450	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1534.8812	1478.6950	1329.1783	1111.9430	828.8085	524.9842	304.7930	325.5732	596.6264	920.0539	1234.1124	1505.9413	(97)
Space heating kWh	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957	(98a)
Space heating requirement - total per year (kWh/year)												4320.2456	
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	(98b)
Solar heating contribution - total per year (kWh/year)											0.0000	
Space heating kWh												
	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											4320.2456	
Space heating per m2										(98c) / (4) =	88.5115	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)											0.0000	(201)
Fraction of space heat from main system(s)											1.0000	(202)
Efficiency of main space heating system 1 (in %)											83.4000	(206)
Efficiency of main space heating system 2 (in %)											0.0000	(207)
Efficiency of secondary/supplementary heating system, %											0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	950.6890	775.3089	689.4351	463.0337	267.9576	0.0000	0.0000	0.0000	0.0000	412.7991	676.5679	944.3593	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6828	86.5764	86.3153	85.8284	84.8255	79.8000	79.8000	79.8000	79.8000	85.5962	86.3367	86.6768	(217)
Fuel for water heating, kWh/month													
	206.0068	181.4369	192.4093	173.2557	169.1558	157.7510	150.8195	164.5498	166.0150	175.6307	186.2201	205.5409	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.2199	13.0122	11.7160	8.5837	6.6303	5.4170	6.0484	7.8619	10.2118	13.3984	15.1335	16.6707	(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												5180.1506	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2128.7915	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												130.9037	(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												7484.8458	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5180.1506	5.6000	290.0884	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2128.7915	5.6000	119.2123	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	130.9037	26.0600	34.1135	(250)
Additional standing charges			99.0000	(251)
Total energy cost			554.1413	(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	5180.1506	0.2100	1087.8316	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2128.7915	0.2100	447.0462	(264)
Space and water heating			1534.8778	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	130.9037	0.1443	18.8934	(268)

Total CO2, kg/year 1560.0134 (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	5180.1506	1.1300	5853.5702	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2128.7915	1.1300	2405.5344	(278)
Space and water heating			8259.1046	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	130.9037	1.5338	200.7845	(282)
Total Primary energy kWh/year			8527.9651	(286)

SAP 10 EPC IMPROVEMENTS

Flat 1, Proposed

Current energy efficiency rating: C 74
Current environmental impact rating: C 76

N	Solar water heating		Not applicable
U	Solar photovoltaic panels		Not applicable
V2	Wind turbine		Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 74
Potential environmental impact rating: C 76

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£46	£46	£0
Mains gas	£508	£508	£0
Space heating	£401	£401	£0
Water heating	£119	£119	£0
Lighting	£34	£34	£0
Total cost of fuels	£554	£554	£0
Total cost of uses	£554	£554	£0
Delivered energy	153 kWh/m²	153 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.6 tonnes	1.6 tonnes	0.0 tonnes
CO2 emissions per m²	32 kg/m²	32 kg/m²	0 kg/m²
Primary energy	175 kWh/m²	175 kWh/m²	0 kWh/m²

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)	
Ground floor	48.8100	(1b)	x 2.8900	(2b) =	141.0609	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		141.0609	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1418 (8)
Number of storeys in the dwelling (ns)		1 (9)

Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7918 (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) = 0.7324 (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	0.9338	0.9155	0.8972	0.8056	0.7873	0.6958	0.6958	0.6775	0.7324	0.7873	0.8239	0.8606	(22b)
Effective ac	0.9360	0.9191	0.9025	0.8245	0.8099	0.7421	0.7421	0.7295	0.7682	0.8099	0.8394	0.8703	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	60.3474			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)	31.0400 (36)
Point Thermal bridges	(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) = 91.3874 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	43.5709	42.7828	42.0102	38.3818	37.7029	34.5427	34.5427	33.9575	35.7600	37.7029	39.0763	40.5121	(38)
Heat transfer coeff	134.9583	134.1702	133.3977	129.7692	129.0904	125.9301	125.9301	125.3449	127.1474	129.0904	130.4637	131.8995	(39)
Average = Sum(39)m / 12 =												129.7660	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.7650	2.7488	2.7330	2.6587	2.6448	2.5800	2.5800	2.5680	2.6049	2.6448	2.6729	2.7023	(40)
HLP (average)												2.6586	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.6551 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	82.9783 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)											Total = Sum(45)m =	1295.3956	
Distribution loss (46)m = 0.15 x (45)m	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 45.9180	40.5391	43.6569	40.7540	40.6629	37.6332	37.9849	39.6740	39.5212	42.6029	42.9813	45.8943	(61)

Total heat required for water heating calculated for each month

178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(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

178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)

Total per year (kWh/year) = Sum(64)m =	1793.2185 (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

55.5871	48.8851	51.6195	46.0814	44.3548	38.7521	36.8839	40.3877	40.7891	46.4711	49.9122	55.4507	(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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)

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

	18.5308	16.4589	13.3853	10.1335	7.5749	6.3951	6.9101	8.9820	12.0556	15.3074	17.8659	19.0458	(67)

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

	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473	(68)

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

	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	(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)

	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	(71)

Water heating gains (Table 5)

	74.7138	72.7457	69.3810	64.0020	59.6167	53.8224	49.5752	54.2846	56.6515	62.4611	69.3225	74.5305	(72)

Total internal gains

	388.0728	386.2653	374.2012	353.5938	331.5317	310.3484	297.1237	301.6725	312.7388	333.7768	358.3150	378.9120	(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	3.3300	10.6334	0.6300	0.7000	0.7700	10.8215	(74)
South	3.8900	46.7521	0.6300	0.7000	0.7700	55.5805	(78)
West	5.3500	19.6403	0.6300	0.7000	0.7700	32.1124	(80)

Solar gains	98.5144	174.5256	254.5462	338.3769	397.5102	402.1117	384.6161	339.7945	283.6968	197.3377	119.2719	83.4557	(83)
Total gains	486.5872	560.7910	628.7474	691.9707	729.0418	712.4601	681.7398	641.4670	596.4357	531.1144	477.5870	462.3676	(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	15.4073	15.4978	15.5875	16.0234	16.1076	16.5118	16.5118	16.5889	16.3538	16.1076	15.9381	15.7646	
alpha	2.0272	2.0332	2.0392	2.0682	2.0738	2.1008	2.1008	2.1059	2.0903	2.0738	2.0625	2.0510	
util living area	0.9646	0.9515	0.9294	0.8882	0.8220	0.7182	0.6052	0.6412	0.7948	0.9063	0.9522	0.9679	(86)
MIT	17.0364	17.3761	17.9836	18.8347	19.6339	20.3232	20.6745	20.6191	20.0769	19.0434	17.9294	17.0256	(87)
Th 2	19.6175	19.6256	19.6335	19.6707	19.6776	19.7100	19.7100	19.7160	19.6975	19.6776	19.6636	19.6488	(88)
util rest of house	0.9588	0.9434	0.9170	0.8666	0.7819	0.6424	0.4815	0.5244	0.7339	0.8839	0.9430	0.9627	(89)
MIT 2	16.0621	16.4025	17.0069	17.8623	18.6330	19.2827	19.5642	19.5333	19.0704	18.0818	16.9771	16.0695	(90)
Living area fraction									fLA = Living area / (4) =			0.3299	(91)
MIT	16.3835	16.7237	17.3291	18.1831	18.9631	19.6259	19.9305	19.8914	19.4024	18.3990	17.2912	16.3849	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.3835	16.7237	17.3291	18.1831	18.9631	19.6259	19.9305	19.8914	19.4024	18.3990	17.2912	16.3849	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9380	0.9185	0.8875	0.8346	0.7549	0.6366	0.5056	0.5428	0.7168	0.8542	0.9189	0.9434	(94)
Useful gains	456.3980	515.0707	557.9888	577.5230	550.3324	453.5710	344.6749	348.2040	427.5346	453.6542	438.8665	436.2016	(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	1630.7628	1586.3829	1444.5758	1204.6560	937.5999	632.9126	419.4041	437.6302	674.1859	1006.7736	1329.5858	1607.1817	(97)
Space heating kWh	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98a)
Space heating requirement - total per year (kWh/year)												4916.9804	
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	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4916.9804	
Space heating per m2											(98c) / (4) =	100.7372	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	873.7274	719.9218	659.6207	451.5357	288.1270	0.0000	0.0000	0.0000	0.0000	411.5208	641.3179	871.2091	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	1047.6348	863.2155	790.9121	541.4097	345.4760	0.0000	0.0000	0.0000	0.0000	493.4302	768.9663	1044.6153	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
Efficiency of water heater												79.8000	(216)

(217)m	86.8124	86.7259	86.5245	86.1012	85.3424	79.8000	79.8000	79.8000	79.8000	85.9224	86.5308	86.8116	(217)
Fuel for water heating, kWh/month													
	205.6993	181.1240	191.9442	172.7069	168.1313	157.7510	150.8195	164.5498	166.0150	174.9640	185.8025	205.2216	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.2199	13.0122	11.7160	8.5837	6.6303	5.4170	6.0484	7.8619	10.2118	13.3984	15.1335	16.6707	(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	5895.6600	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2124.7292	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	130.9037	(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	8196.2929	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5895.6600	3.6400	214.6020	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2124.7292	3.6400	77.3401	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	130.9037	16.4900	21.5860	(250)
Additional standing charges			92.0000	(251)
Total energy cost			412.9487	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.5847	(257)
SAP value		74.3119	
SAP rating (Section 12)		74	(258)
SAP band		C	

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	5895.6600	0.2100	1238.0886	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2124.7292	0.2100	446.1931	(264)
Space and water heating			1684.2817	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	130.9037	0.1443	18.8934	(268)
Total CO2, kg/year			1709.4172	(272)
CO2 emissions per m2			35.0200	(273)
EI value			75.5824	
EI rating			76	(274)
EI band			C	

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)

Ground floor	48.8100 (1b)	x 2.8900 (2b)	= 141.0609 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	48.8100			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 141.0609	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1418 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7918 (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) =	0.7324 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8056	0.7507	0.7507	0.7141	0.7141	0.6225	0.6225	0.6042	0.6225	0.6958	0.6775	0.7324	(22b)
Effective ac	0.8245	0.7818	0.7818	0.7550	0.7550	0.6938	0.6938	0.6825	0.6938	0.7421	0.7295	0.7682	(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	
Window (Uw = 1.20)			12.5700	1.1450	14.3931			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			29.0500	0.2500	7.2625	20.0000	581.0000	(28a)
Heatloss Floor 2			19.7600	0.1200	2.3712	75.0000	1482.0000	(28a)
New Cavity Wall	41.0100	6.2300	34.7800	0.1200	4.1736	60.0000	2086.8000	(29a)
External Solid Brick	37.2800	6.3400	30.9400	0.3100	9.5914	0.0000	0.0000	(29a)
Corridor Brick Wall	26.1300	1.7000	24.4300	0.7000	17.1010	9.0000	219.8700	(29a)
External Roof 1	1.9700		1.9700	0.1800	0.3546	9.0000	17.7300	(30)
Total net area of external elements Aum(A, m2)			155.2000					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		60.3474			(33)
Party Ceiling 1			46.8400			30.0000	1405.2000	(32b)
Internal Wall TImber			97.2800			9.0000	875.5200	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7485.6200 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		153.3624 (35)
Thermal bridges (Default value 0.200 * total exposed area)		31.0400 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	91.3874 (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	38.3818	36.3920	36.3920	35.1435	35.1435	32.2954	32.2954	31.7726	32.2954	34.5427	33.9575	35.7600	(38)
Heat transfer coeff	129.7692	127.7795	127.7795	126.5310	126.5310	123.6828	123.6828	123.1600	123.6828	125.9301	125.3449	127.1474	(39)
Average = Sum(39)m / 12 =												125.9184	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6587	2.6179	2.6179	2.5923	2.5923	2.5340	2.5340	2.5233	2.5340	2.5800	2.5680	2.6049	(40)
HLP (average)												2.5798	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.6551 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

58.5278	57.6443	56.3874	54.5051	52.8087	50.4735	48.7019	50.8683	52.0053	54.3191	56.7248	58.4813	(42b)

Hot water usage for other uses

31.5802	30.4318	29.2834	28.1350	26.9867	25.8383	25.8383	26.9867	28.1350	29.2834	30.4318	31.5802	(42c)

Average daily hot water use (litres/day)	82.9783 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	90.1079	88.0760	85.6708	82.6401	79.7954	76.3118	74.5402	77.8550	80.1403	83.6025	87.1566	90.0615	(44)
Energy conte	132.6544	116.5424	122.4218	107.9487	102.8245	88.2521	82.3691	91.6367	92.9588	107.7303	117.7950	132.2619	(45)
Energy content (annual)										Total = Sum(45)m =		1295.3956	
Distribution loss (46)m = 0.15 x (45)m													
	19.8982	17.4814	18.3633	16.1923	15.4237	13.2378	12.3554	13.7455	13.9438	16.1595	17.6693	19.8393	(46)

Water storage loss:
Total storage loss

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(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	(59)
Combi loss	45.9180	40.5391	43.6569	40.7540	40.6629	37.6332	37.9849	39.6740	39.5212	42.6029	42.9813	45.8943 (61)

Total heat required for water heating calculated for each month

	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563 (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

	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563 (64)

Total per year (kWh/year) = Sum(64)m = 1793.2185 (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

	55.5871	48.8851	51.6195	46.0814	44.3548	38.7521	36.8839	40.3877	40.7891	46.4711	49.9122	55.4507 (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	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	99.3076	(66)

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

	18.5308	16.4589	13.3853	10.1335	7.5749	6.3951	6.9101	8.9820	12.0556	15.3074	17.8659	19.0458 (67)

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

	215.1398	217.3723	211.7465	199.7699	184.6516	170.4425	160.9500	158.7175	164.3433	176.3199	191.4382	205.6473 (68)

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

	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859	46.5859 (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)

	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051	-66.2051 (71)

Water heating gains (Table 5)

	74.7138	72.7457	69.3810	64.0020	59.6167	53.8224	49.5752	54.2846	56.6515	62.4611	69.3225	74.5305 (72)

Total internal gains

	388.0728	386.2653	374.2012	353.5938	331.5317	310.3484	297.1237	301.6725	312.7388	333.7768	358.3150	378.9120 (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	3.3300	12.7500	0.6300	0.7000	0.7700	12.9755	(74)
South	3.8900	54.0600	0.6300	0.7000	0.7700	64.2684	(78)
West	5.3500	23.7835	0.6300	0.7000	0.7700	38.8867	(80)

Solar gains	116.1307	180.0364	261.5970	354.8866	407.8288	437.1101	413.6801	371.4049	311.4179	218.7315	138.5522	98.9221	(83)
Total gains	504.2035	566.3018	635.7982	708.4805	739.3605	747.4585	710.8038	673.0774	624.1567	552.5082	496.8672	477.8341	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	16.0234	16.2729	16.2729	16.4334	16.4334	16.8119	16.8119	16.8832	16.8119	16.5118	16.5889	16.3538	
alpha	2.0682	2.0849	2.0849	2.0956	2.0956	2.1208	2.1208	2.1255	2.1208	2.1008	2.1059	2.0903	
util living area													
	0.9594	0.9464	0.9194	0.8693	0.7859	0.6406	0.4931	0.5317	0.7463	0.8851	0.9431	0.9630	(86)
MIT	17.3618	17.7012	18.3374	19.1324	19.9235	20.5613	20.8375	20.8012	20.3016	19.3442	18.2660	17.3673	(87)
Th 2	19.6707	19.6911	19.6911	19.7038	19.7038	19.7330	19.7330	19.7384	19.7330	19.7100	19.7160	19.6975	(88)
util rest of house													
	0.9527	0.9375	0.9050	0.8436	0.7359	0.5448	0.3413	0.3845	0.6718	0.8569	0.9321	0.9569	(89)
MIT 2	16.4157	16.7627	17.3895	18.1707	18.9189	19.4918	19.6837	19.6705	19.2903	18.3920	17.3404	16.4373	(90)
Living area fraction									fLA = Living area / (4) =			0.3299	(91)
MIT	16.7278	17.0722	17.7021	18.4879	19.2502	19.8446	20.0643	20.0435	19.6238	18.7061	17.6457	16.7441	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.7278	17.0722	17.7021	18.4879	19.2502	19.8446	20.0643	20.0435	19.6238	18.7061	17.6457	16.7441	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9306	0.9120	0.8750	0.8124	0.7147	0.5544	0.3850	0.4242	0.6641	0.8277	0.9065	0.9362	(94)
Useful gains	469.1896	516.4813	556.3438	575.5956	528.4367	414.4112	273.6794	285.5355	414.5131	457.3194	450.4213	447.3450	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	1534.8812	1478.6950	1329.1783	1111.9430	828.8085	524.9842	304.7930	325.5732	596.6264	920.0539	1234.1124	1505.9413	(97)
Space heating kWh													
	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957	(98a)
Space heating requirement - total per year (kWh/year)												4320.2456	
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													
	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4320.2456	
Space heating per m2											(98c) / (4) =	88.5115	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	792.8746	646.6077	574.9888	386.1701	223.4766	0.0000	0.0000	0.0000	0.0000	344.2745	564.2576	787.5957	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	950.6890	775.3089	689.4351	463.0337	267.9576	0.0000	0.0000	0.0000	0.0000	412.7991	676.5679	944.3593	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	178.5724	157.0815	166.0787	148.7027	143.4873	125.8853	120.3540	131.3108	132.4800	150.3332	160.7763	178.1563	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6828	86.5764	86.3153	85.8284	84.8255	79.8000	79.8000	79.8000	79.8000	85.5962	86.3367	86.6768	(217)
Fuel for water heating, kWh/month													
	206.0068	181.4369	192.4093	173.2557	169.1558	157.7510	150.8195	164.5498	166.0150	175.6307	186.2201	205.5409	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.2199	13.0122	11.7160	8.5837	6.6303	5.4170	6.0484	7.8619	10.2118	13.3984	15.1335	16.6707	(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												5180.1506	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2128.7915	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												130.9037	(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												7484.8458	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5180.1506	5.6000	290.0884	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2128.7915	5.6000	119.2123	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	130.9037	26.0600	34.1135	(250)
Additional standing charges			99.0000	(251)
Total energy cost			554.1413	(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	5180.1506	0.2100	1087.8316	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2128.7915	0.2100	447.0462	(264)
Space and water heating			1534.8778	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	130.9037	0.1443	18.8934	(268)
Total CO2, kg/year			1560.0134	(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	5180.1506	1.1300	5853.5702	(275)
Total CO2 associated with community systems			0.0000	(473)

Water heating (other fuel)	2128.7915	1.1300	2405.5344 (278)
Space and water heating			8259.1046 (279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760 (281)
Energy for lighting	130.9037	1.5338	200.7845 (282)
Total Primary energy kWh/year			8527.9651 (286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 1, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 1, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	74 C	**DER**	35.38	**TER**	
Environmental	76 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.56	**DFEE**	101.79	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	193.12	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	East	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	153.36	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	36.00 m	48.81 m²	2.89 m

8.0 Living Area	16.10	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
New Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.12	60.00	41.01	34.78	0.00	None	6.23	Enter Gross Area
External Solid Brick	Solid Wall	Other	0.31	0.00	37.28	30.94	0.00	None	6.34	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	26.13	24.43	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	97.28
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	10.90

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	1.97	1.97	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	46.84

11.0 Heat Loss Floors

Summary for Input Data

elmhurst energy

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Ground Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	29.05
Heatloss Floor 2	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	19.76

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door				0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
GW16S	Window	External Solid Brick	South	1.00	
GW17S	Window	External Solid Brick	South	1.89	
GW18S	Window	External Solid Brick	South	1.00	
GW1W	Window	External Solid Brick	West	0.84	
GW2W	Window	External Solid Brick	West	0.77	
GW3W	Window	External Solid Brick	West	0.84	
GW4W	Window	New Cavity Wall	West	0.95	
GW5W	Window	New Cavity Wall	West	1.95	
GW6N	Window	New Cavity Wall	North	3.33	
GD1E	Door	Corridor Brick Wall	East	1.70	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Test Method	Blower Door	
22.0 Lighting		
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	
Manufacturer	Baxi Heating	
System Type	Combi boiler	

Summary for Input Data

Controls SAP Code	2104
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	None

25.0 Main Heating 2 None

26.0 Heat Networks None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From header tank
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder None

In Airing Cupboard	No

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Flat 2, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 2, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	71 C	**DER**	39.10	**TER**	
Environmental	71 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	2.05	**DFEE**	97.13	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	213.75	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

		Area (m2)		Storey height (m)		Volume (m3)	
Ground floor		57.2700 (1b)	x	2.8900 (2b)	=	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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		2 * 10 =	20.0000 (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) =		20.0000 / (5) =	0.1208 (8)
Number of storeys in the dwelling (ns)			1 (9)
Additional infiltration		[(9) - 1] x 0.1 =	0.0000 (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			0.2000 (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 (16)
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.7708 (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) =	0.7130 (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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		67.1064			(33)
Party Ceiling 1			55.2500			20.0000	1105.0000	(32b)

Internal Wall Timber	97.0500	9.0000	873.4500	(32c)
Internal Wall Brick	10.9000	75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =		7444.5300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			129.9900	(35)
Thermal bridges (Default value 0.200 * total exposed area)			32.9940	(36)
Point Thermal bridges		(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =		100.1004	(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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	149.9800	149.1035	148.2445	144.2094	143.4544	139.9400	139.9400	139.2892	141.2937	143.4544	144.9817	146.5784	(39)
Average = Sum(39)m / 12 =												144.2058	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6188	2.6035	2.5885	2.5181	2.5049	2.4435	2.4435	2.4321	2.4672	2.5049	2.5315	2.5594	(40)
HLP (average)												2.5180	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9035	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)
Hot water usage for other uses	34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)
Average daily hot water use (litres/day)												89.6615	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(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	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
										Total per year (kWh/year) = Sum(64)m =		2838.3027	(64)
12Total per year (kWh/year)												2838	(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	132.7171	118.6971	129.0407	121.0971	121.9998	60.5830	59.4319	62.7616	62.2741	123.7624	124.6347	132.5761	(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	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	83.7191	92.6890	83.7191	86.5098	83.7191	86.5098	83.7191	83.7191	86.5098	83.7191	86.5098	83.7191	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.0132	167.7359	163.3948	154.1530	142.4869	131.5224	124.1975	122.4748	126.8159	136.0577	147.7238	158.6883	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	(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)	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)	178.3832	176.6326	173.4419	168.1904	163.9782	84.1431	79.8816	84.3570	86.4917	166.3473	173.1037	178.1937	(72)
Total internal gains	479.6679	488.6099	472.1081	460.4055	441.7366	353.7277	339.3506	342.1033	351.3698	437.6765	458.8896	472.1534	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	579.9936	666.9532	733.4620	809.2824	852.4653	769.4892	736.9157	692.8137	643.1919	639.6956	580.4732	557.0625	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
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)													
tau	13.7880	13.8691	13.9494	14.3397	14.4152	14.7772	14.7772	14.8463	14.6356	14.4152	14.2634	14.1080	
alpha	1.9192	1.9246	1.9300	1.9560	1.9610	1.9851	1.9851	1.9898	1.9757	1.9610	1.9509	1.9405	
util living area	0.9530	0.9371	0.9136	0.8670	0.7958	0.7140	0.6038	0.6392	0.7893	0.8818	0.9356	0.9562	(86)
MIT	16.8969	17.2552	17.8694	18.7580	19.5867	20.2438	20.6270	20.5666	19.9845	19.0003	17.8457	16.8903	(87)
Th 2	19.6906	19.6982	19.7057	19.7410	19.7476	19.7782	19.7782	19.7839	19.7664	19.7476	19.7342	19.7203	(88)
util rest of house	0.9462	0.9281	0.9004	0.8448	0.7564	0.6449	0.4907	0.5326	0.7335	0.8578	0.9249	0.9500	(89)
MIT 2	15.9920	16.3501	16.9606	17.8505	18.6492	19.2792	19.5966	19.5597	19.0518	18.1020	16.9599	16.0027	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.3039	16.6620	17.2739	18.1633	18.9724	19.6117	19.9518	19.9068	19.3733	18.4117	17.2652	16.3086	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.3039	16.6620	17.2739	18.1633	18.9724	19.6117	19.9518	19.9068	19.3733	18.4117	17.2652	16.3086	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9200	0.8975	0.8658	0.8086	0.7266	0.6337	0.5090	0.5450	0.7114	0.8235	0.8948	0.9251	(94)
Useful gains	533.5799	598.6142	635.0672	654.3823	619.3784	487.6609	375.1258	377.5886	457.5849	526.7946	519.4305	515.3418	(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	1800.3463	1753.7623	1597.1693	1335.8547	1043.2547	701.3342	469.0482	488.4557	745.0812	1120.6164	1473.7675	1774.8607	(97)
Space heating kWh	942.4741	776.2595	715.8040	490.6601	315.3640	0.0000	0.0000	0.0000	0.0000	441.8034	687.1226	937.0820	(98a)
Space heating requirement - total per year (kWh/year)												5306.5698	
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	942.4741	776.2595	715.8040	490.6601	315.3640	0.0000	0.0000	0.0000	0.0000	441.8034	687.1226	937.0820	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5306.5698	
Space heating per m2											(98c) / (4) =	92.6588	(99)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	942.4741	776.2595	715.8040	490.6601	315.3640	0.0000	0.0000	0.0000	0.0000	441.8034	687.1226	937.0820	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1193.0052	982.6070	906.0810	621.0887	399.1949	0.0000	0.0000	0.0000	0.0000	559.2448	869.7755	1186.1798	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
Efficiency of water heater												76.4000	(216)
(217)m	77.0858	76.9711	76.7285	76.2212	75.4132	71.4000	71.4000	71.4000	71.4000	76.0028	76.7199	77.0797	(217)
Fuel for water heating, kWh/month	374.3746	334.0519	361.7077	337.4500	339.9368	236.8751	231.4159	245.4412	243.9980	344.2743	349.1243	373.8541	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	25.8587	20.7448	18.6784	13.6846	10.5704	8.6361	9.6426	12.5339	16.2803	21.3606	24.1267	26.5774	(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												6717.1769	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3772.5038	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												208.6945	(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	10743.3752	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	6717.1769	0.2100	1410.6072	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3772.5038	0.2100	792.2258	(264)
Space and water heating			2202.8330	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	208.6945	0.1443	30.1211	(268)
Total CO2, kg/year			2239.1961	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			39.1000	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	6717.1769	1.1300	7590.4099	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3772.5038	1.1300	4262.9293	(278)
Space and water heating			11853.3393	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	208.6945	1.5338	320.1025	(282)
Total Primary energy kWh/year			12241.5178	(286)
Dwelling Primary energy Rate (DPER)			213.7500	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	57.2700 (1b)	x	2.8900 (2b)	=	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7708 (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) =	0.7130 (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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.1064			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	100.1004 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	149.9800	149.1035	148.2445	144.2094	143.4544	139.9400	139.9400	139.2892	141.2937	143.4544	144.9817	146.5784	(39)
Average = Sum(39)m / 12 =												144.2058	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6188	2.6035	2.5885	2.5181	2.5049	2.4435	2.4435	2.4321	2.4672	2.5049	2.5315	2.5594	(40)
HLP (average)												2.5180	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.9035	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.7222	23.3641	22.8546	22.0917	21.4042	20.4577	19.7396	20.6177	21.0785	22.0163	22.9914	23.7033	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	53.0176	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	57.8458	56.2469	54.4966	52.4928	50.5644	48.3770	47.6589	49.7779	51.4796	53.6583	55.8742	57.8270	(44)
Energy conte	85.1590	74.4260	77.8745	68.5687	65.1573	55.9464	52.6645	58.5895	59.7137	69.1441	75.5158	84.9232	(45)

Energy content (annual)	Total = Sum(45)m =	827.6827

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

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

72.3852	63.2621	66.1933	58.2834	55.3837	47.5544	44.7648	49.8011	50.7567	58.7725	64.1884	72.1847	(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

72.3852	63.2621	66.1933	58.2834	55.3837	47.5544	44.7648	49.8011	50.7567	58.7725	64.1884	72.1847	(64)

	Total per year (kWh/year) = Sum(64)m =	703.5303 (64)
12Total per year (kWh/year)		704 (64)

Electric shower(s)

44.9546	40.0550	43.7385	41.7391	42.5223	40.5622	41.9142	42.5223	41.7391	43.7385	42.9160	44.9546	(64a)

Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		511.3565 (64a)

Heat gains from water heating, kWh/month

29.3350	25.8293	27.4829	25.0056	24.4765	22.0292	21.6698	23.0808	23.1239	25.6277	26.7761	29.2848	(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	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	83.7191	92.6890	83.7191	86.5098	83.7191	86.5098	83.7191	83.7191	86.5098	83.7191	86.5098	83.7191	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.0132	167.7359	163.3948	154.1530	142.4869	131.5224	124.1975	122.4748	126.8159	136.0577	147.7238	158.6883	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	(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)	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)	39.4287	38.4364	36.9394	34.7300	32.8985	30.5960	29.1260	31.0226	32.1166	34.4459	37.1891	39.3613	(72)
Total internal gains	340.7134	350.4137	335.6057	326.9452	310.6569	300.1806	288.5950	288.7689	296.9946	305.7751	322.9750	333.3211	(73)

---

6. Solar gains

[Jan]	Area	Solar flux	g	FF	Access	Gains

	m2	Table 6a W/m2	Specific data or Table 6b	Specific data or Table 6c	factor Table 6d	W	
North	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	441.0391	528.7571	596.9596	675.8221	721.3856	715.9422	686.1602	639.4793	588.8168	507.7942	444.5585	418.2301	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.8113	14.8984	14.9847	15.4040	15.4850	15.8739	15.8739	15.9481	15.7218	15.4850	15.3219	15.1550	
alpha	1.9874	1.9932	1.9990	2.0269	2.0323	2.0583	2.0583	2.0632	2.0481	2.0323	2.0215	2.0103	
util living area	0.9737	0.9614	0.9430	0.9050	0.8442	0.7448	0.6360	0.6742	0.8204	0.9233	0.9629	0.9764	(86)
MIT	16.7745	17.1349	17.7492	18.6440	19.4884	20.2349	20.6213	20.5565	19.9666	18.8673	17.7096	16.7659	(87)
Th 2	18.9527	18.9613	18.9699	19.0103	19.0180	19.0540	19.0540	19.0608	19.0401	19.0180	19.0025	18.9865	(88)
util rest of house	0.9669	0.9512	0.9268	0.8749	0.7852	0.6254	0.4321	0.4822	0.7271	0.8926	0.9513	0.9702	(89)
MIT 2	15.3463	15.7062	16.3159	17.2085	18.0104	18.6834	18.9550	18.9290	18.4731	17.4455	16.3018	15.3554	(90)
Living area fraction									fLA = Living area / (4) =			0.3447	(91)
MIT	15.8386	16.1986	16.8099	17.7033	18.5199	19.2182	19.5293	19.4900	18.9879	17.9356	16.7870	15.8416	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8386	16.1986	16.8099	17.7033	18.5199	19.2182	19.5293	19.4900	18.9879	17.9356	16.7870	15.8416	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9499	0.9297	0.9010	0.8470	0.7655	0.6380	0.4924	0.5347	0.7238	0.8678	0.9311	0.9546	(94)
Useful gains	418.9515	491.5770	537.8842	572.4277	552.2362	456.7768	337.8581	341.9207	426.1847	440.6683	413.9091	399.2625	(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	1730.5533	1684.6672	1528.3886	1269.5149	978.3377	646.2741	409.9332	430.3996	690.6323	1052.3216	1404.4437	1706.4027	(97)
Space heating kWh	975.8317	801.7566	736.9353	501.9028	317.0195	0.0000	0.0000	0.0000	0.0000	455.0701	713.1849	972.5123	(98a)
Space heating requirement - total per year (kWh/year)												5474.2132	
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	975.8317	801.7566	736.9353	501.9028	317.0195	0.0000	0.0000	0.0000	0.0000	455.0701	713.1849	972.5123	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5474.2132	
Space heating per m2											(98c) / (4) =	95.5861	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1315.4360	1035.5560	1058.5978	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5015	0.5713	0.5386	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	659.6420	591.6066	570.1796	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	806.5726	773.4912	720.4246	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	105.7901	135.3222	111.7823	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	26.4475	33.8305	27.9456	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												88.2236	(107)
Energy for space heating												95.5861	(99)
Energy for space cooling												1.5405	(108)
Total												97.1265	(109)
Fabric Energy Efficiency (DFEE)												97.1	(109)

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)	
Ground floor		57.2700	(1b)	x 2.8900	(2b) =	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		165.5103	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7708	(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) =	0.7130	(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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		67.1064			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	100.1004 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	149.9800	149.1035	148.2445	144.2094	143.4544	139.9400	139.9400	139.2892	141.2937	143.4544	144.9817	146.5784	(39)
Average = Sum(39)m / 12 =												144.2058	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6188	2.6035	2.5885	2.5181	2.5049	2.4435	2.4435	2.4321	2.4672	2.5049	2.5315	2.5594	(40)
HLP (average)												2.5180	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.9035 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	89.6615 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)

Water storage loss:	
Store volume	150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)
Temperature factor from Table 2b	0.7800 (49)
Enter (49) or (54) in (55)	1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
											Total per year (kWh/year) = Sum(64)m =	2838.3027	(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													
	132.7171	118.6971	129.0407	121.0971	121.9998	60.5830	59.4319	62.7616	62.2741	123.7624	124.6347	132.5761	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	29.5429	26.2397	21.3396	16.1554	12.0764	10.1954	11.0165	14.3196	19.2198	24.4039	28.4830	30.3639	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	178.3832	176.6326	173.4419	168.1904	163.9782	84.1431	79.8816	84.3570	86.4917	166.3473	173.1037	178.1937	(72)
Total internal gains													
	542.1013	539.6186	525.0485	500.8191	475.1159	377.0349	362.6617	367.8691	381.3833	480.2167	508.4642	531.8000	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	642.4269	717.9620	786.4024	849.6960	885.8445	792.7964	760.2269	718.5795	673.2054	682.2357	630.0478	616.7091	(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	14.8113	14.8984	14.9847	15.4040	15.4850	15.8739	15.8739	15.9481	15.7218	15.4850	15.3219	15.1550	
alpha	1.9874	1.9932	1.9990	2.0269	2.0323	2.0583	2.0583	2.0632	2.0481	2.0323	2.0215	2.0103	
util living area													
	0.9494	0.9350	0.9107	0.8654	0.7944	0.7131	0.6000	0.6342	0.7857	0.8780	0.9325	0.9529	(86)
MIT	17.1419	17.4678	18.0631	18.9012	19.6859	20.3027	20.6631	20.6086	20.0631	19.1386	18.0401	17.1355	(87)
Th 2	19.6906	19.6982	19.7057	19.7410	19.7476	19.7782	19.7782	19.7839	19.7664	19.7476	19.7342	19.7203	(88)
util rest of house													
	0.9419	0.9254	0.8967	0.8425	0.7540	0.6423	0.4851	0.5256	0.7281	0.8527	0.9210	0.9461	(89)
MIT 2	16.2227	16.5485	17.1394	17.9790	18.7333	19.3235	19.6179	19.5857	19.1142	18.2247	17.1398	16.2338	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.5395	16.8654	17.4578	18.2969	19.0616	19.6610	19.9781	19.9382	19.4413	18.5397	17.4501	16.5446	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.5395	16.8654	17.4578	18.2969	19.0616	19.6610	19.9781	19.9382	19.4413	18.5397	17.4501	16.5446	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9157	0.8958	0.8635	0.8086	0.7270	0.6344	0.5064	0.5414	0.7095	0.8206	0.8918	0.9212	(94)
Useful gains	588.2477	643.1448	679.0644	687.0617	644.0500	502.9447	384.9674	389.0217	477.6161	559.8144	561.8455	568.1061	(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													
	1835.6818	1784.0789	1624.4288	1355.1207	1056.0590	708.2377	472.7350	492.8399	754.6879	1138.9884	1500.5770	1809.4479	(97)
Space heating kWh													
	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583	(98a)
Space heating requirement - total per year (kWh/year)												5216.0376	
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													
	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5216.0376	
Space heating per m2											(98c) / (4) =	91.0780	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583	(98)
Space heating efficiency (main heating system 1)													
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)													
	1174.7988	970.5162	890.3178	608.8639	388.0186	0.0000	0.0000	0.0000	0.0000	545.4499	855.5528	1169.0612	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
Efficiency of water heater												76.4000	(216)
(217)m	77.0637	76.9526	76.7005	76.1861	75.3594	71.4000	71.4000	71.4000	71.4000	75.9574	76.6935	77.0587	(217)
Fuel for water heating, kWh/month													
	374.4820	334.1321	361.8399	337.6056	340.1796	236.8751	231.4159	245.4412	243.9980	344.4803	349.2445	373.9557	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	25.8587	20.7448	18.6784	13.6846	10.5704	8.6361	9.6426	12.5339	16.2803	21.3606	24.1267	26.5774	(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	6602.5792	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3773.6499	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	208.6945	(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	10629.9235	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6602.5792	3.6400	240.3339	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3773.6499	3.6400	137.3609	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	208.6945	16.4900	34.4137	(250)
Additional standing charges			92.0000	(251)
Total energy cost			511.5290	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8006	(257)
SAP value		70.8118	
SAP rating (Section 12)		71	(258)
SAP band		C	

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	6602.5792	0.2100	1386.5416	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3773.6499	0.2100	792.4665	(264)
Space and water heating			2179.0081	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	208.6945	0.1443	30.1211	(268)
Total CO2, kg/year			2215.3712	(272)
CO2 emissions per m2			38.6800	(273)
EI value			70.9729	
EI rating			71	(274)
EI band			C	

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)	
Ground floor	57.2700	(1b)	x 2.8900	(2b) =	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.7708 (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) =	0.7130 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.7843	0.7309	0.7309	0.6952	0.6952	0.6061	0.6061	0.5882	0.6061	0.6774	0.6595	0.7130	(22b)
Effective ac	0.8076	0.7671	0.7671	0.7417	0.7417	0.6837	0.6837	0.6730	0.6837	0.7294	0.7175	0.7542	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.1064			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		7997.0300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							139.6373	(35)
Thermal bridges (Default value 0.200 * total exposed area)							32.9940	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		100.1004	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.1090	41.8962	41.8962	40.5078	40.5078	37.3405	37.3405	36.7591	37.3405	39.8396	39.1888	41.1933	(38)
Heat transfer coeff	144.2094	141.9966	141.9966	140.6082	140.6082	137.4409	137.4409	136.8595	137.4409	139.9400	139.2892	141.2937	(39)
Average = Sum(39)m / 12 =												139.9270	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5181	2.4794	2.4794	2.4552	2.4552	2.3999	2.3999	2.3897	2.3999	2.4435	2.4321	2.4672	(40)
HLP (average)												2.4433	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9035	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)
Hot water usage for other uses													
	34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)
Average daily hot water use (litres/day)												89.6615	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m													
	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
										Total per year (kWh/year) = Sum(64)m =		2838.3027	(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													
	132.7171	118.6971	129.0407	121.0971	121.9998	60.5830	59.4319	62.7616	62.2741	123.7624	124.6347	132.5761	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	29.5429	26.2397	21.3396	16.1554	12.0764	10.1954	11.0165	14.3196	19.2198	24.4039	28.4830	30.3639	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	178.3832	176.6326	173.4419	168.1904	163.9782	84.1431	79.8816	84.3570	86.4917	166.3473	173.1037	178.1937	(72)
Total internal gains													
	542.1013	539.6186	525.0485	500.8191	475.1159	377.0349	362.6617	367.8691	381.3833	480.2167	508.4642	531.8000	(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	3.3200	12.7500	0.6300	0.7000	0.7700	12.9366	(74)
East	5.8000	23.7835	0.6300	0.7000	0.7700	42.1575	(76)
South	3.8300	54.0600	0.6300	0.7000	0.7700	63.2771	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	118.3712	184.1453	268.8206	366.1168	421.5398	452.0614	427.7338	383.5243	320.5810	224.1257	141.3657	100.7324	(83)
Total gains	660.4725	723.7639	793.8690	866.9360	896.6557	829.0963	790.3955	751.3934	701.9643	704.3423	649.8299	632.5325	(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	15.4040	15.6440	15.6440	15.7985	15.7985	16.1626	16.1626	16.2312	16.1626	15.8739	15.9481	15.7218	
alpha	2.0269	2.0429	2.0429	2.0532	2.0532	2.0775	2.0775	2.0821	2.0775	2.0583	2.0632	2.0481	
util living area													
	0.9428	0.9284	0.8985	0.8446	0.7560	0.6370	0.4900	0.5269	0.7378	0.8538	0.9211	0.9464	(86)
MIT	17.4677	17.7959	18.4182	19.1958	19.9698	20.5441	20.8296	20.7933	20.2880	19.4334	18.3759	17.4786	(87)
Th 2	19.7410	19.7603	19.7603	19.7724	19.7724	19.8001	19.8001	19.8051	19.8001	19.7782	19.7839	19.7664	(88)
util rest of house													
	0.9343	0.9179	0.8825	0.8177	0.7066	0.5479	0.3487	0.3902	0.6679	0.8228	0.9077	0.9386	(89)
MIT 2	16.5746	16.9091	17.5207	18.2826	19.0124	19.5380	19.7431	19.7283	19.3348	18.5266	17.4998	16.6008	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.8824	17.2148	17.8301	18.5974	19.3424	19.8848	20.1176	20.0954	19.6634	18.8391	17.8018	16.9033	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8824	17.2148	17.8301	18.5974	19.3424	19.8848	20.1176	20.0954	19.6634	18.8391	17.8018	16.9033	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9070	0.8879	0.8494	0.7854	0.6861	0.5550	0.3898	0.4270	0.6584	0.7924	0.8775	0.9125	(94)
Useful gains	599.0442	642.6322	674.2989	680.8665	615.1845	460.1461	308.0610	320.8319	462.1730	558.1550	570.2463	577.1823	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1727.9796	1663.4553	1495.2336	1251.0408	933.9761	588.9026	346.0199	368.8894	668.4278	1041.0321	1393.1430	1695.9959	(97)
Space heating kWh	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98a)
Space heating requirement - total per year (kWh/year)												4568.5465	
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	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4568.5465	
Space heating per m2											(98c) / (4) =	79.7721	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1063.1999	868.3457	773.1334	519.6525	300.2290	0.0000	0.0000	0.0000	0.0000	454.7602	749.9818	1053.6675	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9162	76.7820	76.4680	75.9001	74.8729	71.4000	71.4000	71.4000	71.4000	75.6204	76.4767	76.9048	(217)
Fuel for water heating, kWh/month	375.2003	334.8745	362.9398	338.8779	342.3898	236.8751	231.4159	245.4412	243.9980	346.0152	350.2349	374.7045	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	25.8587	20.7448	18.6784	13.6846	10.5704	8.6361	9.6426	12.5339	16.2803	21.3606	24.1267	26.5774	(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	5782.9702	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3782.9669	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	208.6945	(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	9819.6315	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5782.9702	5.6000	323.8463	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3782.9669	5.6000	211.8461	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	208.6945	26.0600	54.3858	(250)
Additional standing charges			99.0000	(251)
Total energy cost			700.8053	(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	5782.9702	0.2100	1214.4237	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3782.9669	0.2100	794.4230	(264)
Space and water heating			2008.8468	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	208.6945	0.1443	30.1211	(268)
Total CO2, kg/year			2045.2099	(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	5782.9702	1.1300	6534.7563	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3782.9669	1.1300	4274.7526	(278)
Space and water heating			10809.5089	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	208.6945	1.5338	320.1025	(282)
Total Primary energy kWh/year			11197.6874	(286)

SAP 10 EPC IMPROVEMENTS

Flat 2, Notional

Current energy efficiency rating: C 71
Current environmental impact rating: C 71

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 71
Potential environmental impact rating: C 71

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£66	£66	£0
Mains gas	£635	£635	£0
Space heating	£435	£435	£0
Water heating	£212	£212	£0
Lighting	£54	£54	£0
Total cost of fuels	£701	£701	£0
Total cost of uses	£701	£701	£0
Delivered energy	171 kWh/m²	171 kWh/m²	0 kWh/m²
Carbon dioxide emissions	2.0 tonnes	2.0 tonnes	0.0 tonnes
CO2 emissions per m²	36 kg/m²	36 kg/m²	0 kg/m²
Primary energy	196 kWh/m²	196 kWh/m²	0 kWh/m²

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)	
Ground floor	57.2700	(1b)	x 2.8900	(2b) =	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7708	(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) =	0.7130	(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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		67.1064			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	100.1004 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	149.9800	149.1035	148.2445	144.2094	143.4544	139.9400	139.9400	139.2892	141.2937	143.4544	144.9817	146.5784	(39)
Average = Sum(39)m / 12 =												144.2058	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.6188	2.6035	2.5885	2.5181	2.5049	2.4435	2.4435	2.4321	2.4672	2.5049	2.5315	2.5594	(40)
HLP (average)												2.5180	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.9035 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	89.6615 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)

Water storage loss:	
Store volume	150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)
Temperature factor from Table 2b	0.7800 (49)
Enter (49) or (54) in (55)	1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
									Total per year (kWh/year) = Sum(64)m =			2838.3027	(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													
	132.7171	118.6971	129.0407	121.0971	121.9998	60.5830	59.4319	62.7616	62.2741	123.7624	124.6347	132.5761	(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	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	29.5429	26.2397	21.3396	16.1554	12.0764	10.1954	11.0165	14.3196	19.2198	24.4039	28.4830	30.3639	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	178.3832	176.6326	173.4419	168.1904	163.9782	84.1431	79.8816	84.3570	86.4917	166.3473	173.1037	178.1937	(72)
Total internal gains													
	542.1013	539.6186	525.0485	500.8191	475.1159	377.0349	362.6617	367.8691	381.3833	480.2167	508.4642	531.8000	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	642.4269	717.9620	786.4024	849.6960	885.8445	792.7964	760.2269	718.5795	673.2054	682.2357	630.0478	616.7091	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.8113	14.8984	14.9847	15.4040	15.4850	15.8739	15.8739	15.9481	15.7218	15.4850	15.3219	15.1550	
alpha	1.9874	1.9932	1.9990	2.0269	2.0323	2.0583	2.0583	2.0632	2.0481	2.0323	2.0215	2.0103	
util living area													
	0.9494	0.9350	0.9107	0.8654	0.7944	0.7131	0.6000	0.6342	0.7857	0.8780	0.9325	0.9529	(86)
MIT	17.1419	17.4678	18.0631	18.9012	19.6859	20.3027	20.6631	20.6086	20.0631	19.1386	18.0401	17.1355	(87)
Th 2	19.6906	19.6982	19.7057	19.7410	19.7476	19.7782	19.7782	19.7839	19.7664	19.7476	19.7342	19.7203	(88)
util rest of house													
	0.9419	0.9254	0.8967	0.8425	0.7540	0.6423	0.4851	0.5256	0.7281	0.8527	0.9210	0.9461	(89)
MIT 2	16.2227	16.5485	17.1394	17.9790	18.7333	19.3235	19.6179	19.5857	19.1142	18.2247	17.1398	16.2338	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.5395	16.8654	17.4578	18.2969	19.0616	19.6610	19.9781	19.9382	19.4413	18.5397	17.4501	16.5446	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.5395	16.8654	17.4578	18.2969	19.0616	19.6610	19.9781	19.9382	19.4413	18.5397	17.4501	16.5446	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9157	0.8958	0.8635	0.8086	0.7270	0.6344	0.5064	0.5414	0.7095	0.8206	0.8918	0.9212	(94)
Useful gains	588.2477	643.1448	679.0644	687.0617	644.0500	502.9447	384.9674	389.0217	477.6161	559.8144	561.8455	568.1061	(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													
	1835.6818	1784.0789	1624.4288	1355.1207	1056.0590	708.2377	472.7350	492.8399	754.6879	1138.9884	1500.5770	1809.4479	(97)
Space heating kWh													
	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583	(98a)
Space heating requirement - total per year (kWh/year)												5216.0376	
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													
	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5216.0376	
Space heating per m2											(98c) / (4) =	91.0780	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Space heating requirement												

	928.0910	766.7078	703.3511	481.0025	306.5347	0.0000	0.0000	0.0000	0.0000	430.9055	675.8867	923.5583 (98)
Space heating efficiency (main heating system 1)												
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000 (210)
Space heating fuel (main heating system)												
	1174.7988	970.5162	890.3178	608.8639	388.0186	0.0000	0.0000	0.0000	0.0000	545.4499	855.5528	1169.0612 (211)
Space heating efficiency (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (212)
Space heating fuel (main heating system 2)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (213)
Space heating fuel (secondary)												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (215)
Water heating												
Water heating requirement												
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655 (64)
Efficiency of water heater												76.4000 (216)
(217)m	77.0637	76.9526	76.7005	76.1861	75.3594	71.4000	71.4000	71.4000	71.4000	75.9574	76.6935	77.0587 (217)
Fuel for water heating, kWh/month												
	374.4820	334.1321	361.8399	337.6056	340.1796	236.8751	231.4159	245.4412	243.9980	344.4803	349.2445	373.9557 (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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219 (231)
Lighting	25.8587	20.7448	18.6784	13.6846	10.5704	8.6361	9.6426	12.5339	16.2803	21.3606	24.1267	26.5774 (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	6602.5792 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	76.4000
Water heating fuel used	3773.6499 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	45.0000 (231)
Electricity for lighting (calculated in Appendix L)	208.6945 (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	10629.9235 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6602.5792	3.6400	240.3339	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3773.6499	3.6400	137.3609	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	208.6945	16.4900	34.4137	(250)
Additional standing charges			92.0000	(251)
Total energy cost			511.5290	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.8006 (257)
SAP value		70.8118
SAP rating (Section 12)		71 (258)
SAP band		C

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	6602.5792	0.2100	1386.5416	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3773.6499	0.2100	792.4665	(264)
Space and water heating			2179.0081	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	208.6945	0.1443	30.1211	(268)
Total CO2, kg/year			2215.3712	(272)
CO2 emissions per m2			38.6800	(273)
EI value			70.9729	
EI rating			71	(274)
EI band			C	

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)	
Ground floor	57.2700 (1b)	x	2.8900 (2b)	=	165.5103 (1b) - (3b)	
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7708	(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) =	0.7130 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.7843	0.7309	0.7309	0.6952	0.6952	0.6061	0.6061	0.5882	0.6061	0.6774	0.6595	0.7130	(22b)
Effective ac	0.8076	0.7671	0.7671	0.7417	0.7417	0.6837	0.6837	0.6730	0.6837	0.7294	0.7175	0.7542	(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	
Window (Uw = 1.40)			12.9500	1.3258	17.1686			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1800	3.6378	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1800	6.5358	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3000	9.9210	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1600	0.3232	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	67.1064			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	100.1004 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.1090	41.8962	41.8962	40.5078	40.5078	37.3405	37.3405	36.7591	37.3405	39.8396	39.1888	41.1933	(38)
Heat transfer coeff	144.2094	141.9966	141.9966	140.6082	140.6082	137.4409	137.4409	136.8595	137.4409	139.9400	139.2892	141.2937	(39)
Average = Sum(39)m / 12 =												139.9270	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5181	2.4794	2.4794	2.4552	2.4552	2.3999	2.3999	2.3897	2.3999	2.4435	2.4321	2.4672	(40)
HLP (average)												2.4433	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9035	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)
Hot water usage for other uses													
	34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)
Average daily hot water use (litres/day)												89.6615	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m													
	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(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													
	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
										Total per year (kWh/year) = Sum(64)m =		2838.3027	(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													
	132.7171	118.6971	129.0407	121.0971	121.9998	60.5830	59.4319	62.7616	62.2741	123.7624	124.6347	132.5761	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	29.5429	26.2397	21.3396	16.1554	12.0764	10.1954	11.0165	14.3196	19.2198	24.4039	28.4830	30.3639	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	178.3832	176.6326	173.4419	168.1904	163.9782	84.1431	79.8816	84.3570	86.4917	166.3473	173.1037	178.1937	(72)
Total internal gains													
	542.1013	539.6186	525.0485	500.8191	475.1159	377.0349	362.6617	367.8691	381.3833	480.2167	508.4642	531.8000	(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	3.3200	12.7500	0.6300	0.7000	0.7700	12.9366	(74)
East	5.8000	23.7835	0.6300	0.7000	0.7700	42.1575	(76)
South	3.8300	54.0600	0.6300	0.7000	0.7700	63.2771	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	118.3712	184.1453	268.8206	366.1168	421.5398	452.0614	427.7338	383.5243	320.5810	224.1257	141.3657	100.7324	(83)
Total gains	660.4725	723.7639	793.8690	866.9360	896.6557	829.0963	790.3955	751.3934	701.9643	704.3423	649.8299	632.5325	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	15.4040	15.6440	15.6440	15.7985	15.7985	16.1626	16.1626	16.2312	16.1626	15.8739	15.9481	15.7218	
alpha	2.0269	2.0429	2.0429	2.0532	2.0532	2.0775	2.0775	2.0821	2.0775	2.0583	2.0632	2.0481	
util living area													
	0.9428	0.9284	0.8985	0.8446	0.7560	0.6370	0.4900	0.5269	0.7378	0.8538	0.9211	0.9464	(86)
MIT	17.4677	17.7959	18.4182	19.1958	19.9698	20.5441	20.8296	20.7933	20.2880	19.4334	18.3759	17.4786	(87)
Th 2	19.7410	19.7603	19.7603	19.7724	19.7724	19.8001	19.8001	19.8051	19.8001	19.7782	19.7839	19.7664	(88)
util rest of house													
	0.9343	0.9179	0.8825	0.8177	0.7066	0.5479	0.3487	0.3902	0.6679	0.8228	0.9077	0.9386	(89)
MIT 2	16.5746	16.9091	17.5207	18.2826	19.0124	19.5380	19.7431	19.7283	19.3348	18.5266	17.4998	16.6008	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.8824	17.2148	17.8301	18.5974	19.3424	19.8848	20.1176	20.0954	19.6634	18.8391	17.8018	16.9033	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8824	17.2148	17.8301	18.5974	19.3424	19.8848	20.1176	20.0954	19.6634	18.8391	17.8018	16.9033	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Utilisation	0.9070	0.8879	0.8494	0.7854	0.6861	0.5550	0.3898	0.4270	0.6584	0.7924	0.8775	0.9125	(94)
Useful gains	599.0442	642.6322	674.2989	680.8665	615.1845	460.1461	308.0610	320.8319	462.1730	558.1550	570.2463	577.1823	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1727.9796	1663.4553	1495.2336	1251.0408	933.9761	588.9026	346.0199	368.8894	668.4278	1041.0321	1393.1430	1695.9959	(97)
Space heating kWh	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98a)
Space heating requirement - total per year (kWh/year)												4568.5465	
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	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4568.5465	
Space heating per m2											(98c) / (4) =	79.7721	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	839.9279	685.9931	610.7754	410.5255	237.1809	0.0000	0.0000	0.0000	0.0000	359.2606	592.4856	832.3973	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	1063.1999	868.3457	773.1334	519.6525	300.2290	0.0000	0.0000	0.0000	0.0000	454.7602	749.9818	1053.6675	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	288.5897	257.1234	277.5329	257.2086	256.3572	169.1288	165.2310	175.2450	174.2146	261.6581	267.8480	288.1655	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9162	76.7820	76.4680	75.9001	74.8729	71.4000	71.4000	71.4000	71.4000	75.6204	76.4767	76.9048	(217)
Fuel for water heating, kWh/month	375.2003	334.8745	362.9398	338.8779	342.3898	236.8751	231.4159	245.4412	243.9980	346.0152	350.2349	374.7045	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	25.8587	20.7448	18.6784	13.6846	10.5704	8.6361	9.6426	12.5339	16.2803	21.3606	24.1267	26.5774	(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	5782.9702	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3782.9669	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	208.6945	(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	9819.6315	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5782.9702	5.6000	323.8463	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3782.9669	5.6000	211.8461	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	208.6945	26.0600	54.3858	(250)
Additional standing charges			99.0000	(251)
Total energy cost			700.8053	(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	5782.9702	0.2100	1214.4237	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3782.9669	0.2100	794.4230	(264)
Space and water heating			2008.8468	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	208.6945	0.1443	30.1211	(268)
Total CO2, kg/year			2045.2099	(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	5782.9702	1.1300	6534.7563	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3782.9669	1.1300	4274.7526	(278)
Space and water heating			10809.5089	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	208.6945	1.5338	320.1025	(282)
Total Primary energy kWh/year			11197.6874	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 2, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 2, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	71 C	**DER**	39.10	**TER**	
Environmental	71 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	2.05	**DFEE**	97.13	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	213.75	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	West	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	139.64	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	36.61 m	57.27 m²	2.89 m

8.0 Living Area	19.74	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
New Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.18	60.00	42.48	36.31	0.00	None	6.17	Enter Gross Area
External Solid Brick	Solid Wall	Other	0.30	0.00	39.85	33.07	0.00	None	6.78	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	23.35	21.65	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall Timber	Plasterboard on timber frame	9.00	97.05
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	10.90

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.16	9.00	2.02	2.02	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	55.25

11.0 Heat Loss Floors

Summary for Input Data

elmhurst energy

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Ground Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	37.06
Heatloss Floor 2	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.18	None	0.00	75.00	20.21

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Door	SAP table	Solid Door				0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
GW7N	Window	New Cavity Wall	North	3.32	
GW8E	Window	New Cavity Wall	East	1.90	
GW9E	Window	New Cavity Wall	East	0.95	
GW10E	Window	External Solid Brick	East	1.23	
GW11E	Window	External Solid Brick	East	0.74	
GW12E	Window	External Solid Brick	East	0.98	
GW13S	Window	External Solid Brick	South	0.99	
GW14S	Window	External Solid Brick	South	1.89	
GW15S	Window	External Solid Brick	South	0.95	
GD2W	Door	Corridor Brick Wall	West	1.70	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Test Method	Blower Door	
22.0 Lighting		
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	33.33	15.00	500.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	10588	
Fuel Type	Mains gas	
In Winter	79.00	
In Summer	76.40	
Model Name	24 HE	
Manufacturer	Baxi Potterton	
System Type	Regular boiler	

Summary for Input Data

elmhurst energy

Controls SAP Code	2104
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Cold Water Source	From header tank	
Bath Count	1	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	

31.0 Thermal Store — None

34.0 Small-scale Hydro — None

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Full SAP Calculation Printout

Property Reference	Flat 2, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 2, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	75 C	**DER**	32.46	**TER**	
Environmental	76 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.68	**DFEE**	93.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	177.28	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	57.2700	(1b)	x 2.8900	(2b) =	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		165.5103	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7708	(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) =	0.7130	(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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		61.7459			(33)
Party Ceiling 1			55.2500			20.0000	1105.0000	(32b)

Internal Wall Timber	97.0500	9.0000	873.4500 (32c)
Internal Wall Brick	10.9000	75.0000	817.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7444.5300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		129.9900 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	94.7399 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	144.6196	143.7431	142.8840	138.8490	138.0940	134.5796	134.5796	133.9288	135.9333	138.0940	139.6213	141.2179	(39)
Average = Sum(39)m / 12 =												138.8453	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5252	2.5099	2.4949	2.4245	2.4113	2.3499	2.3499	2.3386	2.3736	2.4113	2.4379	2.4658	(40)
HLP (average)												2.4244	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.9035 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)		89.6615 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)											Total = Sum(45)m =	1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.6163	43.8042	47.1731	44.0364	43.9379	40.6643	41.0442	42.8694	42.7043	46.0342	46.4431	49.5907	(61)
Total heat required for water heating calculated for each month	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(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	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
										Total per year (kWh/year) = Sum(64)m =		1937.6463	(64)
12Total per year (kWh/year)												1938	(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	60.0641	52.8224	55.7770	49.7929	47.9272	41.8733	39.8546	43.6406	44.0743	50.2139	53.9322	59.9167	(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	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	83.7191	92.6890	83.7191	86.5098	83.7191	86.5098	83.7191	83.7191	86.5098	83.7191	86.5098	83.7191	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.0132	167.7359	163.3948	154.1530	142.4869	131.5224	124.1975	122.4748	126.8159	136.0577	147.7238	158.6883	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	(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)	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)	80.7314	78.6048	74.9690	69.1568	64.4183	58.1573	53.5680	58.6567	61.2143	67.4918	74.9058	80.5332	(72)
Total internal gains	382.0161	390.5821	373.6353	361.3719	342.1767	327.7419	313.0370	316.4030	326.0924	338.8210	360.6917	374.4930	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	482.3417	568.9254	634.9892	710.2488	752.9054	743.5034	710.6021	667.1134	617.9145	540.8401	482.2753	459.4020	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.2991	14.3863	14.4728	14.8933	14.9748	15.3658	15.3658	15.4405	15.2128	14.9748	14.8110	14.6435	
alpha	1.9533	1.9591	1.9649	1.9929	1.9983	2.0244	2.0244	2.0294	2.0142	1.9983	1.9874	1.9762	
util living area	0.9653	0.9510	0.9300	0.8877	0.8217	0.7172	0.6068	0.6429	0.7943	0.9064	0.9520	0.9683	(86)
MIT	16.8171	17.1825	17.8005	18.6974	19.5355	20.2683	20.6410	20.5815	20.0080	18.9187	17.7594	16.8097	(87)
Th 2	19.7374	19.7450	19.7525	19.7878	19.7944	19.8250	19.8250	19.8307	19.8132	19.7944	19.7810	19.7671	(88)
util rest of house	0.9603	0.9438	0.9192	0.8686	0.7865	0.6505	0.4977	0.5401	0.7410	0.8869	0.9440	0.9638	(89)
MIT 2	15.9410	16.3072	16.9232	17.8248	18.6379	19.3355	19.6458	19.6091	19.1061	18.0562	16.9042	15.9507	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.2430	16.6089	17.2256	18.1255	18.9473	19.6570	19.9888	19.9442	19.4170	18.3535	17.1989	16.2468	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.2430	16.6089	17.2256	18.1255	18.9473	19.6570	19.9888	19.9442	19.4170	18.3535	17.1989	16.2468	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9389	0.9176	0.8881	0.8340	0.7557	0.6393	0.5150	0.5516	0.7190	0.8549	0.9187	0.9439	(94)
Useful gains	452.8837	522.0472	563.9209	592.3791	568.9467	475.3557	365.9271	367.9908	444.2833	462.3430	443.0570	433.6519	(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	1727.1916	1683.0779	1532.5164	1280.9565	1000.8109	680.5659	456.0681	474.6741	722.7533	1070.7147	1410.0247	1701.2255	(97)
Space heating kWh	948.0851	780.2126	720.6351	495.7757	321.3070	0.0000	0.0000	0.0000	0.0000	452.6285	696.2168	943.0748	(98a)
Space heating requirement - total per year (kWh/year)												5357.9356	
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	948.0851	780.2126	720.6351	495.7757	321.3070	0.0000	0.0000	0.0000	0.0000	452.6285	696.2168	943.0748	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5357.9356	
Space heating per m2											(98c) / (4) =	93.5557	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	948.0851	780.2126	720.6351	495.7757	321.3070	0.0000	0.0000	0.0000	0.0000	452.6285	696.2168	943.0748	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	1136.7927	935.5067	864.0708	594.4553	385.2602	0.0000	0.0000	0.0000	0.0000	542.7201	834.7923	1130.7851	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.8178	86.7299	86.5406	86.1281	85.4043	79.8000	79.8000	79.8000	79.8000	85.9536	86.5376	86.8140	(217)
Fuel for water heating, kWh/month	222.2526	195.7030	207.3650	186.5587	181.5412	170.4565	162.9667	177.8029	179.3861	188.9871	200.7514	221.7444	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.6773	14.9836	13.4911	9.8842	7.6348	6.2377	6.9647	9.0530	11.7590	15.4284	17.4264	19.1964	(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	6424.3832	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2295.5155	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	150.7366	(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	8915.6353	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	6424.3832	0.2100	1349.1205	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2295.5155	0.2100	482.0583	(264)
Space and water heating			1831.1787	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	150.7366	0.1443	21.7560	(268)
Total CO2, kg/year			1859.1767	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			32.4600	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	6424.3832	1.1300	7259.5530	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2295.5155	1.1300	2593.9325	(278)
Space and water heating			9853.4855	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	150.7366	1.5338	231.2048	(282)
Total Primary energy kWh/year			10152.7664	(286)
Dwelling Primary energy Rate (DPER)			177.2800	(287)

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	57.2700 (1b)	x	2.8900 (2b)	=	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7708	(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) = 0.7130	(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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.7459			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	94.7399 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	144.6196	143.7431	142.8840	138.8490	138.0940	134.5796	134.5796	133.9288	135.9333	138.0940	139.6213	141.2179	(39)
Average = Sum(39)m / 12 =												138.8453	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5252	2.5099	2.4949	2.4245	2.4113	2.3499	2.3499	2.3386	2.3736	2.4113	2.4379	2.4658	(40)
HLP (average)												2.4244	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.9035	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

23.7222	23.3641	22.8546	22.0917	21.4042	20.4577	19.7396	20.6177	21.0785	22.0163	22.9914	23.7033	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	53.0176 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	57.8458	56.2469	54.4966	52.4928	50.5644	48.3770	47.6589	49.7779	51.4796	53.6583	55.8742	57.8270	(44)
Energy conte	85.1590	74.4260	77.8745	68.5687	65.1573	55.9464	52.6645	58.5895	59.7137	69.1441	75.5158	84.9232	(45)
Energy content (annual)										Total = Sum(45)m =		827.6827	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	72.3852	63.2621	66.1933	58.2834	55.3837	47.5544	44.7648	49.8011	50.7567	58.7725	64.1884	72.1847	(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	72.3852	63.2621	66.1933	58.2834	55.3837	47.5544	44.7648	49.8011	50.7567	58.7725	64.1884	72.1847	(64)
									Total per year (kWh/year) = Sum(64)m =			703.5303	(64)
12Total per year (kWh/year)												704	(64)
Electric shower(s)	44.9546	40.0550	43.7385	41.7391	42.5223	40.5622	41.9142	42.5223	41.7391	43.7385	42.9160	44.9546	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							511.3565	(64a)
Heat gains from water heating, kWh/month	29.3350	25.8293	27.4829	25.0056	24.4765	22.0292	21.6698	23.0808	23.1239	25.6277	26.7761	29.2848	(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	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	95.1746	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	83.7191	92.6890	83.7191	86.5098	83.7191	86.5098	83.7191	83.7191	86.5098	83.7191	86.5098	83.7191	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	166.0132	167.7359	163.3948	154.1530	142.4869	131.5224	124.1975	122.4748	126.8159	136.0577	147.7238	158.6883	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	32.5175	(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)	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)	39.4287	38.4364	36.9394	34.7300	32.8985	30.5960	29.1260	31.0226	32.1166	34.4459	37.1891	39.3613	(72)
Total internal gains	340.7134	350.4137	335.6057	326.9452	310.6569	300.1806	288.5950	288.7689	296.9946	305.7751	322.9750	333.3211	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)

East			5.8000		19.6403		0.6300	0.7000		0.7700		34.8135	(76)
South			3.8300		46.7521		0.6300	0.7000		0.7700		54.7232	(78)
Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	441.0391	528.7571	596.9596	675.8221	721.3856	715.9422	686.1602	639.4793	588.8168	507.7942	444.5585	418.2301	(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	15.3603	15.4539	15.5469	15.9987	16.0861	16.5062	16.5062	16.5864	16.3418	16.0861	15.9102	15.7303	
alpha	2.0240	2.0303	2.0365	2.0666	2.0724	2.1004	2.1004	2.1058	2.0895	2.0724	2.0607	2.0487	
util living area	0.9737	0.9610	0.9422	0.9030	0.8402	0.7376	0.6264	0.6653	0.8155	0.9218	0.9626	0.9764	(86)
MIT	16.8780	17.2390	17.8472	18.7326	19.5588	20.2827	20.6506	20.5887	20.0195	18.9426	17.8026	16.8725	(87)
Th 2	19.0062	19.0151	19.0238	19.0654	19.0732	19.1103	19.1103	19.1172	19.0959	19.0732	19.0574	19.0409	(88)
util rest of house	0.9669	0.9510	0.9261	0.8729	0.7815	0.6201	0.4289	0.4785	0.7232	0.8913	0.9511	0.9703	(89)
MIT 2	15.4765	15.8371	16.4407	17.3243	18.1074	18.7594	19.0165	18.9923	18.5534	17.5484	16.4225	15.4895	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	15.9596	16.3203	16.9255	17.8097	18.6077	19.2844	19.5797	19.5425	19.0587	18.0289	16.8982	15.9662	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.9596	16.3203	16.9255	17.8097	18.6077	19.2844	19.5797	19.5425	19.0587	18.0289	16.8982	15.9662	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9502	0.9298	0.9007	0.8458	0.7629	0.6335	0.4875	0.5299	0.7208	0.8671	0.9312	0.9550	(94)
Useful gains	419.0843	491.6230	537.7052	571.6033	550.3390	453.5473	334.5000	338.8879	424.4039	440.3049	413.9776	399.4099	(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	1686.2027	1641.5867	1489.6372	1237.1035	953.9093	630.4295	401.0107	420.8736	674.0544	1025.8927	1368.0320	1661.5972	(97)
Space heating kWh	942.7361	772.7755	708.2375	479.1601	300.2563	0.0000	0.0000	0.0000	0.0000	435.6773	686.9191	939.0674	(98a)
Space heating requirement - total per year (kWh/year)												5264.8293	
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	942.7361	772.7755	708.2375	479.1601	300.2563	0.0000	0.0000	0.0000	0.0000	435.6773	686.9191	939.0674	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5264.8293	
Space heating per m2											(98c) / (4) =	91.9300	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1265.0481	995.8889	1017.8586	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5182	0.5889	0.5560	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	655.5904	586.4783	565.9380	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	806.5726	773.4912	720.4246	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	108.7072	139.1376	114.9380	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	27.1768	34.7844	28.7345	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												90.6957	(107)
Energy for space heating												91.9300	(99)
Energy for space cooling												1.5837	(108)
Total												93.5136	(109)
Fabric Energy Efficiency (DFEE)												93.5	(109)

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)	
Ground floor		57.2700 (1b)	x	2.8900 (2b)	=	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.7708	(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) =	0.7130 (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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.7459			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	94.7399 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	144.6196	143.7431	142.8840	138.8490	138.0940	134.5796	134.5796	133.9288	135.9333	138.0940	139.6213	141.2179	(39)
Average = Sum(39)m / 12 =												138.8453	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5252	2.5099	2.4949	2.4245	2.4113	2.3499	2.3499	2.3386	2.3736	2.4113	2.4379	2.4658	(40)
HLP (average)												2.4244	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.9035	(42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	89.6615	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.6163	43.8042	47.1731	44.0364	43.9379	40.6643	41.0442	42.8694	42.7043	46.0342	46.4431	49.5907	(61)
Total heat required for water heating calculated for each month	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(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													

	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051 (64)
										Total per year (kWh/year) = Sum(64)m =		1937.6463 (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												
	60.0641	52.8224	55.7770	49.7929	47.9272	41.8733	39.8546	43.6406	44.0743	50.2139	53.9322	59.9167 (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	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	21.3383	18.9525	15.4132	11.6688	8.7226	7.3640	7.9570	10.3428	13.8821	17.6265	20.5728	21.9314	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	80.7314	78.6048	74.9690	69.1568	64.4183	58.1573	53.5680	58.6567	61.2143	67.4918	74.9058	80.5332	(72)
Total internal gains													
	436.2449	434.3036	420.6493	397.2989	372.2022	348.2177	333.2887	338.1920	350.7682	374.5838	402.3561	425.7070	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	536.5705	612.6470	682.0032	746.1758	782.9308	763.9792	730.8538	688.9024	642.5903	576.6029	523.9396	510.6161	(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	15.3603	15.4539	15.5469	15.9987	16.0861	16.5062	16.5062	16.5864	16.3418	16.0861	15.9102	15.7303	
alpha	2.0240	2.0303	2.0365	2.0666	2.0724	2.1004	2.1004	2.1058	2.0895	2.0724	2.0607	2.0487	
util living area													
	0.9626	0.9496	0.9277	0.8867	0.8209	0.7171	0.6040	0.6394	0.7927	0.9039	0.9499	0.9660	(86)
MIT	17.0587	17.3923	17.9939	18.8415	19.6365	20.3252	20.6756	20.6212	20.0820	19.0554	17.9501	17.0509	(87)
Th 2	19.7374	19.7450	19.7525	19.7878	19.7944	19.8250	19.8250	19.8307	19.8132	19.7944	19.7810	19.7671	(88)
util rest of house													
	0.9570	0.9421	0.9163	0.8670	0.7847	0.6490	0.4931	0.5347	0.7378	0.8834	0.9413	0.9610	(89)
MIT 2	16.1690	16.5034	17.1025	17.9549	18.7244	19.3787	19.6665	19.6341	19.1653	18.1785	17.0813	16.1785	(90)
Living area fraction										fLA = Living area / (4) =		0.3447	(91)
MIT	16.4756	16.8098	17.4097	18.2605	19.0388	19.7049	20.0143	19.9744	19.4812	18.4807	17.3807	16.4792	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4756	16.8098	17.4097	18.2605	19.0388	19.7049	20.0143	19.9744	19.4812	18.4807	17.3807	16.4792	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9355	0.9166	0.8863	0.8345	0.7566	0.6409	0.5133	0.5494	0.7190	0.8531	0.9166	0.9409	(94)
Useful gains	501.9516	561.5368	604.4504	622.7146	592.3852	489.6106	375.1173	378.4861	462.0106	491.8870	480.2442	480.4578	(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													
	1760.8352	1711.9457	1558.8250	1299.6936	1013.4420	687.0194	459.5010	478.7090	731.4898	1088.2825	1435.4106	1734.0477	(97)
Space heating kWh													
	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98a)
Space heating requirement - total per year (kWh/year)												5284.5391	
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													
	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5284.5391	
Space heating per m2											(98c) / (4) =	92.2741	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	1123.0329	926.9482	851.3846	584.4423	375.6190	0.0000	0.0000	0.0000	0.0000	532.0363	824.6041	1118.3104	(211)

Space heating efficiency (main heating system 2)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)

Space heating fuel (main heating system 2)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)

Space heating fuel (secondary)

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)

Water heating

Water heating requirement

192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)

Efficiency of water heater

											79.8000	(216)
(217)m	86.8020	86.7175	86.5189	86.0996	85.3546	79.8000	79.8000	79.8000	79.8000	85.9186	86.5196	86.7996 (217)

Fuel for water heating, kWh/month

222.2930	195.7309	207.4169	186.6205	181.6468	170.4565	162.9667	177.8029	179.3861	189.0640	200.7931	221.7812	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219 (231)
Lighting	18.6773	14.9836	13.4911	9.8842	7.6348	6.2377	6.9647	9.0530	11.7590	15.4284	17.4264	19.1964 (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	6336.3778	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2295.9586	(219)
Space cooling fuel	0.0000	(221)

Electricity for pumps and fans:

main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	150.7366	(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	8828.0730	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6336.3778	3.6400	230.6442	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2295.9586	3.6400	83.5729	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	150.7366	16.4900	24.8565	(250)
Additional standing charges			92.0000	(251)
Total energy cost			438.4940	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.5435	(257)
SAP value		74.9792	
SAP rating (Section 12)		75	(258)
SAP band		C	

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	6336.3778	0.2100	1330.6393	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2295.9586	0.2100	482.1513	(264)
Space and water heating			1812.7906	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	150.7366	0.1443	21.7560	(268)
Total CO2, kg/year			1840.7886	(272)
CO2 emissions per m2			32.1400	(273)
EI value			75.8809	
EI rating			76	(274)
EI band			C	

CALCULATION OF EPC COSTS, EMISSIONS AND PRIMARY ENERGY

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	57.2700	(1b)	x 2.8900	(2b) =	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7708 (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) = 0.7130 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.7843	0.7309	0.7309	0.6952	0.6952	0.6061	0.6061	0.5882	0.6061	0.6774	0.6595	0.7130	(22b)
Effective ac	0.8076	0.7671	0.7671	0.7417	0.7417	0.6837	0.6837	0.6730	0.6837	0.7294	0.7175	0.7542	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.7459			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)		32.9940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	94.7399 (37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.1090	41.8962	41.8962	40.5078	40.5078	37.3405	37.3405	36.7591	37.3405	39.8396	39.1888	41.1933	(38)
Heat transfer coeff	138.8490	136.6362	136.6362	135.2478	135.2478	132.0804	132.0804	131.4990	132.0804	134.5796	133.9288	135.9333	(39)
Average = Sum(39)m / 12 =												134.5666	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4245	2.3858	2.3858	2.3616	2.3616	2.3063	2.3063	2.2961	2.3063	2.3499	2.3386	2.3736	(40)
HLP (average)												2.3497	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.9035 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

	34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237 (42c)

Average daily hot water use (litres/day) 89.6615 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m													
	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.6163	43.8042	47.1731	44.0364	43.9379	40.6643	41.0442	42.8694	42.7043	46.0342	46.4431	49.5907	(61)
Total heat required for water heating calculated for each month													
	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(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													
	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
										Total per year (kWh/year) = Sum(64)m =		1937.6463	(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													
	60.0641	52.8224	55.7770	49.7929	47.9272	41.8733	39.8546	43.6406	44.0743	50.2139	53.9322	59.9167	(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	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	21.3383	18.9525	15.4132	11.6688	8.7226	7.3640	7.9570	10.3428	13.8821	17.6265	20.5728	21.9314	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	80.7314	78.6048	74.9690	69.1568	64.4183	58.1573	53.5680	58.6567	61.2143	67.4918	74.9058	80.5332	(72)
Total internal gains													
	436.2449	434.3036	420.6493	397.2989	372.2022	348.2177	333.2887	338.1920	350.7682	374.5838	402.3561	425.7070	(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	3.3200	12.7500	0.6300	0.7000	0.7700	12.9366	(74)
East	5.8000	23.7835	0.6300	0.7000	0.7700	42.1575	(76)
South	3.8300	54.0600	0.6300	0.7000	0.7700	63.2771	(78)

Solar gains	118.3712	184.1453	268.8206	366.1168	421.5398	452.0614	427.7338	383.5243	320.5810	224.1257	141.3657	100.7324	(83)
Total gains	554.6161	618.4489	689.4699	763.4158	793.7420	800.2791	761.0225	721.7163	671.3492	598.7094	543.7218	526.4395	(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	15.9987	16.2578	16.2578	16.4247	16.4247	16.8185	16.8185	16.8929	16.8185	16.5062	16.5864	16.3418	
alpha	2.0666	2.0839	2.0839	2.0950	2.0950	2.1212	2.1212	2.1262	2.1212	2.1004	2.1058	2.0895	
util living area													
	0.9572	0.9443	0.9174	0.8676	0.7846	0.6397	0.4922	0.5302	0.7442	0.8825	0.9407	0.9608	(86)
MIT	17.3872	17.7229	18.3521	19.1406	19.9268	20.5628	20.8382	20.8025	20.3064	19.3563	18.2891	17.3958	(87)
Th 2	19.7878	19.8071	19.8071	19.8192	19.8192	19.8469	19.8469	19.8519	19.8469	19.8250	19.8307	19.8132	(88)
util rest of house													
	0.9509	0.9360	0.9042	0.8443	0.7396	0.5537	0.3559	0.3983	0.6772	0.8568	0.9304	0.9550	(89)
MIT 2	16.5243	16.8673	17.4879	18.2644	19.0122	19.5910	19.7905	19.7758	19.3864	18.4886	17.4456	16.5480	(90)
Living area fraction									fLA = Living area / (4) =			0.3447	(91)
MIT	16.8217	17.1623	17.7858	18.5664	19.3274	19.9259	20.1516	20.1297	19.7035	18.7877	17.7363	16.8402	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8217	17.1623	17.7858	18.5664	19.3274	19.9259	20.1516	20.1297	19.7035	18.7877	17.7363	16.8402	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9281	0.9100	0.8738	0.8126	0.7170	0.5604	0.3953	0.4335	0.6673	0.8270	0.9042	0.9337	(94)
Useful gains	514.7279	562.7905	602.4451	620.3390	569.1334	448.4512	300.8095	312.8970	448.0086	495.1354	491.6584	491.5285	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	1655.3200	1593.4865	1432.7355	1199.1620	896.3475	571.3703	337.0217	358.9496	647.6562	994.2334	1330.7623	1623.0709	(97)
Space heating kWh													
	848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675	(98a)
Space heating requirement - total per year (kWh/year)												4636.5153	
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	(98b)
Solar heating contribution - total per year (kWh/year)											0.0000	
Space heating kWh												
	848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675 (98c)
Space heating requirement after solar contribution - total per year (kWh/year)											4636.5153	
Space heating per m2										(98c) / (4) =	80.9589	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)											0.0000	(201)
Fraction of space heat from main system(s)											1.0000	(202)
Efficiency of main space heating system 1 (in %)											83.4000	(206)
Efficiency of main space heating system 2 (in %)											0.0000	(207)
Efficiency of secondary/supplementary heating system, %											0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	1017.5067	830.4889	740.6907	499.7033	291.9032	0.0000	0.0000	0.0000	0.0000	445.2385	724.4063	1009.4335	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6696	86.5638	86.3062	85.8262	84.8425	79.8000	79.8000	79.8000	79.8000	85.5928	86.3224	86.6618	(217)
Fuel for water heating, kWh/month													
	222.6326	196.0785	207.9280	187.2149	182.7433	170.4565	162.9667	177.8029	179.3861	189.7838	201.2519	222.1337	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.6773	14.9836	13.4911	9.8842	7.6348	6.2377	6.9647	9.0530	11.7590	15.4284	17.4264	19.1964	(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											5559.3709		(211)
Space heating fuel - main system 2											0.0000		(213)
Space heating fuel - secondary											0.0000		(215)
Efficiency of water heater											79.8000		
Water heating fuel used											2300.3786		(219)
Space cooling fuel											0.0000		(221)
Electricity for pumps and fans:													
main heating flue fan											45.0000		(230e)
Total electricity for the above, kWh/year											45.0000		(231)
Electricity for lighting (calculated in Appendix L)											150.7366		(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											8055.4861		(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5559.3709	5.6000	311.3248	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2300.3786	5.6000	128.8212	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	150.7366	26.0600	39.2820	(250)
Additional standing charges			99.0000	(251)
Total energy cost			590.1549	(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	5559.3709	0.2100	1167.4679	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2300.3786	0.2100	483.0795	(264)
Space and water heating			1650.5474	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	150.7366	0.1443	21.7560	(268)

Total CO2, kg/year 1678.5454 (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	5559.3709	1.1300	6282.0891	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2300.3786	1.1300	2599.4278	(278)
Space and water heating			8881.5169	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	150.7366	1.5338	231.2048	(282)
Total Primary energy kWh/year			9180.7978	(286)

SAP 10 EPC IMPROVEMENTS

Flat 2, Proposed

Current energy efficiency rating: C 75
Current environmental impact rating: C 76

N	Solar water heating	Not applicable
U	Solar photovoltaic panels	Not applicable
V2	Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 75
Potential environmental impact rating: C 76

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£51	£51	£0
Mains gas	£539	£539	£0
Space heating	£422	£422	£0
Water heating	£129	£129	£0
Lighting	£39	£39	£0
Total cost of fuels	£590	£590	£0
Total cost of uses	£590	£590	£0
Delivered energy	141 kWh/m²	141 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.7 tonnes	1.7 tonnes	0.0 tonnes
CO2 emissions per m²	29 kg/m²	29 kg/m²	0 kg/m²
Primary energy	160 kWh/m²	160 kWh/m²	0 kWh/m²

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)	
Ground floor	57.2700 (1b)	x	2.8900 (2b)	=	165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	165.5103	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1208 (8)
Number of storeys in the dwelling (ns)		1 (9)

Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method	Blower Door
Measured/design AP50	15.0000 (17)
Infiltration rate	0.7708 (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) = 0.7130 (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	0.9091	0.8913	0.8735	0.7843	0.7665	0.6774	0.6774	0.6595	0.7130	0.7665	0.8022	0.8378	(22b)
Effective ac	0.9132	0.8972	0.8815	0.8076	0.7938	0.7294	0.7294	0.7175	0.7542	0.7938	0.8217	0.8510	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	61.7459			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 7997.0300 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	139.6373 (35)
Thermal bridges (Default value 0.200 * total exposed area)	32.9940 (36)
Point Thermal bridges	(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) = 94.7399 (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	49.8796	49.0032	48.1441	44.1090	43.3541	39.8396	39.8396	39.1888	41.1933	43.3541	44.8813	46.4780	(38)
Heat transfer coeff	144.6196	143.7431	142.8840	138.8490	138.0940	134.5796	134.5796	133.9288	135.9333	138.0940	139.6213	141.2179	(39)
Average = Sum(39)m / 12 =												138.8453	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5252	2.5099	2.4949	2.4245	2.4113	2.3499	2.3499	2.3386	2.3736	2.4113	2.4379	2.4658	(40)
HLP (average)												2.4244	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy	1.9035 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)

Hot water usage for other uses

34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)

Average daily hot water use (litres/day)	89.6615 (43)

Daily hot water use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)

Energy content (annual)	Total = Sum(45)m = 1399.7282

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

21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
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)
49.6163	43.8042	47.1731	44.0364	43.9379	40.6643	41.0442	42.8694	42.7043	46.0342	46.4431	49.5907	(61)

Total heat required for water heating calculated for each month

192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(62)
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)
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)
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)
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

192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)

	Total per year (kWh/year) = Sum(64)m = 1937.6463 (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

60.0641	52.8224	55.7770	49.7929	47.9272	41.8733	39.8546	43.6406	44.0743	50.2139	53.9322	59.9167	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	21.3383	18.9525	15.4132	11.6688	8.7226	7.3640	7.9570	10.3428	13.8821	17.6265	20.5728	21.9314	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)													
	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)
Water heating gains (Table 5)													
	80.7314	78.6048	74.9690	69.1568	64.4183	58.1573	53.5680	58.6567	61.2143	67.4918	74.9058	80.5332	(72)
Total internal gains													
	436.2449	434.3036	420.6493	397.2989	372.2022	348.2177	333.2887	338.1920	350.7682	374.5838	402.3561	425.7070	(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	3.3200	10.6334	0.6300	0.7000	0.7700	10.7890	(74)
East	5.8000	19.6403	0.6300	0.7000	0.7700	34.8135	(76)
South	3.8300	46.7521	0.6300	0.7000	0.7700	54.7232	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	100.3257	178.3433	261.3539	348.8769	410.7286	415.7616	397.5651	350.7104	291.8221	202.0191	121.5836	84.9090	(83)
Total gains	536.5705	612.6470	682.0032	746.1758	782.9308	763.9792	730.8538	688.9024	642.5903	576.6029	523.9396	510.6161	(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	15.3603	15.4539	15.5469	15.9987	16.0861	16.5062	16.5062	16.5864	16.3418	16.0861	15.9102	15.7303	
alpha	2.0240	2.0303	2.0365	2.0666	2.0724	2.1004	2.1004	2.1058	2.0895	2.0724	2.0607	2.0487	
util living area	0.9626	0.9496	0.9277	0.8867	0.8209	0.7171	0.6040	0.6394	0.7927	0.9039	0.9499	0.9660	(86)
MIT	17.0587	17.3923	17.9939	18.8415	19.6365	20.3252	20.6756	20.6212	20.0820	19.0554	17.9501	17.0509	(87)
Th 2	19.7374	19.7450	19.7525	19.7878	19.7944	19.8250	19.8250	19.8307	19.8132	19.7944	19.7810	19.7671	(88)
util rest of house	0.9570	0.9421	0.9163	0.8670	0.7847	0.6490	0.4931	0.5347	0.7378	0.8834	0.9413	0.9610	(89)
MIT 2	16.1690	16.5034	17.1025	17.9549	18.7244	19.3787	19.6665	19.6341	19.1653	18.1785	17.0813	16.1785	(90)
Living area fraction									fLA = Living area / (4) =			0.3447	(91)
MIT	16.4756	16.8098	17.4097	18.2605	19.0388	19.7049	20.0143	19.9744	19.4812	18.4807	17.3807	16.4792	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4756	16.8098	17.4097	18.2605	19.0388	19.7049	20.0143	19.9744	19.4812	18.4807	17.3807	16.4792	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9355	0.9166	0.8863	0.8345	0.7566	0.6409	0.5133	0.5494	0.7190	0.8531	0.9166	0.9409	(94)
Useful gains	501.9516	561.5368	604.4504	622.7146	592.3852	489.6106	375.1173	378.4861	462.0106	491.8870	480.2442	480.4578	(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	1760.8352	1711.9457	1558.8250	1299.6936	1013.4420	687.0194	459.5010	478.7090	731.4898	1088.2825	1435.4106	1734.0477	(97)
Space heating kWh	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98a)
Space heating requirement - total per year (kWh/year)												5284.5391	
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	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												5284.5391	
Space heating per m2											(98c) / (4) =	92.2741	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	936.6094	773.0748	710.0547	487.4249	313.2663	0.0000	0.0000	0.0000	0.0000	443.7183	687.7198	932.6709	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	1123.0329	926.9482	851.3846	584.4423	375.6190	0.0000	0.0000	0.0000	0.0000	532.0363	824.6041	1118.3104	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
Efficiency of water heater												79.8000	(216)

(217)m	86.8020	86.7175	86.5189	86.0996	85.3546	79.8000	79.8000	79.8000	79.8000	85.9186	86.5196	86.7996 (217)
Fuel for water heating, kWh/month												
	222.2930	195.7309	207.4169	186.6205	181.6468	170.4565	162.9667	177.8029	179.3861	189.0640	200.7931	221.7812 (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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219 (231)
Lighting	18.6773	14.9836	13.4911	9.8842	7.6348	6.2377	6.9647	9.0530	11.7590	15.4284	17.4264	19.1964 (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	6336.3778	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2295.9586	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	150.7366	(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	8828.0730	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	6336.3778	3.6400	230.6442	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2295.9586	3.6400	83.5729	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	150.7366	16.4900	24.8565	(250)
Additional standing charges			92.0000	(251)
Total energy cost			438.4940	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.5435	(257)
SAP value		74.9792	
SAP rating (Section 12)		75	(258)
SAP band		C	

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	6336.3778	0.2100	1330.6393	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2295.9586	0.2100	482.1513	(264)
Space and water heating			1812.7906	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	150.7366	0.1443	21.7560	(268)
Total CO2, kg/year			1840.7886	(272)
CO2 emissions per m2			32.1400	(273)
EI value			75.8809	
EI rating			76	(274)
EI band			C	

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)

Ground floor	57.2700 (1b)	x 2.8900 (2b)	= 165.5103	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	57.2700			(4)
Dwelling volume		(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	= 165.5103	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1208	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.7708	(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) =	0.7130	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.7843	0.7309	0.7309	0.6952	0.6952	0.6061	0.6061	0.5882	0.6061	0.6774	0.6595	0.7130	(22b)
Effective ac	0.8076	0.7671	0.7671	0.7417	0.7417	0.6837	0.6837	0.6730	0.6837	0.7294	0.7175	0.7542	(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	
Window (Uw = 1.20)			12.9500	1.1450	14.8282			(27)
Door			1.7000	3.0000	5.1000			(26)
External Ground Floor			37.0600	0.2500	9.2650	20.0000	741.2000	(28a)
Heatloss Floor 2			20.2100	0.1200	2.4252	75.0000	1515.7500	(28a)
New Cavity Wall	42.4800	6.1700	36.3100	0.1200	4.3572	60.0000	2178.6000	(29a)
External Solid Brick	39.8500	6.7800	33.0700	0.3100	10.2517	0.0000	0.0000	(29a)
Corridor Brick Wall	23.3500	1.7000	21.6500	0.7000	15.1550	9.0000	194.8500	(29a)
External Roof 1	2.0200		2.0200	0.1800	0.3636	9.0000	18.1800	(30)
Total net area of external elements Aum(A, m2)			164.9700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		61.7459			(33)
Party Ceiling 1			55.2500			30.0000	1657.5000	(32b)
Internal Wall Timber			97.0500			9.0000	873.4500	(32c)
Internal Wall Brick			10.9000			75.0000	817.5000	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		7997.0300	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							139.6373	(35)
Thermal bridges (Default value 0.200 * total exposed area)							32.9940	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		94.7399	(37)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
(38)m	44.1090	41.8962	41.8962	40.5078	40.5078	37.3405	37.3405	36.7591	37.3405	39.8396	39.1888	41.1933	(38)
Heat transfer coeff	138.8490	136.6362	136.6362	135.2478	135.2478	132.0804	132.0804	131.4990	132.0804	134.5796	133.9288	135.9333	(39)
Average = Sum(39)m / 12 =												134.5666	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4245	2.3858	2.3858	2.3616	2.3616	2.3063	2.3063	2.2961	2.3063	2.3499	2.3386	2.3736	(40)
HLP (average)												2.3497	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.9035	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	63.2416	62.2870	60.9289	58.8950	57.0620	54.5387	52.6244	54.9653	56.1938	58.6940	61.2935	63.1915	(42b)
Hot water usage for other uses	34.1237	32.8828	31.6419	30.4011	29.1602	27.9194	27.9194	29.1602	30.4011	31.6419	32.8828	34.1237	(42c)
Average daily hot water use (litres/day)												89.6615	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	97.3653	95.1698	92.5708	89.2961	86.2222	82.4581	80.5437	84.1255	86.5949	90.3359	94.1763	97.3151	(44)
Energy conte	143.3385	125.9289	132.2818	116.6430	111.1060	95.3600	89.0032	99.0173	100.4458	116.4070	127.2824	142.9144	(45)
Energy content (annual)										Total = Sum(45)m =		1399.7282	
Distribution loss (46)m = 0.15 x (45)m	21.5008	18.8893	19.8423	17.4964	16.6659	14.3040	13.3505	14.8526	15.0669	17.4611	19.0924	21.4372	(46)

Water storage loss:
Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 49.6163	43.8042	47.1731	44.0364	43.9379	40.6643	41.0442	42.8694	42.7043	46.0342	46.4431	49.5907	(61)

Total heat required for water heating calculated for each month

192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(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

192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)

Total per year (kWh/year) = Sum(64)m = 1937.6463 (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

60.0641	52.8224	55.7770	49.7929	47.9272	41.8733	39.8546	43.6406	44.0743	50.2139	53.9322	59.9167	(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	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	114.2095	(66)

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

21.3383	18.9525	15.4132	11.6688	8.7226	7.3640	7.9570	10.3428	13.8821	17.6265	20.5728	21.9314	(67)

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

247.7809	250.3521	243.8728	230.0791	212.6670	196.3021	185.3694	182.7982	189.2775	203.0712	220.4833	236.8482	(68)

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

48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	48.3244	(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)

-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	-76.1396	(71)

Water heating gains (Table 5)

80.7314	78.6048	74.9690	69.1568	64.4183	58.1573	53.5680	58.6567	61.2143	67.4918	74.9058	80.5332	(72)

Total internal gains

436.2449	434.3036	420.6493	397.2989	372.2022	348.2177	333.2887	338.1920	350.7682	374.5838	402.3561	425.7070	(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	3.3200	12.7500	0.6300	0.7000	0.7700	12.9366	(74)
East	5.8000	23.7835	0.6300	0.7000	0.7700	42.1575	(76)
South	3.8300	54.0600	0.6300	0.7000	0.7700	63.2771	(78)

Solar gains	118.3712	184.1453	268.8206	366.1168	421.5398	452.0614	427.7338	383.5243	320.5810	224.1257	141.3657	100.7324	(83)
Total gains	554.6161	618.4489	689.4699	763.4158	793.7420	800.2791	761.0225	721.7163	671.3492	598.7094	543.7218	526.4395	(84)

---

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	15.9987	16.2578	16.2578	16.4247	16.4247	16.8185	16.8185	16.8929	16.8185	16.5062	16.5864	16.3418	
alpha	2.0666	2.0839	2.0839	2.0950	2.0950	2.1212	2.1212	2.1262	2.1212	2.1004	2.1058	2.0895	

util living area

0.9572	0.9443	0.9174	0.8676	0.7846	0.6397	0.4922	0.5302	0.7442	0.8825	0.9407	0.9608	(86)

MIT	17.3872	17.7229	18.3521	19.1406	19.9268	20.5628	20.8382	20.8025	20.3064	19.3563	18.2891	17.3958	(87)
Th 2	19.7878	19.8071	19.8071	19.8192	19.8192	19.8469	19.8469	19.8519	19.8469	19.8250	19.8307	19.8132	(88)

util rest of house

0.9509	0.9360	0.9042	0.8443	0.7396	0.5537	0.3559	0.3983	0.6772	0.8568	0.9304	0.9550	(89)
MIT 2	16.5243	16.8673	17.4879	18.2644	19.0122	19.5910	19.7905	19.7758	19.3864	18.4886	17.4456	16.5480	(90)

Living area fraction fLA = Living area / (4) = 0.3447 (91)

MIT	16.8217	17.1623	17.7858	18.5664	19.3274	19.9259	20.1516	20.1297	19.7035	18.7877	17.7363	16.8402	(92)

Temperature adjustment 0.0000

adjusted MIT	16.8217	17.1623	17.7858	18.5664	19.3274	19.9259	20.1516	20.1297	19.7035	18.7877	17.7363	16.8402	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9281	0.9100	0.8738	0.8126	0.7170	0.5604	0.3953	0.4335	0.6673	0.8270	0.9042	0.9337	(94)
Useful gains	514.7279	562.7905	602.4451	620.3390	569.1334	448.4512	300.8095	312.8970	448.0086	495.1354	491.6584	491.5285	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)

Heat loss rate W

1655.3200	1593.4865	1432.7355	1199.1620	896.3475	571.3703	337.0217	358.9496	647.6562	994.2334	1330.7623	1623.0709	(97)

Space heating kWh

848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675	(98a)

Space heating requirement - total per year (kWh/year) 4636.5153

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

848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675	(98c)

Space heating requirement after solar contribution - total per year (kWh/year) 4636.5153

Space heating per m2 (98c) / (4) = 80.9589 (99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	848.6006	692.6277	617.7360	416.7525	243.4472	0.0000	0.0000	0.0000	0.0000	371.3289	604.1548	841.8675	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	1017.5067	830.4889	740.6907	499.7033	291.9032	0.0000	0.0000	0.0000	0.0000	445.2385	724.4063	1009.4335	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	192.9548	169.7331	179.4548	160.6794	155.0439	136.0243	130.0474	141.8867	143.1501	162.4412	173.7254	192.5051	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.6696	86.5638	86.3062	85.8262	84.8425	79.8000	79.8000	79.8000	79.8000	85.5928	86.3224	86.6618	(217)
Fuel for water heating, kWh/month													
	222.6326	196.0785	207.9280	187.2149	182.7433	170.4565	162.9667	177.8029	179.3861	189.7838	201.2519	222.1337	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.6773	14.9836	13.4911	9.8842	7.6348	6.2377	6.9647	9.0530	11.7590	15.4284	17.4264	19.1964	(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												5559.3709	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2300.3786	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												150.7366	(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												8055.4861	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5559.3709	5.6000	311.3248	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2300.3786	5.6000	128.8212	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	150.7366	26.0600	39.2820	(250)
Additional standing charges			99.0000	(251)
Total energy cost			590.1549	(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	5559.3709	0.2100	1167.4679	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2300.3786	0.2100	483.0795	(264)
Space and water heating			1650.5474	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	150.7366	0.1443	21.7560	(268)
Total CO2, kg/year			1678.5454	(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	5559.3709	1.1300	6282.0891	(275)
Total CO2 associated with community systems			0.0000	(473)

Water heating (other fuel)	2300.3786	1.1300	2599.4278	(278)
Space and water heating			8881.5169	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	150.7366	1.5338	231.2048	(282)
Total Primary energy kWh/year			9180.7978	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 2, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 2, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	75 C	**DER**	32.46	**TER**	
Environmental	76 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.68	**DFEE**	93.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	177.28	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client	Chris Keen, Chris Keen		

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	West	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Ground-floor flat	
Which Floor	0	
2.0 Number of Storeys	1	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	139.64	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	36.61 m	57.27 m²	2.89 m

8.0 Living Area	19.74	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
New Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.12	60.00	42.48	36.31	0.00	None	6.17	Enter Gross Area
External Solid Brick	Solid Wall	Other	0.31	0.00	39.85	33.07	0.00	None	6.78	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	23.35	21.65	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall Timber	Plasterboard on timber frame	9.00	97.05
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	10.90

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	2.02	2.02	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	55.25

11.0 Heat Loss Floors

Summary for Input Data

elmhurst energy

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Ground Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	37.06
Heatloss Floor 2	Ground Floor - Solid	Lowest occupied	Suspended concrete floor, carpeted	0.12	None	0.00	75.00	20.21

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door				0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
GW7N	Window	New Cavity Wall	North	3.32	
GW8E	Window	New Cavity Wall	East	1.90	
GW9E	Window	New Cavity Wall	East	0.95	
GW10E	Window	External Solid Brick	East	1.23	
GW11E	Window	External Solid Brick	East	0.74	
GW12E	Window	External Solid Brick	East	0.98	
GW13S	Window	External Solid Brick	South	0.99	
GW14S	Window	External Solid Brick	South	1.89	
GW15S	Window	External Solid Brick	South	0.95	
GD2W	Door	Corridor Brick Wall	West	1.70	

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Test Method	Blower Door	
22.0 Lighting		
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	
Manufacturer	Baxi Heating	
System Type	Combi boiler	

Summary for Input Data

Controls SAP Code	2104
Delayed Start Stat	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi
Combi keep hot type	None

25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Cold Water Source	From header tank
Bath Count	1

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
In Airing Cupboard	No

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

	Typical Cost	Typical savings per year	Ratings after improvement	
			SAP rating	Environmental Impact
			0	0
			0	0
			0	0

Summary for Input Data

Property Reference	Flat 3, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	65 D	**DER**	62.18	**TER**	
Environmental	66 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.81	**DFEE**	152.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	338.78	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	East	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	98.23	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	26.67 m	31.30 m²	2.76 m

8.0 Living Area	13.84	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Solid Brick	Solid Wall	Other	1.96	0.00	36.79	30.83	0.00	None	5.96	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	21.03	19.33	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	15.68	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	56.05
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	9.05

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	5.41	5.41	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Summary for Input Data

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	25.89

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	4.71

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	26.59

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	SAP table	Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	PVC	0.70	1.70
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW1W	Window	External Solid Brick	West	0.84	0
FW2W	Window	External Solid Brick	West	0.84	0
FW3W	Window	External Solid Brick	West	0.92	0
FW12S	Window	External Solid Brick	South	0.91	0
FW13S	Window	External Solid Brick	South	1.22	0
FW14S	Window	External Solid Brick	South	1.23	0
FD1W	Door	Corridor Brick Wall	East	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	2
Number of passive vents	0
Number of flueless gas fires	0

21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	33.33	15.00	500.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%

Summary for Input Data

Database Ref. No.	10588	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	79.00	
In Summer	76.40	
Model Name	24 HE	
Manufacturer	Baxi Potterton	
System Type	Regular boiler	
Controls SAP Code	2104	
Delayed Start Stat	No	
Burner Control	Modulating	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	No pump	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	No	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	
28.0 Water Heating		
Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From header tank	
Bath Count	1	
Supplementary Immersion	No	
Immersion Only Heating Hot Water	No	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	

Summary for Input Data

31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 3, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	65 D	**DER**	62.18	**TER**	
Environmental	66 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.81	**DFEE**	152.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	338.78	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2315 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8815 (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) =	0.8154 (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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			20.0000	517.8000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2815.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		89.9540 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	104.2840 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	133.9220	133.3408	132.7597	130.0054	129.4901	127.0912	127.0912	126.6469	128.0152	129.4901	130.5326	131.6224	(39)
Average = Sum(39)m / 12 =												130.0006	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.2787	4.2601	4.2415	4.1535	4.1371	4.0604	4.0604	4.0462	4.0899	4.1371	4.1704	4.2052	(40)
HLP (average)												4.1534	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy			1.1991 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)

Hot water usage for other uses

26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)

Average daily hot water use (litres/day)		70.7072 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	

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

16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)

Water storage loss:		
Store volume		150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):		1.6100 (48)
Temperature factor from Table 2b		0.7800 (49)
Enter (49) or (54) in (55)		1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
									Total per year (kWh/year) = Sum(64)m =		2542.4028	(64)
12Total per year (kWh/year)											2542	(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

122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains	357.5637	362.7226	352.0829	344.0613	331.9721	248.4019	238.8998	241.3870	247.4069	329.9511	344.0467	352.9831	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	421.1775	471.8758	502.5129	530.5817	539.7913	453.9094	437.3917	424.3278	410.5027	450.9798	420.4112	407.2999	(84)

---

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	5.8400	5.8654	5.8911	6.0159	6.0398	6.1539	6.1539	6.1754	6.1094	6.0398	5.9916	5.9420	
alpha	1.3893	1.3910	1.3927	1.4011	1.4027	1.4103	1.4103	1.4117	1.4073	1.4027	1.3994	1.3961	
util living area	0.9187	0.9026	0.8814	0.8440	0.7905	0.7428	0.6553	0.6751	0.7838	0.8455	0.8977	0.9218	(86)
MIT	15.5102	15.8733	16.5683	17.5753	18.6256	19.5228	20.1544	20.0787	19.2686	18.0520	16.6414	15.4706	(87)
Th 2	18.8607	18.8700	18.8792	18.9232	18.9315	18.9698	18.9698	18.9769	18.9550	18.9315	18.9148	18.8974	(88)
util rest of house	0.9043	0.8851	0.8584	0.8096	0.7335	0.6430	0.4750	0.5078	0.7001	0.8048	0.8766	0.9081	(89)
MIT 2	14.2033	14.5649	15.2549	16.2648	17.2810	18.1525	18.6800	18.6319	17.9249	16.7453	15.3548	14.1849	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	14.7812	15.1434	15.8357	16.8442	17.8756	18.7584	19.3319	19.2716	18.5190	17.3231	15.9237	14.7534	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.7812	15.1434	15.8357	16.8442	17.8756	18.7584	19.3319	19.2716	18.5190	17.3231	15.9237	14.7534	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8607	0.8380	0.8089	0.7603	0.6935	0.6290	0.5169	0.5399	0.6752	0.7587	0.8299	0.8654	(94)
Useful gains	362.5127	395.4374	406.4611	403.4133	374.3664	285.5239	226.0948	229.0806	277.1765	342.1753	348.8905	352.4817	(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	1403.6593	1365.8667	1239.3998	1032.7944	799.6734	528.4957	347.2066	363.6839	565.7037	870.5726	1151.7808	1389.0637	(97)
Space heating kWh	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98a)
Space heating requirement - total per year (kWh/year)												4558.4564	
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	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4558.4564	
Space heating per m2											(98c) / (4) =	145.6376	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 79.0000 (206)
Efficiency of main space heating system 2 (in %) 0.0000 (207)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	980.5229	825.4792	784.4385	573.6131	400.5423	0.0000	0.0000	0.0000	0.0000	497.6299	731.7481	976.2241	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9612	76.8730	76.6676	76.2586	75.6009	71.4000	71.4000	71.4000	71.4000	75.9701	76.6117	76.9566	(217)
Fuel for water heating, kWh/month	335.6083	299.8480	325.5205	304.9498	308.0249	208.6413	205.0642	216.1246	214.2584	312.0303	314.4959	335.1938	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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 5770.1980 (211)
Space heating fuel - main system 2 0.0000 (213)
Space heating fuel - secondary 0.0000 (215)
Efficiency of water heater 76.4000
Water heating fuel used 3379.7601 (219)
Space cooling fuel 0.0000 (221)

Electricity for pumps and fans:
main heating flue fan 45.0000 (230e)
Total electricity for the above, kWh/year 45.0000 (231)
Electricity for lighting (calculated in Appendix L) 127.9043 (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	9322.8624	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5770.1980	0.2100	1211.7416	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3379.7601	0.2100	709.7496	(264)
Space and water heating			1921.4912	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1946.1938	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			62.1800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5770.1980	1.1300	6520.3238	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3379.7601	1.1300	3819.1289	(278)
Space and water heating			10339.4526	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	127.9043	1.5338	196.1839	(282)
Total Primary energy kWh/year			10603.7125	(286)
Dwelling Primary energy Rate (DPER)			338.7800	(287)

Full SAP Calculation Printout

Property Reference	Flat 3, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	65 D	**DER**	62.18	**TER**	
Environmental	66 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.81	**DFEE**	152.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	338.78	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)

Party Floor 1	26.5900	30.0000	797.7000	(32d)
Party Ceiling 1	25.8900	30.0000	776.7000	(32b)
Internal Wall TImber	56.0500	9.0000	504.4500	(32c)
Internal Wall Brick	9.0500	75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256	(35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	104.2840	(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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	133.9220	133.3408	132.7597	130.0054	129.4901	127.0912	127.0912	126.6469	128.0152	129.4901	130.5326	131.6224	(39)
Average = Sum(39)m / 12 =												130.0006	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.2787	4.2601	4.2415	4.1535	4.1371	4.0604	4.0604	4.0462	4.0899	4.1371	4.1704	4.2052	(40)
HLP (average)												4.1534	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	18.7565	18.4733	18.0705	17.4673	16.9237	16.1753	15.6076	16.3018	16.6662	17.4077	18.1787	18.7416	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												41.8553	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	45.6664	44.4048	43.0234	41.4417	39.9195	38.1926	37.6248	39.2976	40.6405	42.3606	44.1101	45.6516	(44)
Energy conte	67.2289	58.7565	61.4796	54.1332	51.4403	44.1684	41.5765	46.2540	47.1410	54.5859	59.6163	67.0427	(45)
Energy content (annual)										Total = Sum(45)m =		653.4233	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	57.1446	49.9430	52.2576	46.0132	43.7242	37.5432	35.3400	39.3159	40.0698	46.3980	50.6738	56.9863	(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	57.1446	49.9430	52.2576	46.0132	43.7242	37.5432	35.3400	39.3159	40.0698	46.3980	50.6738	56.9863	(64)
										Total per year (kWh/year) = Sum(64)m =		555.4098	(64)
12Total per year (kWh/year)												555	(64)
Electric shower(s)	35.4964	31.6276	34.5361	32.9574	33.5758	32.0281	33.0957	33.5758	32.9574	34.5361	33.8867	35.4964	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		403.7692	(64a)
Heat gains from water heating, kWh/month	23.1602	20.3926	21.6984	19.7426	19.3250	17.3928	17.1089	18.2229	18.2568	20.2335	21.1401	23.1207	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	31.1293	30.3462	29.1646	27.4203	25.9745	24.1567	22.9959	24.4932	25.3567	27.1956	29.3613	31.0762	(72)
Total internal gains	223.8518	229.6082	220.3030	214.6785	204.4651	197.7249	190.4227	190.8779	196.0778	201.7971	212.7302	219.3675	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	287.4656	338.7613	370.7330	401.1989	412.2844	403.2325	388.9145	373.8187	359.1736	322.8258	289.0947	273.6843	(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	6.3770	6.4048	6.4328	6.5691	6.5952	6.7197	6.7197	6.7433	6.6712	6.5952	6.5426	6.4884	
alpha	1.4251	1.4270	1.4289	1.4379	1.4397	1.4480	1.4480	1.4496	1.4447	1.4397	1.4362	1.4326	
util living area	0.9528	0.9389	0.9218	0.8917	0.8484	0.7775	0.6944	0.7158	0.8181	0.8997	0.9392	0.9558	(86)
MIT	15.2567	15.6291	16.3332	17.3551	18.4289	19.4726	20.1165	20.0347	19.2096	17.8217	16.3881	15.2120	(87)
Th 2	18.2469	18.2523	18.2577	18.2841	18.2892	18.3135	18.3135	18.3181	18.3040	18.2892	18.2790	18.2684	(88)
util rest of house	0.9406	0.9228	0.8992	0.8547	0.7816	0.6374	0.4196	0.4630	0.7047	0.8573	0.9200	0.9444	(89)
MIT 2	13.5723	13.9414	14.6392	15.6537	16.6914	17.6567	18.1467	18.1041	17.4381	16.1260	14.7122	13.5386	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	14.3171	14.6876	15.3882	16.4060	17.4597	18.4597	19.0177	18.9578	18.2214	16.8758	15.4532	14.2785	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.3171	14.6876	15.3882	16.4060	17.4597	18.4597	19.0177	18.9578	18.2214	16.8758	15.4532	14.2785	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9104	0.8877	0.8605	0.8147	0.7508	0.6483	0.5211	0.5490	0.6994	0.8217	0.8863	0.9155	(94)
Useful gains	261.7076	300.7164	319.0053	326.8728	309.5581	261.4352	202.6472	205.2393	251.2220	265.2638	256.2319	250.5447	(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	1341.5100	1305.0924	1179.9981	975.8179	745.8220	490.5283	307.2681	323.9339	527.6016	812.6564	1090.3670	1326.5594	(97)
Space heating kWh	803.3730	674.9406	640.5786	467.2405	324.5804	0.0000	0.0000	0.0000	0.0000	407.2602	600.5773	800.5549	(98a)
Space heating requirement - total per year (kWh/year)												4719.1054	
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	803.3730	674.9406	640.5786	467.2405	324.5804	0.0000	0.0000	0.0000	0.0000	407.2602	600.5773	800.5549	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4719.1054	
Space heating per m2											(98c) / (4) =	150.7701	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1194.6569	940.4746	962.5166	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.3165	0.3693	0.3529	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	378.1247	347.3036	339.6573	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	454.9744	439.3613	422.5812	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	55.3317	68.4910	61.6954	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	13.8329	17.1227	15.4238	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												46.3795	(107)
Energy for space heating												150.7701	(99)
Energy for space cooling												1.4818	(108)
Total												152.2519	(109)
Fabric Energy Efficiency (DFEE)												152.3	(109)

Full SAP Calculation Printout

Property Reference	Flat 3, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	65 D	**DER**	62.18	**TER**	
Environmental	66 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.81	**DFEE**	152.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	338.78	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2315 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8815 (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) =	0.8154 (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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			20.0000	517.8000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2815.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		89.9540 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	104.2840 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	133.9220	133.3408	132.7597	130.0054	129.4901	127.0912	127.0912	126.6469	128.0152	129.4901	130.5326	131.6224	(39)
Average = Sum(39)m / 12 =												130.0006	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.2787	4.2601	4.2415	4.1535	4.1371	4.0604	4.0604	4.0462	4.0899	4.1371	4.1704	4.2052	(40)
HLP (average)												4.1534	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy			1.1991 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)

Hot water usage for other uses

26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)

Average daily hot water use (litres/day)		70.7072 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	

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

16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)

Water storage loss:		
Store volume		150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):		1.6100 (48)
Temperature factor from Table 2b		0.7800 (49)
Enter (49) or (54) in (55)		1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
									Total per year (kWh/year) = Sum(64)m =		2542.4028	(64)
12Total per year (kWh/year)											2542	(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

122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains	357.5637	362.7226	352.0829	344.0613	331.9721	248.4019	238.8998	241.3870	247.4069	329.9511	344.0467	352.9831	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	421.1775	471.8758	502.5129	530.5817	539.7913	453.9094	437.3917	424.3278	410.5027	450.9798	420.4112	407.2999	(84)

---

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	5.8400	5.8654	5.8911	6.0159	6.0398	6.1539	6.1539	6.1754	6.1094	6.0398	5.9916	5.9420	
alpha	1.3893	1.3910	1.3927	1.4011	1.4027	1.4103	1.4103	1.4117	1.4073	1.4027	1.3994	1.3961	
util living area	0.9187	0.9026	0.8814	0.8440	0.7905	0.7428	0.6553	0.6751	0.7838	0.8455	0.8977	0.9218	(86)
MIT	15.5102	15.8733	16.5683	17.5753	18.6256	19.5228	20.1544	20.0787	19.2686	18.0520	16.6414	15.4706	(87)
Th 2	18.8607	18.8700	18.8792	18.9232	18.9315	18.9698	18.9698	18.9769	18.9550	18.9315	18.9148	18.8974	(88)
util rest of house	0.9043	0.8851	0.8584	0.8096	0.7335	0.6430	0.4750	0.5078	0.7001	0.8048	0.8766	0.9081	(89)
MIT 2	14.2033	14.5649	15.2549	16.2648	17.2810	18.1525	18.6800	18.6319	17.9249	16.7453	15.3548	14.1849	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	14.7812	15.1434	15.8357	16.8442	17.8756	18.7584	19.3319	19.2716	18.5190	17.3231	15.9237	14.7534	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.7812	15.1434	15.8357	16.8442	17.8756	18.7584	19.3319	19.2716	18.5190	17.3231	15.9237	14.7534	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8607	0.8380	0.8089	0.7603	0.6935	0.6290	0.5169	0.5399	0.6752	0.7587	0.8299	0.8654	(94)
Useful gains	362.5127	395.4374	406.4611	403.4133	374.3664	285.5239	226.0948	229.0806	277.1765	342.1753	348.8905	352.4817	(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	1403.6593	1365.8667	1239.3998	1032.7944	799.6734	528.4957	347.2066	363.6839	565.7037	870.5726	1151.7808	1389.0637	(97)
Space heating kWh	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98a)
Space heating requirement - total per year (kWh/year)												4558.4564	
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	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4558.4564	
Space heating per m2											(98c) / (4) =	145.6376	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 79.0000 (206)
Efficiency of main space heating system 2 (in %) 0.0000 (207)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	774.6131	652.1285	619.7064	453.1544	316.4284	0.0000	0.0000	0.0000	0.0000	393.1276	578.0810	771.2170	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	980.5229	825.4792	784.4385	573.6131	400.5423	0.0000	0.0000	0.0000	0.0000	497.6299	731.7481	976.2241	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9612	76.8730	76.6676	76.2586	75.6009	71.4000	71.4000	71.4000	71.4000	75.9701	76.6117	76.9566	(217)
Fuel for water heating, kWh/month	335.6083	299.8480	325.5205	304.9498	308.0249	208.6413	205.0642	216.1246	214.2584	312.0303	314.4959	335.1938	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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 5770.1980 (211)
Space heating fuel - main system 2 0.0000 (213)
Space heating fuel - secondary 0.0000 (215)
Efficiency of water heater 76.4000
Water heating fuel used 3379.7601 (219)
Space cooling fuel 0.0000 (221)

Electricity for pumps and fans:
main heating flue fan 45.0000 (230e)
Total electricity for the above, kWh/year 45.0000 (231)
Electricity for lighting (calculated in Appendix L) 127.9043 (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	9322.8624	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5770.1980	0.2100	1211.7416	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3379.7601	0.2100	709.7496	(264)
Space and water heating			1921.4912	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1946.1938	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			62.1800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5770.1980	1.1300	6520.3238	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3379.7601	1.1300	3819.1289	(278)
Space and water heating			10339.4526	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	127.9043	1.5338	196.1839	(282)
Total Primary energy kWh/year			10603.7125	(286)
Dwelling Primary energy Rate (DPER)			338.7800	(287)

Full SAP Calculation Printout

Property Reference	Flat 3, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	65 D	**DER**	62.18	**TER**	
Environmental	66 D	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.81	**DFEE**	152.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	338.78	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2315 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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		0.2000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.8815 (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) =	0.8154 (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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	104.2840 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	133.9220	133.3408	132.7597	130.0054	129.4901	127.0912	127.0912	126.6469	128.0152	129.4901	130.5326	131.6224	(39)
Average = Sum(39)m / 12 =												130.0006	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.2787	4.2601	4.2415	4.1535	4.1371	4.0604	4.0604	4.0462	4.0899	4.1371	4.1704	4.2052	(40)
HLP (average)												4.1534	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy			1.1991 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)

Hot water usage for other uses

26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)

Average daily hot water use (litres/day)		70.7072 (43)

Daily hot water use

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)

Energy content (annual)	Total = Sum(45)m =	1103.8283

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

16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)

Water storage loss:		
Store volume		150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):		1.6100 (48)
Temperature factor from Table 2b		0.7800 (49)
Enter (49) or (54) in (55)		1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(59)
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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(62)
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)
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)
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)
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

258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)

	Total per year (kWh/year) = Sum(64)m =	2542.4028 (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

122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1062	16.0817	13.0786	9.9013	7.4013	6.2485	6.7518	8.7762	11.7794	14.9566	17.4566	18.6094	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains	400.2131	398.3635	388.9245	373.2617	356.9070	267.2068	257.7358	261.7342	270.3404	360.5257	378.8869	393.9533	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	463.8269	507.5166	539.3545	559.7822	564.7263	472.7144	456.2276	444.6750	433.4362	481.5544	455.2514	448.2701	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	6.3770	6.4048	6.4328	6.5691	6.5952	6.7197	6.7197	6.7433	6.6712	6.5952	6.5426	6.4884	
alpha	1.4251	1.4270	1.4289	1.4379	1.4397	1.4480	1.4480	1.4496	1.4447	1.4397	1.4362	1.4326	
util living area													
	0.9139	0.8994	0.8776	0.8414	0.7881	0.7404	0.6505	0.6694	0.7792	0.8409	0.8935	0.9173	(86)
MIT	15.6956	16.0356	16.7209	17.6948	18.7156	19.5840	20.1981	20.1269	19.3428	18.1663	16.7924	15.6561	(87)
Th 2	18.8607	18.8700	18.8792	18.9232	18.9315	18.9698	18.9698	18.9769	18.9550	18.9315	18.9148	18.8974	(88)
util rest of house													
	0.8984	0.8812	0.8535	0.8060	0.7296	0.6384	0.4675	0.4992	0.6930	0.7985	0.8712	0.9026	(89)
MIT 2	14.3737	14.7125	15.3918	16.3683	17.3536	18.1950	18.7012	18.6570	17.9796	16.8423	15.4905	14.3557	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	14.9582	15.2976	15.9795	16.9549	17.9559	18.8092	19.3631	19.3070	18.5824	17.4277	16.0661	14.9307	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.9582	15.2976	15.9795	16.9549	17.9559	18.8092	19.3631	19.3070	18.5824	17.4277	16.0661	14.9307	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8544	0.8345	0.8048	0.7584	0.6922	0.6277	0.5132	0.5353	0.6714	0.7543	0.8250	0.8595	(94)
Useful gains	396.3151	423.5040	434.0636	424.5394	390.8903	296.7111	234.1495	238.0547	291.0011	363.2573	375.5913	385.2927	(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													
	1427.3700	1386.4195	1258.4986	1047.1749	810.0706	534.9509	351.1643	368.1595	573.8126	884.1208	1170.3706	1412.4000	(97)
Space heating kWh													
	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98a)
Space heating requirement - total per year (kWh/year)												4511.6628	
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													
	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4511.6628	
Space heating per m2											(98c) / (4) =	144.1426	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98)
Space heating efficiency (main heating system 1)													
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)													
	971.0188	819.0877	776.4299	567.4653	394.7723	0.0000	0.0000	0.0000	0.0000	490.5347	724.3559	967.3011	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9466	76.8611	76.6510	76.2397	75.5736	71.4000	71.4000	71.4000	71.4000	75.9439	76.5950	76.9428	(217)
Fuel for water heating, kWh/month													
	335.6718	299.8945	325.5911	305.0254	308.1361	208.6413	205.0642	216.1246	214.2584	312.1380	314.5643	335.2537	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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												5710.9656	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3380.3635	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												127.9043	(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	9264.2334	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5710.9656	3.6400	207.8791	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3380.3635	3.6400	123.0452	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	127.9043	16.4900	21.0914	(250)
Additional standing charges			92.0000	(251)
Total energy cost			451.4363	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.1300	(257)
SAP value		65.4731	
SAP rating (Section 12)		65	(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	5710.9656	0.2100	1199.3028	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3380.3635	0.2100	709.8763	(264)
Space and water heating			1909.1791	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1933.8817	(272)
CO2 emissions per m2			61.7900	(273)
EI value			66.0367	
EI rating			66	(274)
EI band			D	

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)	
Ground floor		31.3000 (1b)	x	2.7600 (2b)	=	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate													
	0.8969	0.8358	0.8358	0.7950	0.7950	0.6931	0.6931	0.6727	0.6931	0.7746	0.7542	0.8154	(22b)
Effective ac	0.9023	0.8493	0.8493	0.8160	0.8160	0.7402	0.7402	0.7263	0.7402	0.8000	0.7844	0.8324	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	104.2840 (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	25.7214	24.2110	24.2110	23.2633	23.2633	21.1013	21.1013	20.7044	21.1013	22.8072	22.3629	23.7312	(38)
Heat transfer coeff													
	130.0054	128.4950	128.4950	127.5473	127.5473	125.3853	125.3853	124.9884	125.3853	127.0912	126.6469	128.0152	(39)
Average = Sum(39)m / 12 =												127.0823	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.1535	4.1053	4.1053	4.0750	4.0750	4.0059	4.0059	3.9932	4.0059	4.0604	4.0462	4.0899	(40)
HLP (average)												4.0601	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.1991 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses													
	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m													
	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(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													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
										Total per year (kWh/year) = Sum(64)m =		2542.4028	(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													
	122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	18.1062	16.0817	13.0786	9.9013	7.4013	6.2485	6.7518	8.7762	11.7794	14.9566	17.4566	18.6094	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)													
	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)													
	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains													
	400.2131	398.3635	388.9245	373.2617	356.9070	267.2068	257.7358	261.7342	270.3404	360.5257	378.8869	393.9533	(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	
South	3.3600	54.0600	0.6300	0.7000	0.7700	55.5120	(78)
West	2.6000	23.7835	0.6300	0.7000	0.7700	18.8982	(80)

Solar gains	74.4103	111.5046	152.7305	193.1405	210.8045	221.1268	211.2089	197.5047	176.7725	132.7122	87.9724	63.9225	(83)
Total gains	474.6233	509.8680	541.6551	566.4022	567.7115	488.3335	468.9448	459.2388	447.1128	493.2379	466.8593	457.8758	(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	6.5691	6.6463	6.6463	6.6957	6.6957	6.8111	6.8111	6.8328	6.8111	6.7197	6.7433	6.6712	
alpha	1.4379	1.4431	1.4431	1.4464	1.4464	1.4541	1.4541	1.4555	1.4541	1.4480	1.4496	1.4447	
util living area													
	0.9059	0.8920	0.8661	0.8250	0.7593	0.6857	0.5641	0.5867	0.7441	0.8199	0.8813	0.9092	(86)
MIT	16.0121	16.3461	17.0899	18.0325	19.0880	19.9427	20.5002	20.4408	19.6260	18.5076	17.1381	16.0041	(87)
Th 2	18.9232	18.9474	18.9474	18.9625	18.9625	18.9970	18.9970	19.0034	18.9970	18.9698	18.9769	18.9550	(88)
util rest of house													
	0.8890	0.8724	0.8394	0.7846	0.6883	0.5517	0.3122	0.3518	0.6400	0.7700	0.8563	0.8930	(89)
MIT 2	14.7210	15.0619	15.7921	16.7171	17.7194	18.5134	18.9081	18.8830	18.2553	17.1906	15.8642	14.7318	(90)
Living area fraction									fLA = Living area / (4) =			0.4422	(91)
MIT	15.2919	15.6298	16.3660	17.2987	18.3245	19.1454	19.6121	19.5718	18.8614	17.7729	16.4275	15.2944	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.2919	15.6298	16.3660	17.2987	18.3245	19.1454	19.6121	19.5718	18.8614	17.7729	16.4275	15.2944	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8437	0.8250	0.7906	0.7387	0.6588	0.5645	0.4089	0.4360	0.6306	0.7288	0.8093	0.8484	(94)
Useful gains	400.4210	420.6258	428.2097	418.3935	373.9885	275.6711	191.7388	200.2324	281.9511	359.4585	377.8164	388.4615	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	1350.9994	1301.6251	1164.9339	969.1989	717.3958	444.5445	252.2864	271.4541	509.2418	809.9437	1092.6445	1330.6425	(97)
Space heating kWh													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98a)
Space heating requirement - total per year (kWh/year)												4050.2796	
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													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4050.2796	
Space heating per m2											(98c) / (4) =	129.4019	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98)
Space heating efficiency (main heating system 1)													
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)													
	895.2282	749.4070	693.8263	501.9999	323.4115	0.0000	0.0000	0.0000	0.0000	424.2545	651.4889	887.3198	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.8226	76.7219	76.4646	76.0208	75.1960	71.4000	71.4000	71.4000	71.4000	75.6754	76.4175	76.8108	(217)
Fuel for water heating, kWh/month													
	336.2138	300.4389	326.3847	305.9036	309.6835	208.6413	205.0642	216.1246	214.2584	313.2458	315.2953	335.8299	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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	5126.9361	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3387.0840	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	127.9043	(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	8686.9244	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5126.9361	5.6000	287.1084	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3387.0840	5.6000	189.6767	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	127.9043	26.0600	33.3319	(250)
Additional standing charges			99.0000	(251)
Total energy cost			620.8440	(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	5126.9361	0.2100	1076.6566	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3387.0840	0.2100	711.2876	(264)
Space and water heating			1787.9442	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1812.6468	(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	5126.9361	1.1300	5793.4378	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3387.0840	1.1300	3827.4049	(278)
Space and water heating			9620.8427	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	127.9043	1.5338	196.1839	(282)
Total Primary energy kWh/year			9885.1026	(286)

SAP 10 EPC IMPROVEMENTS

Flat 3, Existing

Current energy efficiency rating:	D 65
Current environmental impact rating:	D 66

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	D 65
Potential environmental impact rating:	D 66

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)

Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£45	£45	£0
Mains gas	£576	£576	£0
Space heating	£398	£398	£0
Water heating	£190	£190	£0
Lighting	£33	£33	£0
Total cost of fuels	£621	£621	£0
Total cost of uses	£621	£621	£0
Delivered energy	278 kWh/m²	278 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.8 tonnes	1.8 tonnes	0.0 tonnes
CO2 emissions per m²	58 kg/m²	58 kg/m²	0 kg/m²
Primary energy	316 kWh/m²	316 kWh/m²	0 kWh/m²

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)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154 (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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)

Thermal bridges (Default value 0.200 * total exposed area) 13.5880 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 104.2840 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	133.9220	133.3408	132.7597	130.0054	129.4901	127.0912	127.0912	126.6469	128.0152	129.4901	130.5326	131.6224	(39)

Average = Sum(39)m / 12 = 130.0006

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.2787	4.2601	4.2415	4.1535	4.1371	4.0604	4.0604	4.0462	4.0899	4.1371	4.1704	4.2052	(40)
HLP (average)												4.1534	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.1991 (42)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)

Average daily hot water use (litres/day) 70.7072 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)

Energy content (annual) Total = Sum(45)m = 1103.8283

Distribution loss (46)m = 0.15 x (45)m	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)

Water storage loss:
Store volume 150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)
Temperature factor from Table 2b 0.7800 (49)
Enter (49) or (54) in (55) 1.2558 (55)

Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(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	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)

Total per year (kWh/year) = Sum(64)m = 2542.4028 (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	122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	18.1062	16.0817	13.0786	9.9013	7.4013	6.2485	6.7518	8.7762	11.7794	14.9566	17.4566	18.6094	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains	400.2131	398.3635	388.9245	373.2617	356.9070	267.2068	257.7358	261.7342	270.3404	360.5257	378.8869	393.9533	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	463.8269	507.5166	539.3545	559.7822	564.7263	472.7144	456.2276	444.6750	433.4362	481.5544	455.2514	448.2701	(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	6.3770	6.4048	6.4328	6.5691	6.5952	6.7197	6.7197	6.7433	6.6712	6.5952	6.5426	6.4884	

alpha	1.4251	1.4270	1.4289	1.4379	1.4397	1.4480	1.4480	1.4496	1.4447	1.4397	1.4362	1.4326	
util living area	0.9139	0.8994	0.8776	0.8414	0.7881	0.7404	0.6505	0.6694	0.7792	0.8409	0.8935	0.9173	(86)
MIT	15.6956	16.0356	16.7209	17.6948	18.7156	19.5840	20.1981	20.1269	19.3428	18.1663	16.7924	15.6561	(87)
Th 2	18.8607	18.8700	18.8792	18.9232	18.9315	18.9698	18.9698	18.9769	18.9550	18.9315	18.9148	18.8974	(88)
util rest of house	0.8984	0.8812	0.8535	0.8060	0.7296	0.6384	0.4675	0.4992	0.6930	0.7985	0.8712	0.9026	(89)
MIT 2	14.3737	14.7125	15.3918	16.3683	17.3536	18.1950	18.7012	18.6570	17.9796	16.8423	15.4905	14.3557	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	14.9582	15.2976	15.9795	16.9549	17.9559	18.8092	19.3631	19.3070	18.5824	17.4277	16.0661	14.9307	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.9582	15.2976	15.9795	16.9549	17.9559	18.8092	19.3631	19.3070	18.5824	17.4277	16.0661	14.9307	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8544	0.8345	0.8048	0.7584	0.6922	0.6277	0.5132	0.5353	0.6714	0.7543	0.8250	0.8595	(94)
Useful gains	396.3151	423.5040	434.0636	424.5394	390.8903	296.7111	234.1495	238.0547	291.0011	363.2573	375.5913	385.2927	(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	1427.3700	1386.4195	1258.4986	1047.1749	810.0706	534.9509	351.1643	368.1595	573.8126	884.1208	1170.3706	1412.4000	(97)
Space heating kWh	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98a)
Space heating requirement - total per year (kWh/year)												4511.6628	
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	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4511.6628	
Space heating per m2											(98c) / (4) =	144.1426	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	767.1048	647.0793	613.3796	448.2976	311.8701	0.0000	0.0000	0.0000	0.0000	387.5224	572.2411	764.1679	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	971.0188	819.0877	776.4299	567.4653	394.7723	0.0000	0.0000	0.0000	0.0000	490.5347	724.3559	967.3011	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.9466	76.8611	76.6510	76.2397	75.5736	71.4000	71.4000	71.4000	71.4000	75.9439	76.5950	76.9428	(217)
Fuel for water heating, kWh/month	335.6718	299.8945	325.5911	305.0254	308.1361	208.6413	205.0642	216.1246	214.2584	312.1380	314.5643	335.2537	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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	5710.9656	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3380.3635	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	127.9043	(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	9264.2334	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5710.9656	3.6400	207.8791	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3380.3635	3.6400	123.0452	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	127.9043	16.4900	21.0914	(250)
Additional standing charges			92.0000	(251)
Total energy cost			451.4363	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	2.1300	(257)
SAP value		65.4731	
SAP rating (Section 12)		65	(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	5710.9656	0.2100	1199.3028	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3380.3635	0.2100	709.8763	(264)
Space and water heating			1909.1791	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1933.8817	(272)
CO2 emissions per m2			61.7900	(273)
EI value			66.0367	
EI rating			66	(274)
EI band			D	

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)	
Ground floor		31.3000 (1b)	x	2.7600 (2b)	=	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)

Adj infilt rate													
	0.8969	0.8358	0.8358	0.7950	0.7950	0.6931	0.6931	0.6727	0.6931	0.7746	0.7542	0.8154	(22b)
Effective ac	0.9023	0.8493	0.8493	0.8160	0.8160	0.7402	0.7402	0.7263	0.7402	0.8000	0.7844	0.8324	(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	
Window (Uw = 1.70)			5.9600	1.5918	9.4869			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	1.9600	60.4268	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		90.6960			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	104.2840 (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	25.7214	24.2110	24.2110	23.2633	23.2633	21.1013	21.1013	20.7044	21.1013	22.8072	22.3629	23.7312	(38)
Heat transfer coeff	130.0054	128.4950	128.4950	127.5473	127.5473	125.3853	125.3853	124.9884	125.3853	127.0912	126.6469	128.0152	(39)
Average = Sum(39)m / 12 =												127.0823	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	4.1535	4.1053	4.1053	4.0750	4.0750	4.0059	4.0059	3.9932	4.0059	4.0604	4.0462	4.0899	(40)
HLP (average)												4.0601	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses													
	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m													
	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(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													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
										Total per year (kWh/year) = Sum(64)m =		2542.4028	(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													
	122.6419	109.8456	119.7427	112.8983	114.1902	53.8802	53.1759	55.8017	55.2137	115.5802	115.6880	122.5307	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	18.1062	16.0817	13.0786	9.9013	7.4013	6.2485	6.7518	8.7762	11.7794	14.9566	17.4566	18.6094	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)													
	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)													
	164.8412	163.4606	160.9445	156.8031	153.4814	74.8336	71.4730	75.0023	76.6857	155.3497	160.6778	164.6918	(72)
Total internal gains													

	400.2131	398.3635	388.9245	373.2617	356.9070	267.2068	257.7358	261.7342	270.3404	360.5257	378.8869	393.9533 (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	
South	3.3600	54.0600	0.6300	0.7000	0.7700	55.5120	(78)
West	2.6000	23.7835	0.6300	0.7000	0.7700	18.8982	(80)

Solar gains	74.4103	111.5046	152.7305	193.1405	210.8045	221.1268	211.2089	197.5047	176.7725	132.7122	87.9724	63.9225	(83)
Total gains	474.6233	509.8680	541.6551	566.4022	567.7115	488.3335	468.9448	459.2388	447.1128	493.2379	466.8593	457.8758	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	6.5691	6.6463	6.6463	6.6957	6.6957	6.8111	6.8111	6.8328	6.8111	6.7197	6.7433	6.6712	
alpha	1.4379	1.4431	1.4431	1.4464	1.4464	1.4541	1.4541	1.4555	1.4541	1.4480	1.4496	1.4447	
util living area													
	0.9059	0.8920	0.8661	0.8250	0.7593	0.6857	0.5641	0.5867	0.7441	0.8199	0.8813	0.9092	(86)
MIT	16.0121	16.3461	17.0899	18.0325	19.0880	19.9427	20.5002	20.4408	19.6260	18.5076	17.1381	16.0041	(87)
Th 2	18.9232	18.9474	18.9474	18.9625	18.9625	18.9970	18.9970	19.0034	18.9970	18.9698	18.9769	18.9550	(88)
util rest of house													
	0.8890	0.8724	0.8394	0.7846	0.6883	0.5517	0.3122	0.3518	0.6400	0.7700	0.8563	0.8930	(89)
MIT 2	14.7210	15.0619	15.7921	16.7171	17.7194	18.5134	18.9081	18.8830	18.2553	17.1906	15.8642	14.7318	(90)
Living area fraction									fLA = Living area / (4) =			0.4422	(91)
MIT	15.2919	15.6298	16.3660	17.2987	18.3245	19.1454	19.6121	19.5718	18.8614	17.7729	16.4275	15.2944	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.2919	15.6298	16.3660	17.2987	18.3245	19.1454	19.6121	19.5718	18.8614	17.7729	16.4275	15.2944	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8437	0.8250	0.7906	0.7387	0.6588	0.5645	0.4089	0.4360	0.6306	0.7288	0.8093	0.8484	(94)
Useful gains	400.4210	420.6258	428.2097	418.3935	373.9885	275.6711	191.7388	200.2324	281.9511	359.4585	377.8164	388.4615	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	1350.9994	1301.6251	1164.9339	969.1989	717.3958	444.5445	252.2864	271.4541	509.2418	809.9437	1092.6445	1330.6425	(97)
Space heating kWh													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98a)
Space heating requirement - total per year (kWh/year)												4050.2796	
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													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4050.2796	
Space heating per m2											(98c) / (4) =	129.4019	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	707.2303	592.0316	548.1228	396.5799	255.4951	0.0000	0.0000	0.0000	0.0000	335.1610	514.6762	700.9827	(98)
Space heating efficiency (main heating system 1)													
	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)													
	895.2282	749.4070	693.8263	501.9999	323.4115	0.0000	0.0000	0.0000	0.0000	424.2545	651.4889	887.3198	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	258.2882	230.5023	249.5688	232.5505	232.8696	148.9699	146.4158	154.3130	152.9805	237.0499	240.9407	257.9537	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.8226	76.7219	76.4646	76.0208	75.1960	71.4000	71.4000	71.4000	71.4000	75.6754	76.4175	76.8108	(217)
Fuel for water heating, kWh/month													
	336.2138	300.4389	326.3847	305.9036	309.6835	208.6413	205.0642	216.1246	214.2584	313.2458	315.2953	335.8299	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	15.8482	12.7140	11.4476	8.3870	6.4784	5.2929	5.9098	7.6817	9.9778	13.0914	14.7868	16.2887	(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	5126.9361	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3387.0840	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	127.9043	(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	8686.9244	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5126.9361	5.6000	287.1084	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3387.0840	5.6000	189.6767	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	127.9043	26.0600	33.3319	(250)
Additional standing charges			99.0000	(251)
Total energy cost			620.8440	(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	5126.9361	0.2100	1076.6566	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3387.0840	0.2100	711.2876	(264)
Space and water heating			1787.9442	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	127.9043	0.1443	18.4605	(268)
Total CO2, kg/year			1812.6468	(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	5126.9361	1.1300	5793.4378	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3387.0840	1.1300	3827.4049	(278)
Space and water heating			9620.8427	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	127.9043	1.5338	196.1839	(282)
Total Primary energy kWh/year			9885.1026	(286)

Summary for Input Data

Property Reference	Flat 3, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	34.98	**TER**	
Environmental	81 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.99	**DFEE**	89.36	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	191.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	East	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	98.23	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	26.67 m	31.30 m²	2.76 m

8.0 Living Area	13.84	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Solid Brick	Solid Wall	Other	0.31	0.00	36.79	30.83	0.00	None	5.96	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	21.03	19.33	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	15.68	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	56.05
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	9.05

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	5.41	5.41	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Summary for Input Data

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	25.89

11.0 Heat Loss Floors

Description	Type	Storey Index	Construction	U-Value (W/m²K)	Shelter Code	Shelter Factor	Kappa (kJ/m²K)	Area (m²)
External Floor	Ground Floor - Timber	Lowest occupied	Suspended timber, insulation between joists	0.25	None	0.00	20.00	4.71

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	26.59

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW1W	Window	External Solid Brick	West	0.84	0
FW2W	Window	External Solid Brick	West	0.84	0
FW3W	Window	External Solid Brick	West	0.92	0
FW12S	Window	External Solid Brick	South	0.91	0
FW13S	Window	External Solid Brick	South	1.22	0
FW14S	Window	External Solid Brick	South	1.23	0
FD1W	Door	Corridor Brick Wall	East	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	2
Number of passive vents	0
Number of flueless gas fires	0
21.0 Fixed Cooling System	No
22.0 Pressure Testing	No
Property Tested?	Yes
Test Method	Blower Door

22.0 Lighting

No Fixed Lighting	No				
Lighting Capacity Calculation	List of Lights				
	Name	**Efficacy**	**Power**	**Capacity**	**Count**
	LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	

Summary for Input Data

Fuel Type	Mains gas
SAP Code	0
In Winter	83.40
In Summer	79.80
Model Name	ECO COMPACT 25 COMBI
Manufacturer	Baxi Heating
System Type	Combi boiler
Controls SAP Code	2104
Delayed Start Stat	No
Burner Control	Modulating
HETAS approved System	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No
28.3 Waste Water Heat Recovery System	
29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 3, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	34.98	**TER**	
Environmental	81 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.99	**DFEE**	89.36	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	191.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			20.0000	517.8000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2815.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		89.9540 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	50.7520 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	80.3900	79.8089	79.2277	76.4734	75.9581	73.5592	73.5592	73.1150	74.4832	75.9581	77.0006	78.0905	(39)
Average = Sum(39)m / 12 =												76.4687	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5684	2.5498	2.5312	2.4432	2.4268	2.3501	2.3501	2.3359	2.3797	2.4268	2.4601	2.4949	(40)
HLP (average)												2.4431	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
										Total per year (kWh/year) = Sum(64)m =		1528.0315	(64)
12Total per year (kWh/year)												1528	(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	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains	256.3873	261.2499	250.2592	241.7953	229.2911	219.4312	209.6707	212.6415	218.9949	227.8256	242.4398	251.8000	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	320.0012	370.4030	400.6892	428.3158	437.1103	424.9388	408.1625	395.5823	382.0907	348.8543	318.8043	306.1168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	9.7288	9.7997	9.8715	10.2271	10.2965	10.6323	10.6323	10.6969	10.5004	10.2965	10.1571	10.0153	
alpha	1.6486	1.6533	1.6581	1.6818	1.6864	1.7088	1.7088	1.7131	1.7000	1.6864	1.6771	1.6677	
util living area													
	0.9267	0.9055	0.8791	0.8316	0.7658	0.6627	0.5562	0.5794	0.7186	0.8417	0.9042	0.9309	(86)
MIT	16.3552	16.7615	17.4257	18.3818	19.2822	20.1061	20.5434	20.4917	19.8787	18.7059	17.4195	16.3445	(87)
Th 2	19.7158	19.7251	19.7344	19.7784	19.7866	19.8249	19.8249	19.8320	19.8102	19.7866	19.7700	19.7525	(88)
util rest of house													
	0.9181	0.8945	0.8641	0.8089	0.7288	0.5988	0.4562	0.4844	0.6629	0.8161	0.8914	0.9229	(89)
MIT 2	15.5172	15.9225	16.5831	17.5453	18.4199	19.2113	19.5838	19.5505	19.0042	17.8773	16.6045	15.5276	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	15.8877	16.2935	16.9557	17.9152	18.8012	19.6070	20.0081	19.9667	19.3909	18.2437	16.9649	15.8888	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8877	16.2935	16.9557	17.9152	18.8012	19.6070	20.0081	19.9667	19.3909	18.2437	16.9649	15.8888	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8802	0.8521	0.8189	0.7641	0.6918	0.5851	0.4736	0.4967	0.6393	0.7732	0.8500	0.8864	(94)
Useful gains	281.6514	315.6160	328.1162	327.2740	302.3823	248.6290	193.3256	196.5033	244.2798	269.7441	270.9948	271.3313	(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													
	931.5380	909.3000	828.3797	689.4209	539.3950	368.3073	250.6972	260.7791	394.0814	580.5994	759.6005	912.7839	(97)
Space heating kWh													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98a)
Space heating requirement - total per year (kWh/year)												2752.0636	
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													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2752.0636	
Space heating per m2											(98c) / (4) =	87.9254	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	579.7549	478.3641	446.2783	312.6448	211.4357	0.0000	0.0000	0.0000	0.0000	277.3097	421.8178	572.2311	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1769	86.0698	85.8512	85.3905	84.6640	79.8000	79.8000	79.8000	79.8000	85.1298	85.8081	86.1592	(217)
Fuel for water heating, kWh/month													
	176.5723	155.5155	164.8415	148.3914	144.4155	134.4223	128.5158	140.2157	141.4642	150.4779	159.6588	176.1971	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	3299.8364	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1820.6879	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	92.3832	(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		5257.9076 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3299.8364	0.2100	692.9657	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1820.6879	0.2100	382.3445	(264)
Space and water heating			1075.3101	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			1094.8859	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			34.9800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3299.8364	1.1300	3728.8152	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1820.6879	1.1300	2057.3774	(278)
Space and water heating			5786.1925	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	92.3832	1.5338	141.7004	(282)
Total Primary energy kWh/year			5995.9690	(286)
Dwelling Primary energy Rate (DPER)			191.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 3, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	34.98	**TER**	
Environmental	81 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.99	**DFEE**	89.36	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	191.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)

Party Floor 1	26.5900	30.0000	797.7000	(32d)
Party Ceiling 1	25.8900	30.0000	776.7000	(32b)
Internal Wall TImber	56.0500	9.0000	504.4500	(32c)
Internal Wall Brick	9.0500	75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256	(35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880	(36)
Point Thermal bridges	(36a) =	0.0000	
Total fabric heat loss	(33) + (36) + (36a) =	50.7520	(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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	80.3900	79.8089	79.2277	76.4734	75.9581	73.5592	73.5592	73.1150	74.4832	75.9581	77.0006	78.0905	(39)
Average = Sum(39)m / 12 =												76.4687	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5684	2.5498	2.5312	2.4432	2.4268	2.3501	2.3501	2.3359	2.3797	2.4268	2.4601	2.4949	(40)
HLP (average)												2.4431	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	18.7565	18.4733	18.0705	17.4673	16.9237	16.1753	15.6076	16.3018	16.6662	17.4077	18.1787	18.7416	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												41.8553	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	45.6664	44.4048	43.0234	41.4417	39.9195	38.1926	37.6248	39.2976	40.6405	42.3606	44.1101	45.6516	(44)
Energy conte	67.2289	58.7565	61.4796	54.1332	51.4403	44.1684	41.5765	46.2540	47.1410	54.5859	59.6163	67.0427	(45)
Energy content (annual)										Total = Sum(45)m =		653.4233	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	57.1446	49.9430	52.2576	46.0132	43.7242	37.5432	35.3400	39.3159	40.0698	46.3980	50.6738	56.9863	(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	57.1446	49.9430	52.2576	46.0132	43.7242	37.5432	35.3400	39.3159	40.0698	46.3980	50.6738	56.9863	(64)
										Total per year (kWh/year) = Sum(64)m =		555.4098	(64)
12Total per year (kWh/year)												555	(64)
Electric shower(s)	35.4964	31.6276	34.5361	32.9574	33.5758	32.0281	33.0957	33.5758	32.9574	34.5361	33.8867	35.4964	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		403.7692	(64a)
Heat gains from water heating, kWh/month	23.1602	20.3926	21.6984	19.7426	19.3250	17.3928	17.1089	18.2229	18.2568	20.2335	21.1401	23.1207	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	31.1293	30.3462	29.1646	27.4203	25.9745	24.1567	22.9959	24.4932	25.3567	27.1956	29.3613	31.0762	(72)
Total internal gains	223.8518	229.6082	220.3030	214.6785	204.4651	197.7249	190.4227	190.8779	196.0778	201.7971	212.7302	219.3675	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	287.4656	338.7613	370.7330	401.1989	412.2844	403.2325	388.9145	373.8187	359.1736	322.8258	289.0947	273.6843	(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	10.6234	10.7008	10.7793	11.1675	11.2433	11.6099	11.6099	11.6805	11.4659	11.2433	11.0910	10.9362	
alpha	1.7082	1.7134	1.7186	1.7445	1.7496	1.7740	1.7740	1.7787	1.7644	1.7496	1.7394	1.7291	
util living area	0.9426	0.9229	0.8983	0.8534	0.7899	0.6879	0.5797	0.6059	0.7454	0.8649	0.9230	0.9466	(86)
MIT	16.3658	16.7743	17.4369	18.3929	19.2896	20.1129	20.5495	20.4943	19.8798	18.7056	17.4229	16.3565	(87)
Th 2	18.9813	18.9920	19.0027	19.0542	19.0640	19.1101	19.1101	19.1188	19.0922	19.0640	19.0443	19.0238	(88)
util rest of house	0.9307	0.9070	0.8758	0.8175	0.7284	0.5759	0.3986	0.4339	0.6493	0.8244	0.9044	0.9357	(89)
MIT 2	15.0342	15.4393	16.0944	17.0481	17.9004	18.6536	18.9743	18.9503	18.4614	17.3715	16.1137	15.0477	(90)
Living area fraction									fLA = Living area / (4) =			0.4422	(91)
MIT	15.6230	16.0296	16.6880	17.6428	18.5147	19.2989	19.6708	19.6330	19.0886	17.9614	16.6926	15.6264	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.6230	16.0296	16.6880	17.6428	18.5147	19.2989	19.6708	19.6330	19.0886	17.9614	16.6926	15.6264	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9001	0.8720	0.8385	0.7823	0.7061	0.5894	0.4615	0.4895	0.6490	0.7925	0.8711	0.9064	(94)
Useful gains	258.7414	295.4095	310.8775	313.8706	291.1230	237.6780	179.4928	182.9752	233.1158	255.8469	251.8253	248.0804	(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	910.2527	888.2423	807.1744	668.5892	517.6294	345.6442	225.8864	236.3788	371.5663	559.1586	738.6378	892.2921	(97)
Space heating kWh	484.7244	398.3836	369.2449	255.3974	168.5207	0.0000	0.0000	0.0000	0.0000	225.6639	350.5050	479.2936	(98a)
Space heating requirement - total per year (kWh/year)												2731.7334	
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	484.7244	398.3836	369.2449	255.3974	168.5207	0.0000	0.0000	0.0000	0.0000	225.6639	350.5050	479.2936	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2731.7334	
Space heating per m2											(98c) / (4) =	87.2758	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	691.4565	544.3381	555.6737	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5021	0.5696	0.5504	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	347.1582	310.0486	305.8335	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	454.9744	439.3613	422.5812	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	77.6276	96.2086	86.8603	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction									fC = cooled area / (4) =			1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	19.4069	24.0522	21.7151	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												65.1741	(107)
Energy for space heating												87.2758	(99)
Energy for space cooling												2.0822	(108)
Total												89.3581	(109)
Fabric Energy Efficiency (DFEE)												89.4	(109)

Full SAP Calculation Printout

Property Reference	Flat 3, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	34.98	**TER**	
Environmental	81 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.99	**DFEE**	89.36	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	191.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			20.0000	517.8000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	2815.5600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		89.9540 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	50.7520 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	80.3900	79.8089	79.2277	76.4734	75.9581	73.5592	73.5592	73.1150	74.4832	75.9581	77.0006	78.0905	(39)
Average = Sum(39)m / 12 =												76.4687	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5684	2.5498	2.5312	2.4432	2.4268	2.3501	2.3501	2.3359	2.3797	2.4268	2.4601	2.4949	(40)
HLP (average)												2.4431	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
										Total per year (kWh/year) = Sum(64)m =		1528.0315	(64)
12Total per year (kWh/year)												1528	(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	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	59.9550	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	51.3096	56.8071	51.3096	53.0200	51.3096	53.0200	51.3096	51.3096	53.0200	51.3096	53.0200	51.3096	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	100.4263	101.4684	98.8423	93.2517	86.1945	79.5618	75.1307	74.0886	76.7147	82.3053	89.3625	95.9952	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	28.9955	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains	256.3873	261.2499	250.2592	241.7953	229.2911	219.4312	209.6707	212.6415	218.9949	227.8256	242.4398	251.8000	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	320.0012	370.4030	400.6892	428.3158	437.1103	424.9388	408.1625	395.5823	382.0907	348.8543	318.8043	306.1168	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	9.7288	9.7997	9.8715	10.2271	10.2965	10.6323	10.6323	10.6969	10.5004	10.2965	10.1571	10.0153	
alpha	1.6486	1.6533	1.6581	1.6818	1.6864	1.7088	1.7088	1.7131	1.7000	1.6864	1.6771	1.6677	
util living area													
	0.9267	0.9055	0.8791	0.8316	0.7658	0.6627	0.5562	0.5794	0.7186	0.8417	0.9042	0.9309	(86)
MIT	16.3552	16.7615	17.4257	18.3818	19.2822	20.1061	20.5434	20.4917	19.8787	18.7059	17.4195	16.3445	(87)
Th 2	19.7158	19.7251	19.7344	19.7784	19.7866	19.8249	19.8249	19.8320	19.8102	19.7866	19.7700	19.7525	(88)
util rest of house													
	0.9181	0.8945	0.8641	0.8089	0.7288	0.5988	0.4562	0.4844	0.6629	0.8161	0.8914	0.9229	(89)
MIT 2	15.5172	15.9225	16.5831	17.5453	18.4199	19.2113	19.5838	19.5505	19.0042	17.8773	16.6045	15.5276	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	15.8877	16.2935	16.9557	17.9152	18.8012	19.6070	20.0081	19.9667	19.3909	18.2437	16.9649	15.8888	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8877	16.2935	16.9557	17.9152	18.8012	19.6070	20.0081	19.9667	19.3909	18.2437	16.9649	15.8888	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8802	0.8521	0.8189	0.7641	0.6918	0.5851	0.4736	0.4967	0.6393	0.7732	0.8500	0.8864	(94)
Useful gains	281.6514	315.6160	328.1162	327.2740	302.3823	248.6290	193.3256	196.5033	244.2798	269.7441	270.9948	271.3313	(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													
	931.5380	909.3000	828.3797	689.4209	539.3950	368.3073	250.6972	260.7791	394.0814	580.5994	759.6005	912.7839	(97)
Space heating kWh													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98a)
Space heating requirement - total per year (kWh/year)												2752.0636	
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													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2752.0636	
Space heating per m2											(98c) / (4) =	87.9254	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	483.5156	398.9556	372.1961	260.7458	176.3374	0.0000	0.0000	0.0000	0.0000	231.2763	351.7961	477.2407	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	579.7549	478.3641	446.2783	312.6448	211.4357	0.0000	0.0000	0.0000	0.0000	277.3097	421.8178	572.2311	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1769	86.0698	85.8512	85.3905	84.6640	79.8000	79.8000	79.8000	79.8000	85.1298	85.8081	86.1592	(217)
Fuel for water heating, kWh/month													
	176.5723	155.5155	164.8415	148.3914	144.4155	134.4223	128.5158	140.2157	141.4642	150.4779	159.6588	176.1971	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	3299.8364	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1820.6879	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	92.3832	(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		5257.9076 (238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3299.8364	0.2100	692.9657	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1820.6879	0.2100	382.3445	(264)
Space and water heating			1075.3101	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			1094.8859	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			34.9800	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3299.8364	1.1300	3728.8152	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1820.6879	1.1300	2057.3774	(278)
Space and water heating			5786.1925	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	92.3832	1.5338	141.7004	(282)
Total Primary energy kWh/year			5995.9690	(286)
Dwelling Primary energy Rate (DPER)			191.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 3, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 3, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	34.98	**TER**	
Environmental	81 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.99	**DFEE**	89.36	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	191.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)

Internal Wall TImber	56.0500	9.0000	504.4500 (32c)
Internal Wall Brick	9.0500	75.0000	678.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	50.7520 (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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff	80.3900	79.8089	79.2277	76.4734	75.9581	73.5592	73.5592	73.1150	74.4832	75.9581	77.0006	78.0905	(39)
Average = Sum(39)m / 12 =												76.4687	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5684	2.5498	2.5312	2.4432	2.4268	2.3501	2.3501	2.3359	2.3797	2.4268	2.4601	2.4949	(40)
HLP (average)												2.4431	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses													
	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m													
	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
										Total per year (kWh/year) = Sum(64)m =		1528.0315	(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													
	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	13.0778	11.6156	9.4464	7.1516	5.3459	4.5132	4.8767	6.3389	8.5081	10.8029	12.6086	13.4413	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)													
	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)													
	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains													
	294.0084	292.4245	283.4687	268.2460	252.1705	236.5008	226.6316	230.5514	238.6570	254.2465	272.4320	287.6021	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	357.6222	401.5776	433.8987	454.7665	459.9898	442.0084	425.1234	413.4922	401.7528	375.2752	348.7965	341.9189	(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	10.6234	10.7008	10.7793	11.1675	11.2433	11.6099	11.6099	11.6805	11.4659	11.2433	11.0910	10.9362	
alpha	1.7082	1.7134	1.7186	1.7445	1.7496	1.7740	1.7740	1.7787	1.7644	1.7496	1.7394	1.7291	
util living area													
	0.9212	0.9021	0.8743	0.8283	0.7622	0.6595	0.5502	0.5727	0.7137	0.8361	0.8995	0.9258	(86)
MIT	16.6187	16.9899	17.6393	18.5463	19.4017	20.1777	20.5884	20.5417	19.9663	18.8608	17.6317	16.6100	(87)
Th 2	19.7158	19.7251	19.7344	19.7784	19.7866	19.8249	19.8249	19.8320	19.8102	19.7866	19.7700	19.7525	(88)
util rest of house													
	0.9118	0.8904	0.8585	0.8047	0.7239	0.5941	0.4487	0.4761	0.6563	0.8092	0.8858	0.9171	(89)
MIT 2	15.7664	16.1369	16.7816	17.6945	18.5232	19.2666	19.6118	19.5830	19.0747	18.0161	16.8022	15.7791	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	16.1433	16.5141	17.1609	18.0712	18.9117	19.6695	20.0436	20.0069	19.4689	18.3896	17.1690	16.1465	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.1433	16.5141	17.1609	18.0712	18.9117	19.6695	20.0436	20.0069	19.4689	18.3896	17.1690	16.1465	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8739	0.8492	0.8150	0.7626	0.6904	0.5842	0.4698	0.4923	0.6368	0.7691	0.8456	0.8806	(94)
Useful gains	312.5187	341.0258	353.6088	346.7925	317.5896	258.2195	199.7033	203.5554	255.8270	288.6079	294.9365	301.0924	(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													
	952.0805	926.9066	844.6353	701.3496	547.7843	372.9057	253.3116	263.7202	399.8953	591.6844	775.3183	932.9056	(97)
Space heating kWh													
	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98a)
Space heating requirement - total per year (kWh/year)												2702.8485	
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													
	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2702.8485	
Space heating per m2											(98c) / (4) =	86.3530	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	83.4000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	570.5444	472.0767	438.0381	306.0925	205.3536	0.0000	0.0000	0.0000	0.0000	270.3705	414.7180	563.6319	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1504	86.0472	85.8177	85.3489	84.6022	79.8000	79.8000	79.8000	79.8000	85.0782	85.7773	86.1340	(217)
Fuel for water heating, kWh/month													
	176.6267	155.5562	164.9059	148.4636	144.5210	134.4223	128.5158	140.2157	141.4642	150.5690	159.7162	176.2486	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	3240.8256 (211)
Space heating fuel - main system 2	0.0000 (213)
Space heating fuel - secondary	0.0000 (215)
Efficiency of water heater	79.8000
Water heating fuel used	1821.2252 (219)
Space cooling fuel	0.0000 (221)
Electricity for pumps and fans:	
main heating flue fan	45.0000 (230e)
Total electricity for the above, kWh/year	45.0000 (231)
Electricity for lighting (calculated in Appendix L)	92.3832 (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	5199.4340 (238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3240.8256	3.6400	117.9661	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1821.2252	3.6400	66.2926	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	92.3832	16.4900	15.2340	(250)
Additional standing charges			92.0000	(251)
Total energy cost			298.9131	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4103	(257)
SAP value		77.1384	
SAP rating (Section 12)		77	(258)
SAP band		C	

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	3240.8256	0.2100	680.5734	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1821.2252	0.2100	382.4573	(264)
Space and water heating			1063.0307	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			1082.6065	(272)
CO2 emissions per m2			34.5900	(273)
EI value			80.9870	
EI rating			81	(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)	
Ground floor	31.3000	(1b)	x 2.7600	(2b) =	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.8815	(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) =	0.8154	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)

Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8969	0.8358	0.8358	0.7950	0.7950	0.6931	0.6931	0.6727	0.6931	0.7746	0.7542	0.8154	(22b)
Effective ac	0.9023	0.8493	0.8493	0.8160	0.8160	0.7402	0.7402	0.7263	0.7402	0.8000	0.7844	0.8324	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	50.7520 (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	25.7214	24.2110	24.2110	23.2633	23.2633	21.1013	21.1013	20.7044	21.1013	22.8072	22.3629	23.7312	(38)
Heat transfer coeff	76.4734	74.9630	74.9630	74.0153	74.0153	71.8533	71.8533	71.4564	71.8533	73.5592	73.1150	74.4832	(39)
Average = Sum(39)m / 12 =												73.5503	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4432	2.3950	2.3950	2.3647	2.3647	2.2956	2.2956	2.2830	2.2956	2.3501	2.3359	2.3797	(40)
HLP (average)												2.3499	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
									Total per year (kWh/year) = Sum(64)m =			1528.0315	(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	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.0778	11.6156	9.4464	7.1516	5.3459	4.5132	4.8767	6.3389	8.5081	10.8029	12.6086	13.4413	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains	294.0084	292.4245	283.4687	268.2460	252.1705	236.5008	226.6316	230.5514	238.6570	254.2465	272.4320	287.6021	(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	
South	3.3600	54.0600	0.6300	0.7000	0.7700	55.5120	(78)
West	2.6000	23.7835	0.6300	0.7000	0.7700	18.8982	(80)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	74.4103	111.5046	152.7305	193.1405	210.8045	221.1268	211.2089	197.5047	176.7725	132.7122	87.9724	63.9225	(83)
Total gains	368.4186	403.9291	436.1992	461.3865	462.9750	457.6276	437.8405	428.0561	415.4294	386.9587	360.4043	351.5246	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	11.1675	11.3925	11.3925	11.5384	11.5384	11.8856	11.8856	11.9516	11.8856	11.6099	11.6805	11.4659	
alpha	1.7445	1.7595	1.7595	1.7692	1.7692	1.7924	1.7924	1.7968	1.7924	1.7740	1.7787	1.7644	
util living area	0.9114	0.8925	0.8592	0.8062	0.7250	0.5880	0.4502	0.4745	0.6641	0.8084	0.8838	0.9161	(86)
MIT	16.9953	17.3688	18.0449	18.8783	19.7268	20.4463	20.7802	20.7470	20.2103	19.1958	18.0228	17.0090	(87)
Th 2	19.7784	19.8025	19.8025	19.8176	19.8176	19.8522	19.8522	19.8585	19.8522	19.8249	19.8320	19.8102	(88)
util rest of house	0.9009	0.8800	0.8416	0.7793	0.6794	0.5086	0.3279	0.3572	0.5979	0.7766	0.8683	0.9063	(89)
MIT 2	16.1743	16.5551	17.2193	18.0392	18.8478	19.5133	19.7671	19.7520	19.3186	18.3608	17.2222	16.2067	(90)
Living area fraction									fLA = Living area / (4) =			0.4422	(91)
MIT	16.5374	16.9149	17.5844	18.4102	19.2365	19.9259	20.2151	20.1920	19.7129	18.7300	17.5762	16.5615	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.5374	16.9149	17.5844	18.4102	19.2365	19.9259	20.2151	20.1920	19.7129	18.7300	17.5762	16.5615	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8619	0.8388	0.7988	0.7395	0.6529	0.5143	0.3698	0.3945	0.5887	0.7395	0.8276	0.8686	(94)
Useful gains	317.5447	338.8014	348.4380	341.2183	302.2580	235.3556	161.9049	168.8596	244.5691	286.1416	298.2775	305.3178	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	889.9483	855.6951	770.9463	644.6874	483.8006	310.8283	187.9029	199.5054	353.0080	539.1899	714.7843	868.5827	(97)
Space heating kWh	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98a)
Space heating requirement - total per year (kWh/year)												2348.3542	
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	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2348.3542	
Space heating per m2										(98c) / (4) =		75.0273	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	83.4000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	510.6334	416.4899	376.9138	261.9877	161.9516	0.0000	0.0000	0.0000	0.0000	225.7409	359.5742	502.4809	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9613	85.8271	85.5382	85.0362	84.0940	79.8000	79.8000	79.8000	79.8000	84.7038	85.5102	85.9372	(217)
Fuel for water heating, kWh/month	177.0152	155.9551	165.4446	149.0096	145.3944	134.4223	128.5158	140.2157	141.4642	151.2346	160.2150	176.6522	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	(235d)

Annual totals kWh/year

Space heating fuel - main system 1	2815.7725	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1825.5387	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	92.3832	(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	4778.6944	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2815.7725	5.6000	157.6833	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1825.5387	5.6000	102.2302	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	92.3832	26.0600	24.0751	(250)
Additional standing charges			99.0000	(251)
Total energy cost			394.7155	(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	2815.7725	0.2100	591.3122	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1825.5387	0.2100	383.3631	(264)
Space and water heating			974.6754	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			994.2512	(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	2815.7725	1.1300	3181.8229	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1825.5387	1.1300	2062.8588	(278)
Space and water heating			5244.6817	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	92.3832	1.5338	141.7004	(282)
Total Primary energy kWh/year			5454.4581	(286)

SAP 10 EPC IMPROVEMENTS

Flat 3, Proposed

Current energy efficiency rating: C 77
Current environmental impact rating: B 81

N Solar water heating	Not applicable	
U Solar photovoltaic panels	Not applicable	
V2 Wind turbine	Not applicable	

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

	Typical annual savings	Energy efficiency	Environmental impact
Recommended measures			
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 77
Potential environmental impact rating: B 81

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£36	£36	£0
Mains gas	£359	£359	£0
Space heating	£268	£268	£0

Water heating	£102	£102	£0
Lighting	£24	£24	£0
Total cost of fuels	£395	£395	£0
Total cost of uses	£394	£394	£0
Delivered energy	153 kWh/m²	153 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m²	32 kg/m²	32 kg/m²	0 kg/m²
Primary energy	174 kWh/m²	174 kWh/m²	0 kWh/m²

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)	
Ground floor	31.3000 (1b)	x	2.7600 (2b)	=	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.8815	(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) =	0.8154	(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	1.0396	1.0193	0.9989	0.8969	0.8766	0.7746	0.7746	0.7542	0.8154	0.8766	0.9173	0.9581	(22b)
Effective ac	1.0396	1.0193	0.9989	0.9023	0.8842	0.8000	0.8000	0.7844	0.8324	0.8842	0.9207	0.9590	(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	
Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3074.4600	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							98.2256	(35)
Thermal bridges (Default value 0.200 * total exposed area)							13.5880	(36)
Point Thermal bridges						(36a) =	0.0000	
Total fabric heat loss					(33) + (36) + (36a) =		50.7520	(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	29.6380	29.0568	28.4757	25.7214	25.2061	22.8072	22.8072	22.3629	23.7312	25.2061	26.2486	27.3384	(38)
Heat transfer coeff													

	80.3900	79.8089	79.2277	76.4734	75.9581	73.5592	73.5592	73.1150	74.4832	75.9581	77.0006	78.0905 (39)
Average = Sum(39)m / 12 =												76.4687

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.5684	2.5498	2.5312	2.4432	2.4268	2.3501	2.3501	2.3359	2.3797	2.4268	2.4601	2.4949	(40)
HLP (average)												2.4431	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991 (42)
Hot water usage for mixer showers												
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths												
	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329 (42b)
Hot water usage for other uses												
	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100 (42c)
Average daily hot water use (litres/day)												70.7072 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m													
	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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													
	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
										Total per year (kWh/year) = Sum(64)m =		1528.0315	(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													
	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	13.0778	11.6156	9.4464	7.1516	5.3459	4.5132	4.8767	6.3389	8.5081	10.8029	12.6086	13.4413	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)													
	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)													
	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains													
	294.0084	292.4245	283.4687	268.2460	252.1705	236.5008	226.6316	230.5514	238.6570	254.2465	272.4320	287.6021	(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	
South	3.3600	46.7521	0.6300	0.7000	0.7700	48.0078	(78)
West	2.6000	19.6403	0.6300	0.7000	0.7700	15.6060	(80)

Solar gains	63.6138	109.1531	150.4300	186.5205	207.8192	205.5076	198.4918	182.9408	163.0958	121.0287	76.3645	54.3168	(83)
Total gains	357.6222	401.5776	433.8987	454.7665	459.9898	442.0084	425.1234	413.4922	401.7528	375.2752	348.7965	341.9189	(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	10.6234	10.7008	10.7793	11.1675	11.2433	11.6099	11.6099	11.6805	11.4659	11.2433	11.0910	10.9362	
alpha	1.7082	1.7134	1.7186	1.7445	1.7496	1.7740	1.7740	1.7787	1.7644	1.7496	1.7394	1.7291	
util living area													
	0.9212	0.9021	0.8743	0.8283	0.7622	0.6595	0.5502	0.5727	0.7137	0.8361	0.8995	0.9258	(86)
MIT	16.6187	16.9899	17.6393	18.5463	19.4017	20.1777	20.5884	20.5417	19.9663	18.8608	17.6317	16.6100	(87)
Th 2	19.7158	19.7251	19.7344	19.7784	19.7866	19.8249	19.8249	19.8320	19.8102	19.7866	19.7700	19.7525	(88)
util rest of house													
	0.9118	0.8904	0.8585	0.8047	0.7239	0.5941	0.4487	0.4761	0.6563	0.8092	0.8858	0.9171	(89)
MIT 2	15.7664	16.1369	16.7816	17.6945	18.5232	19.2666	19.6118	19.5830	19.0747	18.0161	16.8022	15.7791	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	16.1433	16.5141	17.1609	18.0712	18.9117	19.6695	20.0436	20.0069	19.4689	18.3896	17.1690	16.1465	(92)
Temperature adjustment												0.0000	

adjusted MIT	16.1433	16.5141	17.1609	18.0712	18.9117	19.6695	20.0436	20.0069	19.4689	18.3896	17.1690	16.1465	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8739	0.8492	0.8150	0.7626	0.6904	0.5842	0.4698	0.4923	0.6368	0.7691	0.8456	0.8806	(94)
Useful gains	312.5187	341.0258	353.6088	346.7925	317.5896	258.2195	199.7033	203.5554	255.8270	288.6079	294.9365	301.0924	(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	952.0805	926.9066	844.6353	701.3496	547.7843	372.9057	253.3116	263.7202	399.8953	591.6844	775.3183	932.9056	(97)
Space heating kWh	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98a)
Space heating requirement - total per year (kWh/year)												2702.8485	
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	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2702.8485	
Space heating per m2											(98c) / (4) =	86.3530	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	475.8340	393.7119	365.3237	255.2812	171.2649	0.0000	0.0000	0.0000	0.0000	225.4890	345.8749	470.0690	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	570.5444	472.0767	438.0381	306.0925	205.3536	0.0000	0.0000	0.0000	0.0000	270.3705	414.7180	563.6319	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1504	86.0472	85.8177	85.3489	84.6022	79.8000	79.8000	79.8000	79.8000	85.0782	85.7773	86.1340	(217)
Fuel for water heating, kWh/month	176.6267	155.5562	164.9059	148.4636	144.5210	134.4223	128.5158	140.2157	141.4642	150.5690	159.7162	176.2486	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	3240.8256	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1821.2252	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	92.3832	(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	5199.4340	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3240.8256	3.6400	117.9661	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1821.2252	3.6400	66.2926	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)

Energy for lighting	92.3832	16.4900	15.2340	(250)
Additional standing charges			92.0000	(251)
Total energy cost			298.9131	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):			0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =		1.4103	(257)
SAP value			77.1384	
SAP rating (Section 12)			77	(258)
SAP band			C	

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	3240.8256	0.2100	680.5734	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1821.2252	0.2100	382.4573	(264)
Space and water heating			1063.0307	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			1082.6065	(272)
CO2 emissions per m2			34.5900	(273)
EI value			80.9870	
EI rating			81	(274)
EI band			B	

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)	
Ground floor	31.3000 (1b)	x	2.7600 (2b)	=	86.3880	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	31.3000					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	86.3880	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2315	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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		0.2000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.8815	(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) =	0.8154 (21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.8969	0.8358	0.8358	0.7950	0.7950	0.6931	0.6931	0.6727	0.6931	0.7746	0.7542	0.8154	(22b)
Effective ac	0.9023	0.8493	0.8493	0.8160	0.8160	0.7402	0.7402	0.7263	0.7402	0.8000	0.7844	0.8324	(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

Window (Uw = 1.20)			5.9600	1.1450	6.8244			(27)
Door			1.7000	3.0000	5.1000			(26)
External Floor			4.7100	0.2500	1.1775	20.0000	94.2000	(28a)
External Solid Brick	36.7900	5.9600	30.8300	0.3100	9.5573	0.0000	0.0000	(29a)
Corridor Brick Wall	21.0300	1.7000	19.3300	0.7000	13.5310	9.0000	173.9700	(29a)
External Roof 1	5.4100		5.4100	0.1800	0.9738	9.0000	48.6900	(30)
Total net area of external elements Aum(A, m2)			67.9400					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		37.1640			(33)
Party Wall 1			15.6800	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			26.5900			30.0000	797.7000	(32d)
Party Ceiling 1			25.8900			30.0000	776.7000	(32b)
Internal Wall TImber			56.0500			9.0000	504.4500	(32c)
Internal Wall Brick			9.0500			75.0000	678.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3074.4600 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		98.2256 (35)
Thermal bridges (Default value 0.200 * total exposed area)		13.5880 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	50.7520 (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	25.7214	24.2110	24.2110	23.2633	23.2633	21.1013	21.1013	20.7044	21.1013	22.8072	22.3629	23.7312	(38)
Heat transfer coeff	76.4734	74.9630	74.9630	74.0153	74.0153	71.8533	71.8533	71.4564	71.8533	73.5592	73.1150	74.4832	(39)
Average = Sum(39)m / 12 =												73.5503	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4432	2.3950	2.3950	2.3647	2.3647	2.2956	2.2956	2.2830	2.2956	2.3501	2.3359	2.3797	(40)
HLP (average)												2.3499	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.1991	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	49.8725	49.1196	48.0486	46.4447	44.9992	43.0093	41.4997	43.3457	44.3146	46.2862	48.3361	49.8329	(42b)
Hot water usage for other uses	26.9100	25.9314	24.9529	23.9743	22.9958	22.0173	22.0173	22.9958	23.9743	24.9529	25.9314	26.9100	(42c)
Average daily hot water use (litres/day)												70.7072	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	76.7825	75.0511	73.0015	70.4190	67.9950	65.0266	63.5169	66.3415	68.2889	71.2391	74.2676	76.7429	(44)
Energy conte	113.0370	99.3077	104.3176	91.9849	87.6184	75.2011	70.1881	78.0852	79.2117	91.7988	100.3751	112.7026	(45)
Energy content (annual)										Total = Sum(45)m =		1103.8283	
Distribution loss (46)m = 0.15 x (45)m	16.9556	14.8962	15.6476	13.7977	13.1428	11.2802	10.5282	11.7128	11.8818	13.7698	15.0563	16.9054	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	39.1275	34.5441	37.2008	34.7272	34.6495	32.0679	32.3675	33.8069	33.6767	36.3027	36.6251	39.1073	(61)
Total heat required for water heating calculated for each month	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(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	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
										Total per year (kWh/year) = Sum(64)m =		1528.0315	(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	47.3667	41.6558	43.9858	39.2668	37.7955	33.0213	31.4294	34.4151	34.7571	39.5988	42.5310	47.2504	(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	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	71.9460	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.0778	11.6156	9.4464	7.1516	5.3459	4.5132	4.8767	6.3389	8.5081	10.8029	12.6086	13.4413	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	149.8900	151.4454	147.5258	139.1816	128.6486	118.7489	112.1354	110.5800	114.4995	122.8438	133.3768	143.2764	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	43.3937	(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)	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	-47.9640	(71)
Water heating gains (Table 5)	63.6649	61.9879	59.1207	54.5372	50.8004	45.8630	42.2438	46.2568	48.2737	53.2241	59.0708	63.5087	(72)
Total internal gains	294.0084	292.4245	283.4687	268.2460	252.1705	236.5008	226.6316	230.5514	238.6570	254.2465	272.4320	287.6021	(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	
South	3.3600	54.0600	0.6300	0.7000	0.7700	55.5120	(78)
West	2.6000	23.7835	0.6300	0.7000	0.7700	18.8982	(80)

Solar gains	74.4103	111.5046	152.7305	193.1405	210.8045	221.1268	211.2089	197.5047	176.7725	132.7122	87.9724	63.9225	(83)
Total gains	368.4186	403.9291	436.1992	461.3865	462.9750	457.6276	437.8405	428.0561	415.4294	386.9587	360.4043	351.5246	(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	11.1675	11.3925	11.3925	11.5384	11.5384	11.8856	11.8856	11.9516	11.8856	11.6099	11.6805	11.4659	
alpha	1.7445	1.7595	1.7595	1.7692	1.7692	1.7924	1.7924	1.7968	1.7924	1.7740	1.7787	1.7644	
util living area	0.9114	0.8925	0.8592	0.8062	0.7250	0.5880	0.4502	0.4745	0.6641	0.8084	0.8838	0.9161	(86)
MIT	16.9953	17.3688	18.0449	18.8783	19.7268	20.4463	20.7802	20.7470	20.2103	19.1958	18.0228	17.0090	(87)
Th 2	19.7784	19.8025	19.8025	19.8176	19.8176	19.8522	19.8522	19.8585	19.8522	19.8249	19.8320	19.8102	(88)
util rest of house	0.9009	0.8800	0.8416	0.7793	0.6794	0.5086	0.3279	0.3572	0.5979	0.7766	0.8683	0.9063	(89)
MIT 2	16.1743	16.5551	17.2193	18.0392	18.8478	19.5133	19.7671	19.7520	19.3186	18.3608	17.2222	16.2067	(90)
Living area fraction										fLA = Living area / (4) =		0.4422	(91)
MIT	16.5374	16.9149	17.5844	18.4102	19.2365	19.9259	20.2151	20.1920	19.7129	18.7300	17.5762	16.5615	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.5374	16.9149	17.5844	18.4102	19.2365	19.9259	20.2151	20.1920	19.7129	18.7300	17.5762	16.5615	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8619	0.8388	0.7988	0.7395	0.6529	0.5143	0.3698	0.3945	0.5887	0.7395	0.8276	0.8686	(94)
Useful gains	317.5447	338.8014	348.4380	341.2183	302.2580	235.3556	161.9049	168.8596	244.5691	286.1416	298.2775	305.3178	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	889.9483	855.6951	770.9463	644.6874	483.8006	310.8283	187.9029	199.5054	353.0080	539.1899	714.7843	868.5827	(97)
Space heating kWh	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98a)
Space heating requirement - total per year (kWh/year)												2348.3542	
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	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2348.3542	
Space heating per m2											(98c) / (4) =	75.0273	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	425.8683	347.3526	314.3461	218.4977	135.0676	0.0000	0.0000	0.0000	0.0000	188.2679	299.8849	419.0691	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	510.6334	416.4899	376.9138	261.9877	161.9516	0.0000	0.0000	0.0000	0.0000	225.7409	359.5742	502.4809	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	152.1645	133.8518	141.5184	126.7121	122.2679	107.2690	102.5556	111.8921	112.8884	128.1014	137.0002	151.8099	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9613	85.8271	85.5382	85.0362	84.0940	79.8000	79.8000	79.8000	79.8000	84.7038	85.5102	85.9372	(217)
Fuel for water heating, kWh/month	177.0152	155.9551	165.4446	149.0096	145.3944	134.4223	128.5158	140.2157	141.4642	151.2346	160.2150	176.6522	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	11.4469	9.1831	8.2684	6.0578	4.6792	3.8230	4.2685	5.5484	7.2068	9.4557	10.6802	11.7651	(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	2815.7725	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1825.5387	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)

Electricity for lighting (calculated in Appendix L)	92.3832	(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	4778.6944	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2815.7725	5.6000	157.6833	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1825.5387	5.6000	102.2302	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	92.3832	26.0600	24.0751	(250)
Additional standing charges			99.0000	(251)
Total energy cost			394.7155	(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	2815.7725	0.2100	591.3122	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1825.5387	0.2100	383.3631	(264)
Space and water heating			974.6754	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	92.3832	0.1443	13.3338	(268)
Total CO2, kg/year			994.2512	(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	2815.7725	1.1300	3181.8229	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1825.5387	1.1300	2062.8588	(278)
Space and water heating			5244.6817	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	92.3832	1.5338	141.7004	(282)
Total Primary energy kWh/year			5454.4581	(286)

Summary for Input Data

Property Reference	Flat 4, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	68 D	**DER**	53.37	**TER**	
Environmental	69 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.71	**DFEE**	124.81	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	291.23	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	West	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	106.60	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	24.61 m	34.14 m²	2.76 m

8.0 Living Area	13.52	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Solid Brick	Solid Wall	Other	1.96	0.00	33.87	27.34	0.00	None	6.53	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	22.27	20.57	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	11.67	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	68.80
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	11.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	4.33	4.33	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Summary for Input Data

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	29.81

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	34.14

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW7E	Window	External Solid Brick	East	1.04	0
FW8E	Window	External Solid Brick	East	1.91	0
FW9E	Window	External Solid Brick	East	1.20	0
FW10S	Window	External Solid Brick	South	1.21	0
FW11S	Window	External Solid Brick	South	1.17	0
FD2W	Door	Corridor Brick Wall	West	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	
22.0 Lighting		
No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	33.33	15.00	500.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	10588	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	79.00	

Summary for Input Data

In Summer	76.40	
Model Name	24 HE	
Manufacturer	Baxi Potterton	
System Type	Regular boiler	
Controls SAP Code	2104	
Delayed Start Stat	No	
Burner Control	On/Off	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	No pump	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	No	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	
28.0 Water Heating		
Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From header tank	
Bath Count	1	
Supplementary Immersion	No	
Immersion Only Heating Hot Water	No	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	Hot Water Cylinder	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	
31.0 Thermal Store	None	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 4, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	68 D	**DER**	53.37	**TER**	
Environmental	69 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.71	**DFEE**	124.81	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	291.23	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			20.0000	596.2000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3341.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												97.8676	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		93.4359	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	118.4677	118.0994	117.7384	116.0428	115.7255	114.2487	114.2487	113.9752	114.8176	115.7255	116.3673	117.0383	(39)
Average = Sum(39)m / 12 =												116.0413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.4701	3.4593	3.4487	3.3990	3.3897	3.3465	3.3465	3.3385	3.3631	3.3897	3.4085	3.4282	(40)
HLP (average)												3.3990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
										Total per year (kWh/year) = Sum(64)m =		2568.3134	(64)
12Total per year (kWh/year)												2568	(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	123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741	(72)
Total internal gains	369.7659	375.3253	364.0880	355.7092	342.9582	258.9545	248.9649	251.4654	257.8130	340.7216	355.5261	364.8862	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	428.6811	479.7462	515.2790	552.9275	569.9455	486.1934	467.3175	447.8382	425.2533	458.6114	426.8936	414.7546	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	7.8343	7.8587	7.8828	7.9980	8.0199	8.1236	8.1236	8.1431	8.0834	8.0199	7.9757	7.9300	
alpha	1.5223	1.5239	1.5255	1.5332	1.5347	1.5416	1.5416	1.5429	1.5389	1.5347	1.5317	1.5287	
util living area	0.9220	0.9054	0.8820	0.8396	0.7784	0.7233	0.6285	0.6537	0.7760	0.8458	0.9009	0.9254	(86)
MIT	15.9655	16.3234	16.9970	17.9626	18.9513	19.7585	20.3164	20.2413	19.4938	18.3585	17.0242	15.9200	(87)
Th 2	19.2650	19.2704	19.2757	19.3005	19.3051	19.3268	19.3268	19.3308	19.3184	19.3051	19.2957	19.2859	(88)
util rest of house	0.9102	0.8909	0.8626	0.8100	0.7290	0.6380	0.4817	0.5164	0.7054	0.8115	0.8834	0.9142	(89)
MIT 2	14.8680	15.2228	15.8894	16.8474	17.8004	18.5750	19.0441	18.9940	18.3435	17.2479	15.9353	14.8350	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	15.3026	15.6587	16.3280	17.2891	18.2562	19.0437	19.5480	19.4880	18.7990	17.6877	16.3666	15.2647	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.3026	15.6587	16.3280	17.2891	18.2562	19.0437	19.5480	19.4880	18.7990	17.6877	16.3666	15.2647	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8686	0.8457	0.8145	0.7616	0.6890	0.6196	0.5057	0.5326	0.6762	0.7657	0.8384	0.8737	(94)
Useful gains	372.3387	405.7267	419.6900	421.1296	392.6975	301.2499	236.3146	238.5250	287.5628	351.1444	357.9100	362.3521	(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	1303.4575	1270.5914	1157.1367	973.4893	758.7171	507.6895	336.8012	351.9518	539.5309	820.2250	1078.3236	1294.9875	(97)
Space heating kWh	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98a)
Space heating requirement - total per year (kWh/year)												4054.1939	
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	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4054.1939	
Space heating per m2										(98c) / (4) =		118.7520	(99)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	876.9017	735.6824	694.5068	503.4164	344.7070	0.0000	0.0000	0.0000	0.0000	441.7671	656.5794	878.3300	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.7743	76.6761	76.4497	76.0092	75.3004	71.4000	71.4000	71.4000	71.4000	75.7340	76.4141	76.7789	(217)
Fuel for water heating, kWh/month	339.8815	303.6585	329.6511	308.7911	311.9853	211.1136	207.3717	218.6917	216.8626	315.8487	318.3924	339.4151	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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												5131.8911	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3421.6634	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												136.3573	(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	8734.9117	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5131.8911	0.2100	1077.6971	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3421.6634	0.2100	718.5493	(264)
Space and water heating			1796.2464	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1822.1691	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			53.3700	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5131.8911	1.1300	5799.0369	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3421.6634	1.1300	3866.4796	(278)
Space and water heating			9665.5165	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	136.3573	1.5338	209.1493	(282)
Total Primary energy kWh/year			9942.7419	(286)
Dwelling Primary energy Rate (DPER)			291.2300	(287)

Full SAP Calculation Printout

Property Reference	Flat 4, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	68 D	**DER**	53.37	**TER**	
Environmental	69 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.71	**DFEE**	124.81	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	291.23	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)

Party Ceiling 1	29.8100	30.0000	894.3000 (32b)
Internal Wall TImber	68.8000	9.0000	619.2000 (32c)
Internal Wall Brick	11.7000	75.0000	877.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	93.4359 (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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	118.4677	118.0994	117.7384	116.0428	115.7255	114.2487	114.2487	113.9752	114.8176	115.7255	116.3673	117.0383	(39)
Average = Sum(39)m / 12 =												116.0413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.4701	3.4593	3.4487	3.3990	3.3897	3.3465	3.3465	3.3385	3.3631	3.3897	3.4085	3.4282	(40)
HLP (average)												3.3990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	19.1913	18.9016	18.4895	17.8723	17.3160	16.5503	15.9694	16.6797	17.0526	17.8113	18.6001	19.1761	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												42.8327	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	46.7329	45.4417	44.0281	42.4094	40.8516	39.0844	38.5035	40.2153	41.5897	43.3499	45.1402	46.7177	(44)
Energy conte	68.7990	60.1286	62.9152	55.3972	52.6414	45.1998	42.5474	47.3342	48.2419	55.8607	61.0085	68.6084	(45)
Energy content (annual)										Total = Sum(45)m =		668.6824	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	58.4791	51.1093	53.4779	47.0876	44.7452	38.4198	36.1653	40.2341	41.0056	47.4816	51.8572	58.3171	(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	58.4791	51.1093	53.4779	47.0876	44.7452	38.4198	36.1653	40.2341	41.0056	47.4816	51.8572	58.3171	(64)
									Total per year (kWh/year) = Sum(64)m =			568.3800	(64)
12Total per year (kWh/year)												568	(64)
Electric shower(s)	36.3246	32.3655	35.3419	33.7263	34.3592	32.7753	33.8679	34.3592	33.7263	35.3419	34.6773	36.3246	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							413.1901	(64a)
Heat gains from water heating, kWh/month	23.7009	20.8687	22.2050	20.2035	19.7761	17.7988	17.5083	18.6483	18.6830	20.7059	21.6336	23.6604	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	31.8561	31.0546	29.8454	28.0604	26.5808	24.7205	23.5327	25.0649	25.9486	27.8305	30.0467	31.8017	(72)
Total internal gains	235.5950	241.7659	231.8946	225.9694	215.1384	208.0262	200.2883	200.7089	206.2172	212.2394	223.8070	230.8138	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	294.5101	346.1867	383.0856	423.1876	442.1257	435.2652	418.6408	397.0817	373.6575	330.1292	295.1745	280.6822	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.5333	8.5599	8.5861	8.7116	8.7355	8.8484	8.8484	8.8696	8.8045	8.7355	8.6873	8.6375	
alpha	1.5689	1.5707	1.5724	1.5808	1.5824	1.5899	1.5899	1.5913	1.5870	1.5824	1.5792	1.5758	
util living area	0.9568	0.9429	0.9244	0.8901	0.8397	0.7599	0.6688	0.6963	0.8129	0.9028	0.9436	0.9598	(86)
MIT	15.7090	16.0768	16.7606	17.7454	18.7622	19.7167	20.2862	20.2043	19.4402	18.1258	16.7674	15.6595	(87)
Th 2	18.5334	18.5379	18.5424	18.5638	18.5678	18.5868	18.5868	18.5903	18.5794	18.5678	18.5596	18.5512	(88)
util rest of house	0.9460	0.9284	0.9034	0.8549	0.7751	0.6278	0.4242	0.4693	0.7071	0.8640	0.9265	0.9498	(89)
MIT 2	14.1437	14.5080	15.1844	16.1574	17.1328	18.0027	18.4285	18.3871	17.7809	16.5463	15.2088	14.1039	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	14.7636	15.1293	15.8086	16.7863	17.7781	18.6815	19.1642	19.1067	18.4380	17.1718	15.8261	14.7199	(92)
Temperature adjustment												0.0000	
adjusted MIT	14.7636	15.1293	15.8086	16.7863	17.7781	18.6815	19.1642	19.1067	18.4380	17.1718	15.8261	14.7199	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9180	0.8956	0.8665	0.8160	0.7450	0.6349	0.5024	0.5353	0.6982	0.8291	0.8948	0.9232	(94)
Useful gains	270.3565	310.0473	331.9417	345.3333	329.3618	276.3360	210.3104	212.5708	260.8933	273.7085	264.1352	259.1192	(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	1239.6011	1208.0686	1095.9785	915.1472	703.3884	466.3012	292.9548	308.4999	498.0791	760.5279	1015.4286	1231.2329	(97)
Space heating kWh	721.1180	603.4703	568.4434	410.2660	278.2758	0.0000	0.0000	0.0000	0.0000	362.1936	540.9312	723.2526	(98a)
Space heating requirement - total per year (kWh/year)												4207.9511	
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	721.1180	603.4703	568.4434	410.2660	278.2758	0.0000	0.0000	0.0000	0.0000	362.1936	540.9312	723.2526	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4207.9511	
Space heating per m2											(98c) / (4) =	123.2557	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1073.9380	845.4406	866.2119	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.3747	0.4333	0.4106	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	402.4468	366.3674	355.6713	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	490.8234	472.5794	448.3125	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	63.6311	79.0217	68.9250	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	15.9078	19.7554	17.2313	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												52.8945	(107)
Energy for space heating												123.2557	(99)
Energy for space cooling												1.5493	(108)
Total												124.8051	(109)
Fabric Energy Efficiency (DFEE)												124.8	(109)

Full SAP Calculation Printout

Property Reference	Flat 4, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	68 D	**DER**	53.37	**TER**	
Environmental	69 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.71	**DFEE**	124.81	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	291.23	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			20.0000	596.2000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3341.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												97.8676	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		93.4359	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	118.4677	118.0994	117.7384	116.0428	115.7255	114.2487	114.2487	113.9752	114.8176	115.7255	116.3673	117.0383	(39)
Average = Sum(39)m / 12 =												116.0413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.4701	3.4593	3.4487	3.3990	3.3897	3.3465	3.3465	3.3385	3.3631	3.3897	3.4085	3.4282	(40)
HLP (average)												3.3990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
										Total per year (kWh/year) = Sum(64)m =		2568.3134	(64)
12Total per year (kWh/year)												2568	(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	123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741	(72)
Total internal gains	369.7659	375.3253	364.0880	355.7092	342.9582	258.9545	248.9649	251.4654	257.8130	340.7216	355.5261	364.8862	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	428.6811	479.7462	515.2790	552.9275	569.9455	486.1934	467.3175	447.8382	425.2533	458.6114	426.8936	414.7546	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	7.8343	7.8587	7.8828	7.9980	8.0199	8.1236	8.1236	8.1431	8.0834	8.0199	7.9757	7.9300	
alpha	1.5223	1.5239	1.5255	1.5332	1.5347	1.5416	1.5416	1.5429	1.5389	1.5347	1.5317	1.5287	
util living area	0.9220	0.9054	0.8820	0.8396	0.7784	0.7233	0.6285	0.6537	0.7760	0.8458	0.9009	0.9254	(86)
MIT	15.9655	16.3234	16.9970	17.9626	18.9513	19.7585	20.3164	20.2413	19.4938	18.3585	17.0242	15.9200	(87)
Th 2	19.2650	19.2704	19.2757	19.3005	19.3051	19.3268	19.3268	19.3308	19.3184	19.3051	19.2957	19.2859	(88)
util rest of house	0.9102	0.8909	0.8626	0.8100	0.7290	0.6380	0.4817	0.5164	0.7054	0.8115	0.8834	0.9142	(89)
MIT 2	14.8680	15.2228	15.8894	16.8474	17.8004	18.5750	19.0441	18.9940	18.3435	17.2479	15.9353	14.8350	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	15.3026	15.6587	16.3280	17.2891	18.2562	19.0437	19.5480	19.4880	18.7990	17.6877	16.3666	15.2647	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.3026	15.6587	16.3280	17.2891	18.2562	19.0437	19.5480	19.4880	18.7990	17.6877	16.3666	15.2647	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8686	0.8457	0.8145	0.7616	0.6890	0.6196	0.5057	0.5326	0.6762	0.7657	0.8384	0.8737	(94)
Useful gains	372.3387	405.7267	419.6900	421.1296	392.6975	301.2499	236.3146	238.5250	287.5628	351.1444	357.9100	362.3521	(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	1303.4575	1270.5914	1157.1367	973.4893	758.7171	507.6895	336.8012	351.9518	539.5309	820.2250	1078.3236	1294.9875	(97)
Space heating kWh	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98a)
Space heating requirement - total per year (kWh/year)												4054.1939	
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	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4054.1939	
Space heating per m2										(98c) / (4) =		118.7520	(99)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
Space heating requirement	692.7524	581.1891	548.6604	397.6990	272.3186	0.0000	0.0000	0.0000	0.0000	348.9960	518.6978	693.8807	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	876.9017	735.6824	694.5068	503.4164	344.7070	0.0000	0.0000	0.0000	0.0000	441.7671	656.5794	878.3300	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.7743	76.6761	76.4497	76.0092	75.3004	71.4000	71.4000	71.4000	71.4000	75.7340	76.4141	76.7789	(217)
Fuel for water heating, kWh/month	339.8815	303.6585	329.6511	308.7911	311.9853	211.1136	207.3717	218.6917	216.8626	315.8487	318.3924	339.4151	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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												5131.8911	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3421.6634	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												136.3573	(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	8734.9117	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5131.8911	0.2100	1077.6971	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3421.6634	0.2100	718.5493	(264)
Space and water heating			1796.2464	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1822.1691	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			53.3700	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5131.8911	1.1300	5799.0369	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3421.6634	1.1300	3866.4796	(278)
Space and water heating			9665.5165	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	136.3573	1.5338	209.1493	(282)
Total Primary energy kWh/year			9942.7419	(286)
Dwelling Primary energy Rate (DPER)			291.2300	(287)

Full SAP Calculation Printout

Property Reference	Flat 4, Existing	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Existing	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	68 D	**DER**	53.37	**TER**	
Environmental	69 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.71	**DFEE**	124.81	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	291.23	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3639.3000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												106.5993	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	93.4359	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	118.4677	118.0994	117.7384	116.0428	115.7255	114.2487	114.2487	113.9752	114.8176	115.7255	116.3673	117.0383	(39)
Average = Sum(39)m / 12 =												116.0413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.4701	3.4593	3.4487	3.3990	3.3897	3.3465	3.3465	3.3385	3.3631	3.3897	3.4085	3.4282	(40)
HLP (average)												3.3990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
										Total per year (kWh/year) = Sum(64)m =		2568.3134	(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	123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.3028	17.1446	13.9429	10.5557	7.8905	6.6615	7.1980	9.3562	12.5579	15.9451	18.6103	19.8393	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741	(72)
Total internal gains	414.2613	412.3492	402.3913	385.8646	368.5639	278.0230	268.0652	272.1764	281.2821	372.3385	391.6927	407.5900	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	473.1765	516.7701	553.5823	583.0829	595.5512	505.2620	486.4178	468.5492	448.7223	490.2284	463.0602	457.4584	(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	8.5333	8.5599	8.5861	8.7116	8.7355	8.8484	8.8484	8.8696	8.8045	8.7355	8.6873	8.6375	
alpha	1.5689	1.5707	1.5724	1.5808	1.5824	1.5899	1.5899	1.5913	1.5870	1.5824	1.5792	1.5758	
util living area													
	0.9173	0.9025	0.8783	0.8374	0.7764	0.7213	0.6240	0.6482	0.7716	0.8413	0.8969	0.9211	(86)
MIT	16.1838	16.5142	17.1744	18.0989	19.0514	19.8246	20.3616	20.2918	19.5759	18.4888	17.1998	16.1377	(87)
Th 2	19.2650	19.2704	19.2757	19.3005	19.3051	19.3268	19.3268	19.3308	19.3184	19.3051	19.2957	19.2859	(88)
util rest of house													
	0.9045	0.8873	0.8579	0.8068	0.7257	0.6342	0.4748	0.5083	0.6987	0.8055	0.8783	0.9090	(89)
MIT 2	15.0709	15.3985	16.0508	16.9675	17.8833	18.6229	19.0686	19.0230	18.4063	17.3608	16.0953	15.0376	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	15.5116	15.8404	16.4957	17.4156	18.3459	19.0988	19.5806	19.5255	18.8695	17.8075	16.5327	15.4733	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5116	15.8404	16.4957	17.4156	18.3459	19.0988	19.5806	19.5255	18.8695	17.8075	16.5327	15.4733	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8628	0.8428	0.8111	0.7606	0.6885	0.6191	0.5025	0.5285	0.6730	0.7618	0.8341	0.8683	(94)
Useful gains	408.2728	435.5525	448.9976	443.4817	410.0485	312.8215	244.4257	247.6409	302.0085	373.4679	386.2585	397.2209	(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	1328.2170	1292.0503	1176.8822	988.1718	769.0981	513.9830	340.5323	356.2254	547.6221	834.0948	1097.6576	1319.4029	(97)
Space heating kWh	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98a)
Space heating requirement - total per year (kWh/year)												4001.8780	
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	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4001.8780	
Space heating per m2											(98c) / (4) =	117.2196	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	866.3779	728.5653	685.5014	496.4263	338.1429	0.0000	0.0000	0.0000	0.0000	433.8056	648.3637	868.4854	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.7552	76.6604	76.4276	75.9838	75.2639	71.4000	71.4000	71.4000	71.4000	75.7001	76.3926	76.7611	(217)
Fuel for water heating, kWh/month	339.9658	303.7208	329.7467	308.8944	312.1367	211.1136	207.3717	218.6917	216.8626	315.9902	318.4821	339.4937	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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												5065.6684	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												76.4000	
Water heating fuel used												3422.4699	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												136.3573	(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	8669.4956	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5065.6684	3.6400	184.3903	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3422.4699	3.6400	124.5779	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	136.3573	16.4900	22.4853	(250)
Additional standing charges			92.0000	(251)
Total energy cost			430.8740	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.9600	(257)
SAP value		68.2283	
SAP rating (Section 12)		68	(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	5065.6684	0.2100	1063.7904	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3422.4699	0.2100	718.7187	(264)
Space and water heating			1782.5090	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1808.4317	(272)
CO2 emissions per m2			52.9700	(273)
EI value			69.3796	
EI rating			69	(274)
EI band			C	

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)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n) 34.1400						(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate													
	0.6738	0.6279	0.6279	0.5973	0.5973	0.5207	0.5207	0.5054	0.5207	0.5820	0.5666	0.6126	(22b)
Effective ac	0.7270	0.6971	0.6971	0.6784	0.6784	0.6356	0.6356	0.6277	0.6356	0.6693	0.6605	0.6876	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)
Internal Wall Brick			11.7000			75.0000	877.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	93.4359 (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	22.6069	21.6770	21.6770	21.0936	21.0936	19.7627	19.7627	19.5183	19.7627	20.8128	20.5393	21.3817	(38)
Heat transfer coeff													
	116.0428	115.1129	115.1129	114.5295	114.5295	113.1986	113.1986	112.9542	113.1986	114.2487	113.9752	114.8176	(39)
Average = Sum(39)m / 12 =												114.2433	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.3990	3.3718	3.3718	3.3547	3.3547	3.3157	3.3157	3.3086	3.3157	3.3465	3.3385	3.3631	(40)
HLP (average)												3.3463	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.2608 (42)
Hot water usage for mixer showers		
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000		(42a)
Hot water usage for baths		
51.0432 50.2726 49.1765 47.5349 46.0555 44.0189 42.4738 44.3632 45.3548 47.3727 49.4708 51.0027		(42b)
Hot water usage for other uses		
27.5416 26.5401 25.5386 24.5371 23.5356 22.5341 22.5341 23.5356 24.5371 25.5386 26.5401 27.5416		(42c)
Average daily hot water use (litres/day)		72.3670 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m													
	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Store volume												150.0000	(47)
a) If manufacturer declared loss factor is known (kWh/day):												1.6100	(48)
Temperature factor from Table 2b												0.7800	(49)
Enter (49) or (54) in (55)												1.2558	(55)
Total storage loss													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)
If cylinder contains dedicated solar storage													
	38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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													
	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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													
	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
									Total per year (kWh/year) = Sum(64)m =			2568.3134	(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													
	123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	19.3028	17.1446	13.9429	10.5557	7.8905	6.6615	7.1980	9.3562	12.5579	15.9451	18.6103	19.8393	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)													
	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)

Water heating gains (Table 5)

	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741 (72)
Total internal gains												
	414.2613	412.3492	402.3913	385.8646	368.5639	278.0230	268.0652	272.1764	281.2821	372.3385	391.6927	407.5900 (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	
East	4.1500	23.7835	0.6300	0.7000	0.7700	30.1645	(76)
South	2.3800	54.0600	0.6300	0.7000	0.7700	39.3210	(78)

Solar gains	69.4855	107.6520	154.9763	205.9191	231.6992	245.7811	233.6640	213.6023	183.1699	130.4987	82.9220	59.1554 (83)
Total gains	483.7468	520.0013	557.3676	591.7837	600.2631	523.8041	501.7292	485.7787	464.4520	502.8372	474.6148	466.7454 (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	8.7116	8.7820	8.7820	8.8267	8.8267	8.9305	8.9305	8.9498	8.9305	8.8484	8.8696	8.8045	
alpha	1.5808	1.5855	1.5855	1.5884	1.5884	1.5954	1.5954	1.5967	1.5954	1.5899	1.5913	1.5870	
util living area	0.9097	0.8953	0.8666	0.8196	0.7448	0.6613	0.5318	0.5595	0.7338	0.8193	0.8851	0.9134	(86)
MIT	16.4758	16.7975	17.5135	18.4114	19.3892	20.1452	20.6191	20.5641	19.8349	18.8052	17.5183	16.4587	(87)
Th 2	19.3005	19.3141	19.3141	19.3226	19.3226	19.3421	19.3421	19.3457	19.3421	19.3268	19.3308	19.3184	(88)
util rest of house	0.8956	0.8789	0.8438	0.7844	0.6833	0.5485	0.3340	0.3724	0.6456	0.7768	0.8639	0.8999	(89)
MIT 2	15.3795	15.7028	16.4054	17.2821	18.2083	18.9022	19.2466	19.2201	18.6505	17.6762	16.4277	15.3736	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	15.8136	16.1363	16.8443	17.7293	18.6760	19.3945	19.7901	19.7523	19.1195	18.1233	16.8596	15.8033	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8136	16.1363	16.8443	17.7293	18.6760	19.3945	19.7901	19.7523	19.1195	18.1233	16.8596	15.8033	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8527	0.8339	0.7969	0.7399	0.6533	0.5528	0.3974	0.4275	0.6304	0.7357	0.8190	0.8579	(94)
Useful gains	412.5032	433.6065	444.1475	437.8670	392.1641	289.5772	199.4039	207.6530	292.7997	369.9330	388.7087	400.4185	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1266.4487	1224.3808	1098.6667	919.5969	684.4259	429.5270	247.9194	265.7051	488.9657	768.1300	1032.5684	1251.8902	(97)
Space heating kWh	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98a)
Space heating requirement - total per year (kWh/year)												3611.3188	
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	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3611.3188	
Space heating per m2											(98c) / (4) =	105.7797	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	79.0000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	804.2221	672.6586	616.4079	439.0450	275.2440	0.0000	0.0000	0.0000	0.0000	375.0109	586.8088	801.8922	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.6357	76.5291	76.2438	75.7578	74.8737	71.4000	71.4000	71.4000	71.4000	75.4260	76.2192	76.6331	(217)
Fuel for water heating, kWh/month	340.4960	304.2416	330.5415	309.8160	313.7635	211.1136	207.3717	218.6917	216.8626	317.1384	319.2068	340.0608	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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	4571.2897	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3429.3042	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	136.3573	(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	8181.9511	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4571.2897	5.6000	255.9922	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3429.3042	5.6000	192.0410	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	136.3573	26.0600	35.5347	(250)
Additional standing charges			99.0000	(251)
Total energy cost			594.2950	(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	4571.2897	0.2100	959.9708	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3429.3042	0.2100	720.1539	(264)
Space and water heating			1680.1247	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1706.0473	(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	4571.2897	1.1300	5165.5573	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3429.3042	1.1300	3875.1137	(278)
Space and water heating			9040.6711	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	136.3573	1.5338	209.1493	(282)
Total Primary energy kWh/year			9317.8964	(286)

SAP 10 EPC IMPROVEMENTS

Flat 4, Existing

Current energy efficiency rating:	D 68
Current environmental impact rating:	C 69

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	D 68
Potential environmental impact rating:	C 69

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£47	£47	£0
Mains gas	£547	£547	£0
Space heating	£367	£367	£0
Water heating	£192	£192	£0
Lighting	£36	£36	£0
Total cost of fuels	£594	£594	£0
Total cost of uses	£595	£595	£0
Delivered energy	240 kWh/m²	240 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.7 tonnes	1.7 tonnes	0.0 tonnes
CO2 emissions per m²	50 kg/m²	50 kg/m²	0 kg/m²
Primary energy	273 kWh/m²	273 kWh/m²	0 kWh/m²

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)	
Ground floor	34.1400 (1b)	x	2.7600 (2b)	=	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.6623	(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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)
Internal Wall Brick			11.7000			75.0000	877.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	93.4359 (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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	118.4677	118.0994	117.7384	116.0428	115.7255	114.2487	114.2487	113.9752	114.8176	115.7255	116.3673	117.0383	(39)
Average = Sum(39)m / 12 =												116.0413	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.4701	3.4593	3.4487	3.3990	3.3897	3.3465	3.3465	3.3385	3.3631	3.3897	3.4085	3.4282	(40)
HLP (average)												3.3990	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2608 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)

Hot water usage for other uses

27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)

Average daily hot water use (litres/day) 72.3670 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)

Water storage loss:

Store volume 150.0000 (47)

a) If manufacturer declared loss factor is known (kWh/day): 1.6100 (48)

Temperature factor from Table 2b 0.7800 (49)

Enter (49) or (54) in (55) 1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)
Primary loss 106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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

260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
									Total per year (kWh/year) = Sum(64)m =		2568.3134	(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

123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.3028	17.1446	13.9429	10.5557	7.8905	6.6615	7.1980	9.3562	12.5579	15.9451	18.6103	19.8393	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741	(72)
Total internal gains	414.2613	412.3492	402.3913	385.8646	368.5639	278.0230	268.0652	272.1764	281.2821	372.3385	391.6927	407.5900	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	473.1765	516.7701	553.5823	583.0829	595.5512	505.2620	486.4178	468.5492	448.7223	490.2284	463.0602	457.4584	(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	8.5333	8.5599	8.5861	8.7116	8.7355	8.8484	8.8484	8.8696	8.8045	8.7355	8.6873	8.6375	
alpha	1.5689	1.5707	1.5724	1.5808	1.5824	1.5899	1.5899	1.5913	1.5870	1.5824	1.5792	1.5758	
util living area	0.9173	0.9025	0.8783	0.8374	0.7764	0.7213	0.6240	0.6482	0.7716	0.8413	0.8969	0.9211	(86)

MIT	16.1838	16.5142	17.1744	18.0989	19.0514	19.8246	20.3616	20.2918	19.5759	18.4888	17.1998	16.1377	(87)
Th 2	19.2650	19.2704	19.2757	19.3005	19.3051	19.3268	19.3268	19.3308	19.3184	19.3051	19.2957	19.2859	(88)
util rest of house	0.9045	0.8873	0.8579	0.8068	0.7257	0.6342	0.4748	0.5083	0.6987	0.8055	0.8783	0.9090	(89)
MIT 2	15.0709	15.3985	16.0508	16.9675	17.8833	18.6229	19.0686	19.0230	18.4063	17.3608	16.0953	15.0376	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	15.5116	15.8404	16.4957	17.4156	18.3459	19.0988	19.5806	19.5255	18.8695	17.8075	16.5327	15.4733	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5116	15.8404	16.4957	17.4156	18.3459	19.0988	19.5806	19.5255	18.8695	17.8075	16.5327	15.4733	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8628	0.8428	0.8111	0.7606	0.6885	0.6191	0.5025	0.5285	0.6730	0.7618	0.8341	0.8683	(94)
Useful gains	408.2728	435.5525	448.9976	443.4817	410.0485	312.8215	244.4257	247.6409	302.0085	373.4679	386.2585	397.2209	(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	1328.2170	1292.0503	1176.8822	988.1718	769.0981	513.9830	340.5323	356.2254	547.6221	834.0948	1097.6576	1319.4029	(97)
Space heating kWh	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98a)
Space heating requirement - total per year (kWh/year)												4001.8780	
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	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4001.8780	
Space heating per m2											(98c) / (4) =	117.2196	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												79.0000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	684.4385	575.5666	541.5461	392.1768	267.1329	0.0000	0.0000	0.0000	0.0000	342.7064	512.2073	686.1035	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	866.3779	728.5653	685.5014	496.4263	338.1429	0.0000	0.0000	0.0000	0.0000	433.8056	648.3637	868.4854	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.7552	76.6604	76.4276	75.9838	75.2639	71.4000	71.4000	71.4000	71.4000	75.7001	76.3926	76.7611	(217)
Fuel for water heating, kWh/month	339.9658	303.7208	329.7467	308.8944	312.1367	211.1136	207.3717	218.6917	216.8626	315.9902	318.4821	339.4937	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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	5065.6684	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3422.4699	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	136.3573	(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	8669.4956	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5065.6684	3.6400	184.3903	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3422.4699	3.6400	124.5779	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	136.3573	16.4900	22.4853	(250)
Additional standing charges			92.0000	(251)
Total energy cost			430.8740	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.9600	(257)
SAP value		68.2283	
SAP rating (Section 12)		68	(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	5065.6684	0.2100	1063.7904	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3422.4699	0.2100	718.7187	(264)
Space and water heating			1782.5090	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1808.4317	(272)
CO2 emissions per m2			52.9700	(273)
EI value			69.3796	
EI rating			69	(274)
EI band			C	

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)	
Ground floor	34.1400	(1b) x	2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6738	0.6279	0.6279	0.5973	0.5973	0.5207	0.5207	0.5054	0.5207	0.5820	0.5666	0.6126	(22b)
Effective ac	0.7270	0.6971	0.6971	0.6784	0.6784	0.6356	0.6356	0.6277	0.6356	0.6693	0.6605	0.6876	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	1.9600	53.5864	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		81.3419			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)
Internal Wall Brick			11.7000			75.0000	877.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	93.4359 (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	22.6069	21.6770	21.6770	21.0936	21.0936	19.7627	19.7627	19.5183	19.7627	20.8128	20.5393	21.3817	(38)
Heat transfer coeff	116.0428	115.1129	115.1129	114.5295	114.5295	113.1986	113.1986	112.9542	113.1986	114.2487	113.9752	114.8176	(39)

Average = Sum(39)m / 12 = 114.2433

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	3.3990	3.3718	3.3718	3.3547	3.3547	3.3157	3.3157	3.3086	3.3157	3.3465	3.3385	3.3631	(40)
HLP (average)												3.3463	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2608 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)

Hot water usage for other uses

27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)

Average daily hot water use (litres/day) 72.3670 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)

Water storage loss:

Store volume	150.0000 (47)
a) If manufacturer declared loss factor is known (kWh/day):	1.6100 (48)
Temperature factor from Table 2b	0.7800 (49)
Enter (49) or (54) in (55)	1.2558 (55)

Total storage loss

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(56)

If cylinder contains dedicated solar storage

38.9298	35.1624	38.9298	37.6740	38.9298	37.6740	38.9298	38.9298	37.6740	38.9298	37.6740	38.9298	(57)

Primary loss	106.3213	96.0322	106.3213	102.8916	106.3213	36.0948	37.2980	37.2980	36.0948	106.3213	102.8916	106.3213	(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

260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(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

260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)

Total per year (kWh/year) = Sum(64)m = 2568.3134 (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

123.5241	110.6206	120.5569	113.6162	114.8740	54.4671	53.7237	56.4111	55.8320	116.2966	116.4714	123.4103	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	19.3028	17.1446	13.9429	10.5557	7.8905	6.6615	7.1980	9.3562	12.5579	15.9451	18.6103	19.8393	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	166.0270	164.6141	162.0388	157.8003	154.4006	75.6488	72.2093	75.8214	77.5444	156.3127	161.7659	165.8741	(72)
Total internal gains	414.2613	412.3492	402.3913	385.8646	368.5639	278.0230	268.0652	272.1764	281.2821	372.3385	391.6927	407.5900	(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	
East	4.1500	23.7835	0.6300	0.7000	0.7700	30.1645	(76)
South	2.3800	54.0600	0.6300	0.7000	0.7700	39.3210	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	69.4855	107.6520	154.9763	205.9191	231.6992	245.7811	233.6640	213.6023	183.1699	130.4987	82.9220	59.1554	(83)
Total gains	483.7468	520.0013	557.3676	591.7837	600.2631	523.8041	501.7292	485.7787	464.4520	502.8372	474.6148	466.7454	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.7116	8.7820	8.7820	8.8267	8.8267	8.9305	8.9305	8.9498	8.9305	8.8484	8.8696	8.8045	
alpha	1.5808	1.5855	1.5855	1.5884	1.5884	1.5954	1.5954	1.5967	1.5954	1.5899	1.5913	1.5870	
util living area	0.9097	0.8953	0.8666	0.8196	0.7448	0.6613	0.5318	0.5595	0.7338	0.8193	0.8851	0.9134	(86)
MIT	16.4758	16.7975	17.5135	18.4114	19.3892	20.1452	20.6191	20.5641	19.8349	18.8052	17.5183	16.4587	(87)
Th 2	19.3005	19.3141	19.3141	19.3226	19.3226	19.3421	19.3421	19.3457	19.3421	19.3268	19.3308	19.3184	(88)
util rest of house	0.8956	0.8789	0.8438	0.7844	0.6833	0.5485	0.3340	0.3724	0.6456	0.7768	0.8639	0.8999	(89)
MIT 2	15.3795	15.7028	16.4054	17.2821	18.2083	18.9022	19.2466	19.2201	18.6505	17.6762	16.4277	15.3736	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	15.8136	16.1363	16.8443	17.7293	18.6760	19.3945	19.7901	19.7523	19.1195	18.1233	16.8596	15.8033	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.8136	16.1363	16.8443	17.7293	18.6760	19.3945	19.7901	19.7523	19.1195	18.1233	16.8596	15.8033	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8527	0.8339	0.7969	0.7399	0.6533	0.5528	0.3974	0.4275	0.6304	0.7357	0.8190	0.8579	(94)
Useful gains	412.5032	433.6065	444.1475	437.8670	392.1641	289.5772	199.4039	207.6530	292.7997	369.9330	388.7087	400.4185	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1266.4487	1224.3808	1098.6667	919.5969	684.4259	429.5270	247.9194	265.7051	488.9657	768.1300	1032.5684	1251.8902	(97)
Space heating kWh	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98a)
Space heating requirement - total per year (kWh/year)												3611.3188	
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	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3611.3188	
Space heating per m2											(98c) / (4) =	105.7797	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	79.0000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	635.3355	531.4003	486.9623	346.8456	217.4428	0.0000	0.0000	0.0000	0.0000	296.2586	463.5790	633.4949	(98)
Space heating efficiency (main heating system 1)	79.0000	79.0000	79.0000	79.0000	79.0000	0.0000	0.0000	0.0000	0.0000	79.0000	79.0000	79.0000	(210)
Space heating fuel (main heating system)	804.2221	672.6586	616.4079	439.0450	275.2440	0.0000	0.0000	0.0000	0.0000	375.0109	586.8088	801.8922	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	260.9415	232.8334	252.0175	234.7097	234.9263	150.7351	148.0634	156.1459	154.8399	239.2047	243.2968	260.5992	(64)
Efficiency of water heater												76.4000	(216)
(217)m	76.6357	76.5291	76.2438	75.7578	74.8737	71.4000	71.4000	71.4000	71.4000	75.4260	76.2192	76.6331	(217)
Fuel for water heating, kWh/month	340.4960	304.2416	330.5415	309.8160	313.7635	211.1136	207.3717	218.6917	216.8626	317.1384	319.2068	340.0608	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	16.8956	13.5543	12.2041	8.9413	6.9065	5.6427	6.3003	8.1894	10.6372	13.9566	15.7640	17.3652	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	4571.2897	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	76.4000	
Water heating fuel used	3429.3042	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	136.3573	(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	8181.9511	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4571.2897	5.6000	255.9922	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3429.3042	5.6000	192.0410	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	136.3573	26.0600	35.5347	(250)
Additional standing charges			99.0000	(251)
Total energy cost			594.2950	(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	4571.2897	0.2100	959.9708	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	3429.3042	0.2100	720.1539	(264)
Space and water heating			1680.1247	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	136.3573	0.1443	19.6806	(268)
Total CO2, kg/year			1706.0473	(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	4571.2897	1.1300	5165.5573	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	3429.3042	1.1300	3875.1137	(278)
Space and water heating			9040.6711	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	136.3573	1.5338	209.1493	(282)
Total Primary energy kWh/year			9317.8964	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 4, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	79 C	**DER**	30.63	**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.96	**DFEE**	75.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	168.02	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	West	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	106.60	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	24.61 m	34.14 m²	2.76 m

8.0 Living Area	13.52	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
External Solid Brick	Solid Wall	Other	0.31	0.00	33.87	27.34	0.00	None	6.53	Enter Gross Area
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	22.27	20.57	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	11.67	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	68.80
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	11.70

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	4.33	4.33	None	0.00	Enter Gross Area	0.00

10.1 Party Ceilings

Summary for Input Data

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Party Ceiling 1	Timber I-joists, carpeted	20.00	29.81

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	34.14

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW7E	Window	External Solid Brick	East	1.04	0
FW8E	Window	External Solid Brick	East	1.91	0
FW9E	Window	External Solid Brick	East	1.20	0
FW10S	Window	External Solid Brick	South	1.21	0
FW11S	Window	External Solid Brick	South	1.17	0
FD2W	Door	Corridor Brick Wall	West	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	
22.0 Lighting		
No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	83.40	

Summary for Input Data

In Summer	79.80
Model Name	ECO COMPACT 25 COMBI
Manufacturer	Baxi Heating
System Type	Combi boiler
Controls SAP Code	2104
Delayed Start Stat	No
Burner Control	Modulating
HETAS approved System	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No
28.3 Waste Water Heat Recovery System	
29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 4, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	79 C	**DER**	30.63	**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.96	**DFEE**	75.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	168.02	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			20.0000	596.2000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3341.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												97.8676	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	48.3249	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	73.3567	72.9884	72.6274	70.9318	70.6145	69.1377	69.1377	68.8642	69.7066	70.6145	71.2563	71.9273	(39)
Average = Sum(39)m / 12 =												70.9303	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1487	2.1379	2.1273	2.0777	2.0684	2.0251	2.0251	2.0171	2.0418	2.0684	2.0872	2.1068	(40)
HLP (average)												2.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)											Total = Sum(45)m =	1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
											Total per year (kWh/year) = Sum(64)m =	1563.8996	(64)
12Total per year (kWh/year)												1564	(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	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains	268.8982	274.1542	262.5577	253.7263	240.5505	230.2452	219.9911	222.9866	229.6755	238.8824	254.2177	264.0116	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	327.8134	378.5750	413.7487	450.9446	467.5378	457.4842	438.3436	419.3594	397.1157	356.7723	325.5852	313.8800	(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	12.6520	12.7159	12.7791	13.0846	13.1433	13.4241	13.4241	13.4774	13.3145	13.1433	13.0250	12.9035	
alpha	1.8435	1.8477	1.8519	1.8723	1.8762	1.8949	1.8949	1.8985	1.8876	1.8762	1.8683	1.8602	
util living area													
	0.9340	0.9129	0.8843	0.8312	0.7558	0.6436	0.5311	0.5605	0.7142	0.8483	0.9124	0.9384	(86)
MIT	16.9087	17.2954	17.9217	18.8036	19.6183	20.3172	20.6708	20.6221	20.0942	19.0333	17.8584	16.8827	(87)
Th 2	19.9256	19.9310	19.9363	19.9612	19.9658	19.9874	19.9874	19.9914	19.9791	19.9658	19.9564	19.9466	(88)
util rest of house													
	0.9269	0.9036	0.8713	0.8106	0.7218	0.5857	0.4437	0.4765	0.6639	0.8258	0.9016	0.9318	(89)
MIT 2	16.1749	16.5592	17.1799	18.0575	18.8443	19.5054	19.8042	19.7718	19.3083	18.2953	17.1358	16.1614	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	16.4655	16.8508	17.4737	18.3530	19.1508	19.8269	20.1474	20.1085	19.6195	18.5876	17.4220	16.4470	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4655	16.8508	17.4737	18.3530	19.1508	19.8269	20.1474	20.1085	19.6195	18.5876	17.4220	16.4470	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8940	0.8665	0.8312	0.7709	0.6901	0.5754	0.4587	0.4872	0.6433	0.7875	0.8654	0.9004	(94)
Useful gains	293.0646	328.0535	343.8937	347.6195	322.6425	263.2258	201.0876	204.3074	255.4667	280.9516	281.7685	282.6148	(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													
	892.4190	872.2671	796.9897	670.5156	526.1355	361.3740	245.2594	255.3860	384.7450	564.0393	735.5064	880.8967	(97)
Space heating kWh													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98a)
Space heating requirement - total per year (kWh/year)												2515.0489	
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													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2515.0489	
Space heating per m2											(98c) / (4) =	73.6687	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	534.6759	438.5030	404.2007	278.7593	181.5333	0.0000	0.0000	0.0000	0.0000	252.5387	391.7162	533.7191	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0009	85.8779	85.6267	85.1154	84.2894	79.8000	79.8000	79.8000	79.8000	84.8900	85.6287	86.0019	(217)
Fuel for water heating, kWh/month													
	181.0868	159.5216	169.1533	152.3654	148.4623	137.5776	131.5325	143.5070	144.7848	154.4450	163.7489	180.6628	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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	3015.6461	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1866.8482	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	98.4886	(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	5025.9829	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3015.6461	0.2100	633.2857	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1866.8482	0.2100	392.0381	(264)
Space and water heating			1025.3238	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			1045.7808	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			30.6300	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3015.6461	1.1300	3407.6801	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1866.8482	1.1300	2109.5384	(278)
Space and water heating			5517.2185	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	98.4886	1.5338	151.0651	(282)
Total Primary energy kWh/year			5736.3597	(286)
Dwelling Primary energy Rate (DPER)			168.0200	(287)

Full SAP Calculation Printout

Property Reference	Flat 4, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	79 C	**DER**	30.63	**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.96	**DFEE**	75.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	168.02	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)

Party Ceiling 1	29.8100	30.0000	894.3000 (32b)
Internal Wall TImber	68.8000	9.0000	619.2000 (32c)
Internal Wall Brick	11.7000	75.0000	877.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	48.3249 (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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	73.3567	72.9884	72.6274	70.9318	70.6145	69.1377	69.1377	68.8642	69.7066	70.6145	71.2563	71.9273	(39)
Average = Sum(39)m / 12 =												70.9303	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1487	2.1379	2.1273	2.0777	2.0684	2.0251	2.0251	2.0171	2.0418	2.0684	2.0872	2.1068	(40)
HLP (average)												2.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	19.1913	18.9016	18.4895	17.8723	17.3160	16.5503	15.9694	16.6797	17.0526	17.8113	18.6001	19.1761	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												42.8327	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	46.7329	45.4417	44.0281	42.4094	40.8516	39.0844	38.5035	40.2153	41.5897	43.3499	45.1402	46.7177	(44)
Energy conte	68.7990	60.1286	62.9152	55.3972	52.6414	45.1998	42.5474	47.3342	48.2419	55.8607	61.0085	68.6084	(45)
Energy content (annual)											Total = Sum(45)m =	668.6824	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	58.4791	51.1093	53.4779	47.0876	44.7452	38.4198	36.1653	40.2341	41.0056	47.4816	51.8572	58.3171	(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	58.4791	51.1093	53.4779	47.0876	44.7452	38.4198	36.1653	40.2341	41.0056	47.4816	51.8572	58.3171	(64)
										Total per year (kWh/year) = Sum(64)m =		568.3800	(64)
12Total per year (kWh/year)												568	(64)
Electric shower(s)	36.3246	32.3655	35.3419	33.7263	34.3592	32.7753	33.8679	34.3592	33.7263	35.3419	34.6773	36.3246	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		413.1901	(64a)
Heat gains from water heating, kWh/month	23.7009	20.8687	22.2050	20.2035	19.7761	17.7988	17.5083	18.6483	18.6830	20.7059	21.6336	23.6604	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	31.8561	31.0546	29.8454	28.0604	26.5808	24.7205	23.5327	25.0649	25.9486	27.8305	30.0467	31.8017	(72)
Total internal gains	235.5950	241.7659	231.8946	225.9694	215.1384	208.0262	200.2883	200.7089	206.2172	212.2394	223.8070	230.8138	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	294.5101	346.1867	383.0856	423.1876	442.1257	435.2652	418.6408	397.0817	373.6575	330.1292	295.1745	280.6822	(84)

---

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)	21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	13.7808	13.8504	13.9192	14.2520	14.3160	14.6218	14.6218	14.6798	14.5025	14.3160	14.1870	14.0547	
alpha	1.9187	1.9234	1.9279	1.9501	1.9544	1.9748	1.9748	1.9787	1.9668	1.9544	1.9458	1.9370	
util living area	0.9499	0.9308	0.9045	0.8542	0.7812	0.6693	0.5542	0.5871	0.7424	0.8726	0.9315	0.9540	(86)
MIT	16.9365	17.3232	17.9452	18.8237	19.6327	20.3283	20.6793	20.6276	20.0996	19.0399	17.8734	16.9112	(87)
Th 2	19.2360	19.2430	19.2498	19.2821	19.2881	19.3166	19.3166	19.3219	19.3056	19.2881	19.2758	19.2631	(88)
util rest of house	0.9399	0.9171	0.8843	0.8206	0.7228	0.5649	0.3927	0.4317	0.6532	0.8362	0.9155	0.9448	(89)
MIT 2	15.7161	16.0985	16.7112	17.5772	18.3383	18.9602	19.2125	19.1893	18.7801	17.8060	16.6654	15.7062	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	16.1994	16.5835	17.1999	18.0708	18.8509	19.5020	19.7934	19.7589	19.3026	18.2946	17.1438	16.1834	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.1994	16.5835	17.1999	18.0708	18.8509	19.5020	19.7934	19.7589	19.3026	18.2946	17.1438	16.1834	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9140	0.8870	0.8516	0.7898	0.7044	0.5783	0.4446	0.4782	0.6530	0.8077	0.8868	0.9203	(94)
Useful gains	269.1826	307.0662	326.2503	334.2183	311.4439	251.7184	186.1230	189.8742	243.9946	266.6395	261.7627	258.3106	(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	872.8991	852.7617	777.1050	650.5034	504.9600	338.9131	220.7840	231.3063	362.6585	543.3539	715.6839	861.9325	(97)
Space heating kWh	449.1651	366.7074	335.4359	227.7253	143.9760	0.0000	0.0000	0.0000	0.0000	205.8755	326.8233	449.0947	(98a)
Space heating requirement - total per year (kWh/year)												2504.8031	
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	449.1651	366.7074	335.4359	227.7253	143.9760	0.0000	0.0000	0.0000	0.0000	205.8755	326.8233	449.0947	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2504.8031	
Space heating per m2											(98c) / (4) =	73.3686	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	649.8946	511.6192	523.3683	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5677	0.6372	0.6118	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	368.9337	325.9952	320.1844	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	490.8234	472.5794	448.3125	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	87.7606	109.0587	95.3274	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	21.9401	27.2647	23.8318	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												73.0367	(107)
Energy for space heating												73.3686	(99)
Energy for space cooling												2.1393	(108)
Total												75.5079	(109)
Fabric Energy Efficiency (DFEE)												75.5	(109)

Full SAP Calculation Printout

Property Reference	Flat 4, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	79 C	**DER**	30.63	**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.96	**DFEE**	75.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	168.02	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			20.0000	596.2000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3341.2000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												97.8676	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	48.3249	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	73.3567	72.9884	72.6274	70.9318	70.6145	69.1377	69.1377	68.8642	69.7066	70.6145	71.2563	71.9273	(39)
Average = Sum(39)m / 12 =												70.9303	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1487	2.1379	2.1273	2.0777	2.0684	2.0251	2.0251	2.0171	2.0418	2.0684	2.0872	2.1068	(40)
HLP (average)												2.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)											Total = Sum(45)m =	1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
											Total per year (kWh/year) = Sum(64)m =	1563.8996	(64)
12Total per year (kWh/year)												1564	(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	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(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	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	63.0390	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	54.7006	60.5614	54.7006	56.5239	54.7006	56.5239	54.7006	54.7006	56.5239	54.7006	56.5239	54.7006	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	107.1266	108.2382	105.4369	99.4733	91.9453	84.8700	80.1433	79.0317	81.8330	87.7966	95.3246	102.3999	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	29.3039	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains	268.8982	274.1542	262.5577	253.7263	240.5505	230.2452	219.9911	222.9866	229.6755	238.8824	254.2177	264.0116	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	327.8134	378.5750	413.7487	450.9446	467.5378	457.4842	438.3436	419.3594	397.1157	356.7723	325.5852	313.8800	(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	12.6520	12.7159	12.7791	13.0846	13.1433	13.4241	13.4241	13.4774	13.3145	13.1433	13.0250	12.9035	
alpha	1.8435	1.8477	1.8519	1.8723	1.8762	1.8949	1.8949	1.8985	1.8876	1.8762	1.8683	1.8602	
util living area													
	0.9340	0.9129	0.8843	0.8312	0.7558	0.6436	0.5311	0.5605	0.7142	0.8483	0.9124	0.9384	(86)
MIT	16.9087	17.2954	17.9217	18.8036	19.6183	20.3172	20.6708	20.6221	20.0942	19.0333	17.8584	16.8827	(87)
Th 2	19.9256	19.9310	19.9363	19.9612	19.9658	19.9874	19.9874	19.9914	19.9791	19.9658	19.9564	19.9466	(88)
util rest of house													
	0.9269	0.9036	0.8713	0.8106	0.7218	0.5857	0.4437	0.4765	0.6639	0.8258	0.9016	0.9318	(89)
MIT 2	16.1749	16.5592	17.1799	18.0575	18.8443	19.5054	19.8042	19.7718	19.3083	18.2953	17.1358	16.1614	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	16.4655	16.8508	17.4737	18.3530	19.1508	19.8269	20.1474	20.1085	19.6195	18.5876	17.4220	16.4470	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4655	16.8508	17.4737	18.3530	19.1508	19.8269	20.1474	20.1085	19.6195	18.5876	17.4220	16.4470	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8940	0.8665	0.8312	0.7709	0.6901	0.5754	0.4587	0.4872	0.6433	0.7875	0.8654	0.9004	(94)
Useful gains	293.0646	328.0535	343.8937	347.6195	322.6425	263.2258	201.0876	204.3074	255.4667	280.9516	281.7685	282.6148	(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													
	892.4190	872.2671	796.9897	670.5156	526.1355	361.3740	245.2594	255.3860	384.7450	564.0393	735.5064	880.8967	(97)
Space heating kWh													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98a)
Space heating requirement - total per year (kWh/year)												2515.0489	
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													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2515.0489	
Space heating per m2											(98c) / (4) =	73.6687	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	445.9197	365.7115	337.1034	232.4852	151.3988	0.0000	0.0000	0.0000	0.0000	210.6173	326.6913	445.1217	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	534.6759	438.5030	404.2007	278.7593	181.5333	0.0000	0.0000	0.0000	0.0000	252.5387	391.7162	533.7191	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.0009	85.8779	85.6267	85.1154	84.2894	79.8000	79.8000	79.8000	79.8000	84.8900	85.6287	86.0019	(217)
Fuel for water heating, kWh/month													
	181.0868	159.5216	169.1533	152.3654	148.4623	137.5776	131.5325	143.5070	144.7848	154.4450	163.7489	180.6628	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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	3015.6461	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1866.8482	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	98.4886	(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	5025.9829	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3015.6461	0.2100	633.2857	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1866.8482	0.2100	392.0381	(264)
Space and water heating			1025.3238	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			1045.7808	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			30.6300	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3015.6461	1.1300	3407.6801	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1866.8482	1.1300	2109.5384	(278)
Space and water heating			5517.2185	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	98.4886	1.5338	151.0651	(282)
Total Primary energy kWh/year			5736.3597	(286)
Dwelling Primary energy Rate (DPER)			168.0200	(287)

Full SAP Calculation Printout

Property Reference	Flat 4, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 4, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	79 C	**DER**	30.63	**TER**	
Environmental	83 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	0.96	**DFEE**	75.51	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	168.02	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.6623	(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) =	0.6126	(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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)

Internal Wall Brick						11.7000					75.0000	877.5000	(32c)
Heat capacity Cm = Sum(A x k)									(28)...(30) + (32) + (32a)...(32e) =			3639.3000	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												106.5993	(35)
Thermal bridges (Default value 0.200 * total exposed area)												12.0940	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss											(33) + (36) + (36a) =	48.3249	(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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	73.3567	72.9884	72.6274	70.9318	70.6145	69.1377	69.1377	68.8642	69.7066	70.6145	71.2563	71.9273	(39)
Average = Sum(39)m / 12 =												70.9303	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1487	2.1379	2.1273	2.0777	2.0684	2.0251	2.0251	2.0171	2.0418	2.0684	2.0872	2.1068	(40)
HLP (average)												2.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)											Total = Sum(45)m =	1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
										Total per year (kWh/year) = Sum(64)m =		1563.8996	(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	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.9421	12.3832	10.0707	7.6242	5.6992	4.8115	5.1990	6.7578	9.0703	11.5169	13.4419	14.3296	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains	308.0329	306.4168	296.9888	280.9502	263.9649	247.4638	237.0924	241.0992	249.6570	266.0711	285.2159	301.2057	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	366.9481	410.8376	448.1798	478.1685	490.9522	474.7027	455.4450	437.4720	417.0973	383.9610	356.5834	351.0741	(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	13.7808	13.8504	13.9192	14.2520	14.3160	14.6218	14.6218	14.6798	14.5025	14.3160	14.1870	14.0547

alpha	1.9187	1.9234	1.9279	1.9501	1.9544	1.9748	1.9748	1.9787	1.9668	1.9544	1.9458	1.9370	
util living area	0.9286	0.9097	0.8795	0.8278	0.7521	0.6403	0.5249	0.5534	0.7089	0.8425	0.9078	0.9335	(86)
MIT	17.1986	17.5452	18.1513	18.9741	19.7374	20.3844	20.7106	20.6674	20.1804	19.1953	18.0864	17.1719	(87)
Th 2	19.9256	19.9310	19.9363	19.9612	19.9658	19.9874	19.9874	19.9914	19.9791	19.9658	19.9564	19.9466	(88)
util rest of house	0.9207	0.8997	0.8656	0.8064	0.7169	0.5810	0.4363	0.4680	0.6571	0.8187	0.8962	0.9263	(89)
MIT 2	16.4506	16.7950	17.3947	18.2132	18.9481	19.5579	19.8297	19.8019	19.3787	18.4418	17.3496	16.4368	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	16.7468	17.0921	17.6943	18.5145	19.2607	19.8852	20.1785	20.1447	19.6962	18.7402	17.6414	16.7279	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.7468	17.0921	17.6943	18.5145	19.2607	19.8852	20.1785	20.1447	19.6962	18.7402	17.6414	16.7279	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8881	0.8641	0.8275	0.7696	0.6889	0.5743	0.4544	0.4822	0.6405	0.7833	0.8613	0.8951	(94)
Useful gains	325.9042	354.9898	370.8641	368.0136	338.1954	272.6304	206.9607	210.9512	267.1627	300.7664	307.1233	314.2434	(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	913.0577	889.8801	813.0148	681.9733	533.8954	365.4065	247.4126	257.8728	390.0907	574.8160	751.1406	901.0972	(97)
Space heating kWh	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98a)
Space heating requirement - total per year (kWh/year)												2457.1051	
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	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2457.1051	
Space heating per m2											(98c) / (4) =	71.9714	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	523.7916	430.9908	394.4366	271.0444	174.5813	0.0000	0.0000	0.0000	0.0000	244.4759	383.3243	523.5243	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9652	85.8470	85.5805	85.0582	84.2056	79.8000	79.8000	79.8000	79.8000	84.8224	85.5879	85.9684	(217)
Fuel for water heating, kWh/month	181.1621	159.5790	169.2445	152.4678	148.6101	137.5776	131.5325	143.5070	144.7848	154.5681	163.8270	180.7332	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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	2946.1692	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1867.5939	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	98.4886	(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	4957.2517	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2946.1692	3.6400	107.2406	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1867.5939	3.6400	67.9804	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	98.4886	16.4900	16.2408	(250)
Additional standing charges			92.0000	(251)
Total energy cost			290.8822	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.3232	(257)
SAP value		78.5510	
SAP rating (Section 12)		79	(258)
SAP band		C	

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	2946.1692	0.2100	618.6955	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1867.5939	0.2100	392.1947	(264)
Space and water heating			1010.8902	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			1031.3473	(272)
CO2 emissions per m2			30.2100	(273)
EI value			82.5372	
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)	
Ground floor		34.1400 (1b)	x	2.7600 (2b)	=	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)

Adj infilt rate													
	0.6738	0.6279	0.6279	0.5973	0.5973	0.5207	0.5207	0.5054	0.5207	0.5820	0.5666	0.6126	(22b)
Effective ac	0.7270	0.6971	0.6971	0.6784	0.6784	0.6356	0.6356	0.6277	0.6356	0.6693	0.6605	0.6876	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)
Internal Wall Brick			11.7000			75.0000	877.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	48.3249 (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	22.6069	21.6770	21.6770	21.0936	21.0936	19.7627	19.7627	19.5183	19.7627	20.8128	20.5393	21.3817	(38)
Heat transfer coeff	70.9318	70.0019	70.0019	69.4185	69.4185	68.0876	68.0876	67.8432	68.0876	69.1377	68.8642	69.7066	(39)
Average = Sum(39)m / 12 =												69.1323	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0777	2.0504	2.0504	2.0333	2.0333	1.9944	1.9944	1.9872	1.9944	2.0251	2.0171	2.0418	(40)
HLP (average)												2.0250	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
										Total per year (kWh/year) = Sum(64)m =		1563.8996	(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	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(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	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.9421	12.3832	10.0707	7.6242	5.6992	4.8115	5.1990	6.7578	9.0703	11.5169	13.4419	14.3296	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains	308.0329	306.4168	296.9888	280.9502	263.9649	247.4638	237.0924	241.0992	249.6570	266.0711	285.2159	301.2057	(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	
East	4.1500	23.7835	0.6300	0.7000	0.7700	30.1645	(76)
South	2.3800	54.0600	0.6300	0.7000	0.7700	39.3210	(78)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	69.4855	107.6520	154.9763	205.9191	231.6992	245.7811	233.6640	213.6023	183.1699	130.4987	82.9220	59.1554	(83)
Total gains	377.5184	414.0688	451.9651	486.8693	495.6641	493.2449	470.7564	454.7015	432.8269	396.5698	368.1380	360.3611	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	14.2520	14.4413	14.4413	14.5626	14.5626	14.8473	14.8473	14.9008	14.8473	14.6218	14.6798	14.5025	
alpha	1.9501	1.9628	1.9628	1.9708	1.9708	1.9898	1.9898	1.9934	1.9898	1.9748	1.9787	1.9668	
util living area	0.9196	0.9009	0.8647	0.8044	0.7119	0.5645	0.4226	0.4518	0.6572	0.8143	0.8933	0.9247	(86)
MIT	17.5179	17.8580	18.4924	19.2586	20.0100	20.6002	20.8541	20.8259	20.3831	19.4858	18.4167	17.5098	(87)
Th 2	19.9612	19.9748	19.9748	19.9833	19.9833	20.0028	20.0028	20.0064	20.0028	19.9874	19.9914	19.9791	(88)
util rest of house	0.9108	0.8902	0.8490	0.7798	0.6700	0.4935	0.3186	0.3504	0.5971	0.7859	0.8798	0.9165	(89)
MIT 2	16.7873	17.1298	17.7526	18.5017	19.2140	19.7503	19.9418	19.9279	19.5736	18.7342	17.6953	16.7906	(90)
Living area fraction									fLA = Living area / (4) =			0.3960	(91)
MIT	17.0766	17.4182	18.0456	18.8014	19.5293	20.0868	20.3031	20.2835	19.8942	19.0318	17.9810	17.0754	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0766	17.4182	18.0456	18.8014	19.5293	20.0868	20.3031	20.2835	19.8942	19.0318	17.9810	17.0754	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8772	0.8544	0.8115	0.7453	0.6485	0.5000	0.3519	0.3806	0.5898	0.7531	0.8444	0.8841	(94)
Useful gains	331.1756	353.7702	366.7498	362.8624	321.4498	246.6133	165.6403	173.0753	255.2713	298.6442	310.8595	318.6132	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	863.7103	834.2944	752.2101	631.8085	474.0769	305.4985	184.0493	195.6290	346.8513	527.6473	701.1056	848.7047	(97)
Space heating kWh	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98a)
Space heating requirement - total per year (kWh/year)												2158.8400	
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	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2158.8400	
Space heating per m2											(98c) / (4) =	63.2349	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	475.0670	387.1850	343.8639	232.1837	136.1566	0.0000	0.0000	0.0000	0.0000	204.2906	336.9031	472.8874	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.7912	85.6505	85.3147	84.7371	83.6725	79.8000	79.8000	79.8000	79.8000	84.4425	85.3383	85.7871	(217)
Fuel for water heating, kWh/month	181.5295	159.9451	169.7719	153.0456	149.5568	137.5776	131.5325	143.5070	144.7848	155.2635	164.3061	181.1151	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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	2588.5372	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1871.9356	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	98.4886	(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	4603.9615	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2588.5372	5.6000	144.9581	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1871.9356	5.6000	104.8284	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	98.4886	26.0600	25.6661	(250)
Additional standing charges			99.0000	(251)
Total energy cost			386.1796	(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	2588.5372	0.2100	543.5928	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1871.9356	0.2100	393.1065	(264)
Space and water heating			936.6993	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			957.1563	(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	2588.5372	1.1300	2925.0471	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1871.9356	1.1300	2115.2872	(278)
Space and water heating			5040.3343	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	98.4886	1.5338	151.0651	(282)
Total Primary energy kWh/year			5259.4754	(286)

SAP 10 EPC IMPROVEMENTS

Flat 4, Proposed

Current energy efficiency rating:	C 79
Current environmental impact rating:	B 83

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

	Typical annual savings		Energy efficiency	Environmental impact
Recommended measures				
(none)				
Total Savings	£0	0.00 kg/m²		

Potential energy efficiency rating:	C 79
Potential environmental impact rating:	B 83

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£37	£37	£0
Mains gas	£349	£349	£0
Space heating	£256	£256	£0
Water heating	£105	£105	£0
Lighting	£26	£26	£0

Total cost of fuels	£386	£386	£0
Total cost of uses	£387	£387	£0
Delivered energy	135 kWh/m²	135 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m²	28 kg/m²	28 kg/m²	0 kg/m²
Primary energy	154 kWh/m²	154 kWh/m²	0 kWh/m²

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)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2123 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6623 (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) =	0.6126 (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	0.7810	0.7657	0.7504	0.6738	0.6585	0.5820	0.5820	0.5666	0.6126	0.6585	0.6892	0.7198	(22b)
Effective ac	0.8050	0.7932	0.7816	0.7270	0.7168	0.6693	0.6693	0.6605	0.6876	0.7168	0.7375	0.7590	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)
Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300	(29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700	(30)
Total net area of external elements Aum(A, m2)			60.4700					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309			(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			34.1400			30.0000	1024.2000	(32d)
Party Ceiling 1			29.8100			30.0000	894.3000	(32b)
Internal Wall TImber			68.8000			9.0000	619.2000	(32c)
Internal Wall Brick			11.7000			75.0000	877.5000	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	48.3249 (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	25.0318	24.6635	24.3025	22.6069	22.2896	20.8128	20.8128	20.5393	21.3817	22.2896	22.9314	23.6024	(38)
Heat transfer coeff	73.3567	72.9884	72.6274	70.9318	70.6145	69.1377	69.1377	68.8642	69.7066	70.6145	71.2563	71.9273	(39)
Average = Sum(39)m / 12 =												70.9303	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1487	2.1379	2.1273	2.0777	2.0684	2.0251	2.0251	2.0171	2.0418	2.0684	2.0872	2.1068	(40)
HLP (average)												2.0776	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses													
	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m													
	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month													
	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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													
	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
										Total per year (kWh/year) = Sum(64)m =		1563.8996	(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													
	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	13.9421	12.3832	10.0707	7.6242	5.6992	4.8115	5.1990	6.7578	9.0703	11.5169	13.4419	14.3296	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)													
	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)													
	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains													
	308.0329	306.4168	296.9888	280.9502	263.9649	247.4638	237.0924	241.0992	249.6570	266.0711	285.2159	301.2057	(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	
East	4.1500	19.6403	0.6300	0.7000	0.7700	24.9096	(76)
South	2.3800	46.7521	0.6300	0.7000	0.7700	34.0055	(78)

Solar gains	58.9152	104.4208	151.1910	197.2183	226.9873	227.2390	218.3526	196.3728	167.4402	117.8899	71.3675	49.8684	(83)
Total gains	366.9481	410.8376	448.1798	478.1685	490.9522	474.7027	455.4450	437.4720	417.0973	383.9610	356.5834	351.0741	(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	13.7808	13.8504	13.9192	14.2520	14.3160	14.6218	14.6218	14.6798	14.5025	14.3160	14.1870	14.0547	
alpha	1.9187	1.9234	1.9279	1.9501	1.9544	1.9748	1.9748	1.9787	1.9668	1.9544	1.9458	1.9370	
util living area													
	0.9286	0.9097	0.8795	0.8278	0.7521	0.6403	0.5249	0.5534	0.7089	0.8425	0.9078	0.9335	(86)
MIT	17.1986	17.5452	18.1513	18.9741	19.7374	20.3844	20.7106	20.6674	20.1804	19.1953	18.0864	17.1719	(87)
Th 2	19.9256	19.9310	19.9363	19.9612	19.9658	19.9874	19.9874	19.9914	19.9791	19.9658	19.9564	19.9466	(88)
util rest of house													
	0.9207	0.8997	0.8656	0.8064	0.7169	0.5810	0.4363	0.4680	0.6571	0.8187	0.8962	0.9263	(89)
MIT 2	16.4506	16.7950	17.3947	18.2132	18.9481	19.5579	19.8297	19.8019	19.3787	18.4418	17.3496	16.4368	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	16.7468	17.0921	17.6943	18.5145	19.2607	19.8852	20.1785	20.1447	19.6962	18.7402	17.6414	16.7279	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.7468	17.0921	17.6943	18.5145	19.2607	19.8852	20.1785	20.1447	19.6962	18.7402	17.6414	16.7279	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8881	0.8641	0.8275	0.7696	0.6889	0.5743	0.4544	0.4822	0.6405	0.7833	0.8613	0.8951	(94)
Useful gains	325.9042	354.9898	370.8641	368.0136	338.1954	272.6304	206.9607	210.9512	267.1627	300.7664	307.1233	314.2434	(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	913.0577	889.8801	813.0148	681.9733	533.8954	365.4065	247.4126	257.8728	390.0907	574.8160	751.1406	901.0972	(97)
Space heating kWh	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98a)
Space heating requirement - total per year (kWh/year)												2457.1051	
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	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2457.1051	
Space heating per m2											(98c) / (4) =	71.9714	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	436.8422	359.4463	328.9601	226.0510	145.6008	0.0000	0.0000	0.0000	0.0000	203.8929	319.6925	436.6192	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	523.7916	430.9908	394.4366	271.0444	174.5813	0.0000	0.0000	0.0000	0.0000	244.4759	383.3243	523.5243	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9652	85.8470	85.5805	85.0582	84.2056	79.8000	79.8000	79.8000	79.8000	84.8224	85.5879	85.9684	(217)
Fuel for water heating, kWh/month	181.1621	159.5790	169.2445	152.4678	148.6101	137.5776	131.5325	143.5070	144.7848	154.5681	163.8270	180.7332	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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	2946.1692	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1867.5939	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	98.4886	(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	4957.2517	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2946.1692	3.6400	107.2406	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1867.5939	3.6400	67.9804	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	98.4886	16.4900	16.2408	(250)
Additional standing charges			92.0000	(251)
Total energy cost			290.8822	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.3232	(257)
SAP value		78.5510	
SAP rating (Section 12)		79	(258)
SAP band		C	

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	2946.1692	0.2100	618.6955	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1867.5939	0.2100	392.1947	(264)
Space and water heating			1010.8902	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			1031.3473	(272)
CO2 emissions per m2			30.2100	(273)
EI value			82.5372	
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 FOR IMPROVED DWELLING

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	34.1400	(1b)	x 2.7600	(2b) =	94.2264	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	34.1400					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		94.2264	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2123	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6623	(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) =	0.6126	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6738	0.6279	0.6279	0.5973	0.5973	0.5207	0.5207	0.5054	0.5207	0.5820	0.5666	0.6126	(22b)
Effective ac	0.7270	0.6971	0.6971	0.6784	0.6784	0.6356	0.6356	0.6277	0.6356	0.6693	0.6605	0.6876	(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	
Window (Uw = 1.20)			6.5300	1.1450	7.4771			(27)
Door			1.7000	3.0000	5.1000			(26)
External Solid Brick	33.8700	6.5300	27.3400	0.3100	8.4754	0.0000	0.0000	(29a)

Corridor Brick Wall	22.2700	1.7000	20.5700	0.7000	14.3990	9.0000	185.1300 (29a)
External Roof 1	4.3300		4.3300	0.1800	0.7794	9.0000	38.9700 (30)
Total net area of external elements Aum(A, m2)			60.4700				(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		36.2309		(33)
Party Wall 1			11.6700	0.0000	0.0000	0.0000	0.0000 (32)
Party Floor 1			34.1400			30.0000	1024.2000 (32d)
Party Ceiling 1			29.8100			30.0000	894.3000 (32b)
Internal Wall TImber			68.8000			9.0000	619.2000 (32c)
Internal Wall Brick			11.7000			75.0000	877.5000 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3639.3000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		106.5993 (35)
Thermal bridges (Default value 0.200 * total exposed area)		12.0940 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	48.3249 (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	22.6069	21.6770	21.6770	21.0936	21.0936	19.7627	19.7627	19.5183	19.7627	20.8128	20.5393	21.3817	(38)
Heat transfer coeff	70.9318	70.0019	70.0019	69.4185	69.4185	68.0876	68.0876	67.8432	68.0876	69.1377	68.8642	69.7066	(39)
Average = Sum(39)m / 12 =												69.1323	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0777	2.0504	2.0504	2.0333	2.0333	1.9944	1.9944	1.9872	1.9944	2.0251	2.0171	2.0418	(40)
HLP (average)												2.0250	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2608	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.0432	50.2726	49.1765	47.5349	46.0555	44.0189	42.4738	44.3632	45.3548	47.3727	49.4708	51.0027	(42b)
Hot water usage for other uses	27.5416	26.5401	25.5386	24.5371	23.5356	22.5341	22.5341	23.5356	24.5371	25.5386	26.5401	27.5416	(42c)
Average daily hot water use (litres/day)												72.3670	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	78.5848	76.8128	74.7151	72.0720	69.5911	66.5530	65.0079	67.8988	69.8919	72.9113	76.0109	78.5443	(44)
Energy conte	115.6904	101.6388	106.7663	94.1441	89.6751	76.9663	71.8356	79.9181	81.0711	93.9536	102.7312	115.3481	(45)
Energy content (annual)										Total = Sum(45)m =		1129.7389	
Distribution loss (46)m = 0.15 x (45)m	17.3536	15.2458	16.0150	14.1216	13.4513	11.5449	10.7753	11.9877	12.1607	14.0930	15.4097	17.3022	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.0460	35.3549	38.0740	35.5424	35.4629	32.8206	33.1273	34.6005	34.4672	37.1548	37.4848	40.0253	(61)
Total heat required for water heating calculated for each month	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(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	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
										Total per year (kWh/year) = Sum(64)m =		1563.8996	(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	48.4786	42.6336	45.0183	40.1885	38.6827	33.7965	32.1672	35.2229	35.5729	40.5283	43.5293	48.3596	(65)

---

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	75.6468	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	13.9421	12.3832	10.0707	7.6242	5.6992	4.8115	5.1990	6.7578	9.0703	11.5169	13.4419	14.3296	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	159.8904	161.5496	157.3685	148.4676	137.2318	126.6717	119.6169	117.9577	122.1388	131.0397	142.2755	152.8356	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	43.8255	(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)	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	-50.4312	(71)
Water heating gains (Table 5)	65.1593	63.4429	60.5085	55.8174	51.9929	46.9395	43.2355	47.3426	49.4069	54.4735	60.4574	64.9994	(72)
Total internal gains	308.0329	306.4168	296.9888	280.9502	263.9649	247.4638	237.0924	241.0992	249.6570	266.0711	285.2159	301.2057	(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	
East	4.1500	23.7835	0.6300	0.7000	0.7700	30.1645	(76)
South	2.3800	54.0600	0.6300	0.7000	0.7700	39.3210	(78)

Solar gains	69.4855	107.6520	154.9763	205.9191	231.6992	245.7811	233.6640	213.6023	183.1699	130.4987	82.9220	59.1554	(83)
Total gains	377.5184	414.0688	451.9651	486.8693	495.6641	493.2449	470.7564	454.7015	432.8269	396.5698	368.1380	360.3611	(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	14.2520	14.4413	14.4413	14.5626	14.5626	14.8473	14.8473	14.9008	14.8473	14.6218	14.6798	14.5025	
alpha	1.9501	1.9628	1.9628	1.9708	1.9708	1.9898	1.9898	1.9934	1.9898	1.9748	1.9787	1.9668	
util living area													
	0.9196	0.9009	0.8647	0.8044	0.7119	0.5645	0.4226	0.4518	0.6572	0.8143	0.8933	0.9247	(86)
MIT	17.5179	17.8580	18.4924	19.2586	20.0100	20.6002	20.8541	20.8259	20.3831	19.4858	18.4167	17.5098	(87)
Th 2	19.9612	19.9748	19.9748	19.9833	19.9833	20.0028	20.0028	20.0064	20.0028	19.9874	19.9914	19.9791	(88)
util rest of house													
	0.9108	0.8902	0.8490	0.7798	0.6700	0.4935	0.3186	0.3504	0.5971	0.7859	0.8798	0.9165	(89)
MIT 2	16.7873	17.1298	17.7526	18.5017	19.2140	19.7503	19.9418	19.9279	19.5736	18.7342	17.6953	16.7906	(90)
Living area fraction										fLA = Living area / (4) =		0.3960	(91)
MIT	17.0766	17.4182	18.0456	18.8014	19.5293	20.0868	20.3031	20.2835	19.8942	19.0318	17.9810	17.0754	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0766	17.4182	18.0456	18.8014	19.5293	20.0868	20.3031	20.2835	19.8942	19.0318	17.9810	17.0754	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8772	0.8544	0.8115	0.7453	0.6485	0.5000	0.3519	0.3806	0.5898	0.7531	0.8444	0.8841	(94)
Useful gains	331.1756	353.7702	366.7498	362.8624	321.4498	246.6133	165.6403	173.0753	255.2713	298.6442	310.8595	318.6132	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W													
	863.7103	834.2944	752.2101	631.8085	474.0769	305.4985	184.0493	195.6290	346.8513	527.6473	701.1056	848.7047	(97)
Space heating kWh													
	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98a)
Space heating requirement - total per year (kWh/year)												2158.8400	
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													
	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2158.8400	
Space heating per m2											(98c) / (4) =	63.2349	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	396.2059	322.9123	286.7825	193.6412	113.5546	0.0000	0.0000	0.0000	0.0000	170.3783	280.9772	394.3881	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	475.0670	387.1850	343.8639	232.1837	136.1566	0.0000	0.0000	0.0000	0.0000	204.2906	336.9031	472.8874	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	155.7364	136.9938	144.8403	129.6864	125.1380	109.7870	104.9629	114.5186	115.5383	131.1084	140.2161	155.3734	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.7912	85.6505	85.3147	84.7371	83.6725	79.8000	79.8000	79.8000	79.8000	84.4425	85.3383	85.7871	(217)
Fuel for water heating, kWh/month													
	181.5295	159.9451	169.7719	153.0456	149.5568	137.5776	131.5325	143.5070	144.7848	155.2635	164.3061	181.1151	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	12.2034	9.7900	8.8148	6.4581	4.9884	4.0756	4.5506	5.9151	7.6831	10.0806	11.3861	12.5426	(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												2588.5372	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1871.9356	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												98.4886	(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	4603.9615	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2588.5372	5.6000	144.9581	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1871.9356	5.6000	104.8284	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	98.4886	26.0600	25.6661	(250)
Additional standing charges			99.0000	(251)
Total energy cost			386.1796	(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	2588.5372	0.2100	543.5928	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1871.9356	0.2100	393.1065	(264)
Space and water heating			936.6993	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	98.4886	0.1443	14.2150	(268)
Total CO2, kg/year			957.1563	(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	2588.5372	1.1300	2925.0471	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1871.9356	1.1300	2115.2872	(278)
Space and water heating			5040.3343	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	98.4886	1.5338	151.0651	(282)
Total Primary energy kWh/year			5259.4754	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 5, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	36.71	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.19	**DFEE**	99.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	200.73	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	South	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	164.49	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	28.64 m	35.72 m²	2.76 m

8.0 Living Area	16.22	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	5.44	3.74	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area
External Cavity wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	47.69	41.99	0.00	None	5.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	19.84	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	49.29
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	19.81

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.16	9.00	35.72	35.72	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	35.72

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.40
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW4N	Window	External Cavity wall	North	1.90	0
FW5N	Window	External Cavity wall	North	0.95	0
FW5N	Window	External Cavity wall	North	0.95	0
FW6N	Window	External Cavity wall	North	1.90	0
FD3S	Door	Corridor Brick Wall	South	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation		
Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	
Manufacturer	Baxi Heating	
System Type	Combi boiler	

Summary for Input Data

Controls SAP Code	2104	
Delayed Start Stat	No	
Burner Control	On/Off	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	No pump	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Boiler Interlock	No	
Combi boiler type	No Combi	

25.0 Main Heating 2 — None

26.0 Heat Networks — None

	Heat Source	Fuel Type	Heating Use	Efficiency	Percentage Of Heat	Heat	Heat Power Ratio	Electrical	Fuel Factor	Efficiency type
Heat source 1	None									
Heat source 2	None									
Heat source 3	None									
Heat source 4	None									
Heat source 5	None									

27.0 Secondary Heating — None

28.0 Water Heating

Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From header tank	
Bath Count	1	
Supplementary Immersion	No	
Immersion Only Heating Hot Water	No	

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	

31.0 Thermal Store — None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 5, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	36.71	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.19	**DFEE**	99.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	200.73	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 61.8545 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	87.7654	87.3909	87.0238	85.2997	84.9771	83.4755	83.4755	83.1974	84.0539	84.9771	85.6297	86.3119	(39)
Average = Sum(39)m / 12 =												85.2982	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4570	2.4466	2.4363	2.3880	2.3790	2.3369	2.3369	2.3292	2.3531	2.3790	2.3972	2.4163	(40)
HLP (average)												2.3880	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(64)
12Total per year (kWh/year)												1585	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	277.8715	283.5407	271.4068	262.4222	248.8022	238.2991	227.7022	230.7147	237.6553	247.0206	262.8298	272.8145	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	296.3948	318.9397	331.5583	359.0410	378.9565	377.6332	357.7883	333.9214	309.9769	289.1585	285.6807	288.2564	(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	18.5960	18.6757	18.7544	19.1335	19.2061	19.5517	19.5517	19.6170	19.4171	19.2061	19.0598	18.9091
alpha	2.2397	2.2450	2.2503	2.2756	2.2804	2.3034	2.3034	2.3078	2.2945	2.2804	2.2707	2.2606

util living area													
	0.9776	0.9722	0.9631	0.9391	0.8930	0.8067	0.7064	0.7437	0.8733	0.9460	0.9700	0.9791	(86)
MIT	17.3531	17.5913	18.0655	18.8163	19.5777	20.2715	20.6365	20.5730	20.0218	19.0793	18.1358	17.3503	(87)
Th 2	19.7715	19.7767	19.7819	19.8060	19.8105	19.8315	19.8315	19.8354	19.8234	19.8105	19.8014	19.7918	(88)
util rest of house													
	0.9740	0.9675	0.9563	0.9264	0.8661	0.7462	0.5944	0.6418	0.8304	0.9323	0.9641	0.9757	(89)
MIT 2	16.4556	16.6956	17.1704	17.9280	18.6743	19.3399	19.6504	19.6082	19.1159	18.1955	17.2539	16.4650	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	16.8631	17.1023	17.5768	18.3314	19.0845	19.7629	20.0982	20.0463	19.5273	18.5968	17.6543	16.8670	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8631	17.1023	17.5768	18.3314	19.0845	19.7629	20.0982	20.0463	19.5273	18.5968	17.6543	16.8670	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9609	0.9524	0.9387	0.9049	0.8449	0.7419	0.6239	0.6636	0.8166	0.9129	0.9488	0.9634	(94)
Useful gains	284.8012	303.7605	311.2236	324.9079	320.1990	280.1601	223.2335	221.5786	253.1192	263.9610	271.0484	277.6953	(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	1102.6079	1066.3725	963.9470	804.4957	627.5128	430.9784	292.0112	303.3634	456.1815	679.5456	903.7634	1093.3114	(97)
Space heating kWh	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98a)
Space heating requirement - total per year (kWh/year)												3552.0626	
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	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3552.0626	
Space heating per m2											(98c) / (4) =	99.4418	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	729.5542	614.4788	582.2856	414.0327	274.1504	0.0000	0.0000	0.0000	0.0000	370.7373	546.2288	727.6000	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4799	86.4143	86.2422	85.8488	85.1263	79.8000	79.8000	79.8000	79.8000	85.6258	86.1909	86.4794	(217)
Fuel for water heating, kWh/month	182.5634	160.7140	170.2584	153.1437	149.0268	139.4719	133.3435	145.4829	146.7783	155.2261	164.9206	182.1390	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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	4259.0678	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1883.0685	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	6292.3013	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4259.0678	0.2100	894.4042	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1883.0685	0.2100	395.4444	(264)
Space and water heating			1289.8486	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1311.2692	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			36.7100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4259.0678	1.1300	4812.7467	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1883.0685	1.1300	2127.8674	(278)
Space and water heating			6940.6141	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			7169.9956	(286)
Dwelling Primary energy Rate (DPER)			200.7300	(287)

Full SAP Calculation Printout

Property Reference	Flat 5, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	36.71	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.19	**DFEE**	99.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	200.73	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)

Internal Wall TImber	49.2900	9.0000	443.6100 (32c)
Internal Wall Brick	19.8100	75.0000	1485.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	61.8545 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	87.7654	87.3909	87.0238	85.2997	84.9771	83.4755	83.4755	83.1974	84.0539	84.9771	85.6297	86.3119	(39)
Average = Sum(39)m / 12 =												85.2982	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4570	2.4466	2.4363	2.3880	2.3790	2.3369	2.3369	2.3292	2.3531	2.3790	2.3972	2.4163	(40)
HLP (average)												2.3880	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	19.4523	19.1587	18.7409	18.1153	17.5515	16.7754	16.1866	16.9066	17.2845	18.0535	18.8531	19.4369	(42b)
Hot water usage for other uses													
	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)
Average daily hot water use (litres/day)												43.4195	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	47.3732	46.0642	44.6312	42.9903	41.4112	39.6197	39.0309	40.7663	42.1594	43.9438	45.7586	47.3577	(44)
Energy conte	69.7415	60.9523	63.7770	56.1561	53.3625	45.8189	43.1303	47.9826	48.9028	56.6260	61.8443	69.5483	(45)
Energy content (annual)										Total = Sum(45)m =		677.8428	
Distribution loss (46)m = 0.15 x (45)m													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month													
	59.2803	51.8095	54.2105	47.7327	45.3581	38.9461	36.6608	40.7852	41.5674	48.1321	52.5677	59.1161	(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													
	59.2803	51.8095	54.2105	47.7327	45.3581	38.9461	36.6608	40.7852	41.5674	48.1321	52.5677	59.1161	(64)
										Total per year (kWh/year) = Sum(64)m =		576.1664	(64)
12Total per year (kWh/year)												576	(64)
Electric shower(s)													
	36.8218	32.8085	35.8256	34.1880	34.8295	33.2240	34.3314	34.8295	34.1880	35.8256	35.1520	36.8218	(64a)
										Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =		418.8457	(64a)
Heat gains from water heating, kWh/month													
	24.0255	21.1545	22.5090	20.4802	20.0469	18.0425	17.7480	18.9037	18.9388	20.9894	21.9299	23.9845	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)													
	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)													
	32.2924	31.4799	30.2541	28.4447	26.9448	25.0590	23.8549	25.4082	26.3040	28.2116	30.4582	32.2372	(72)
Total internal gains													
	244.1074	250.7042	240.3193	234.2810	223.0382	215.7724	207.7263	208.1284	213.8721	220.0087	231.9982	239.1573	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	262.6307	286.1032	300.4708	330.8998	353.1925	355.1064	337.8125	311.3352	286.1938	262.1466	254.8491	254.5992	(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	18.5960	18.6757	18.7544	19.1335	19.2061	19.5517	19.5517	19.6170	19.4171	19.2061	19.0598	18.9091	
alpha	2.2397	2.2450	2.2503	2.2756	2.2804	2.3034	2.3034	2.3078	2.2945	2.2804	2.2707	2.2606	
util living area													
	0.9825	0.9776	0.9695	0.9477	0.9051	0.8233	0.7259	0.7659	0.8890	0.9552	0.9761	0.9838	(86)
MIT	17.2547	17.4969	17.9783	18.7423	19.5187	20.2325	20.6126	20.5416	19.9702	19.0064	18.0469	17.2510	(87)
Th 2	19.0460	19.0522	19.0583	19.0872	19.0926	19.1182	19.1182	19.1229	19.1083	19.0926	19.0817	19.0702	(88)
util rest of house													
	0.9775	0.9710	0.9597	0.9281	0.8613	0.7180	0.5227	0.5814	0.8164	0.9344	0.9679	0.9792	(89)
MIT 2	15.8285	16.0723	16.5535	17.3218	18.0728	18.7305	19.0114	18.9782	18.5158	17.5921	16.6372	15.8381	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	16.4761	16.7192	17.2005	17.9668	18.7294	19.4125	19.7385	19.6881	19.1762	18.2343	17.2773	16.4797	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.4761	16.7192	17.2005	17.9668	18.7294	19.4125	19.7385	19.6881	19.1762	18.2343	17.2773	16.4797	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9671	0.9589	0.9455	0.9116	0.8499	0.7390	0.6049	0.6514	0.8200	0.9205	0.9558	0.9695	(94)
Useful gains	253.9930	274.3333	284.0913	301.6597	300.1811	262.4303	204.3576	202.8183	234.6833	241.2950	243.5917	246.8279	(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													
	1068.6400	1032.8910	931.1967	773.3967	597.3360	401.7252	261.9888	273.5646	426.6777	648.7421	871.4799	1059.8862	(97)
Space heating kWh													
	606.0974	509.7508	481.4464	339.6507	221.0832	0.0000	0.0000	0.0000	0.0000	303.1406	452.0796	604.9153	(98a)
Space heating requirement - total per year (kWh/year)												3518.1640	
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													
	606.0974	509.7508	481.4464	339.6507	221.0832	0.0000	0.0000	0.0000	0.0000	303.1406	452.0796	604.9153	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3518.1640	
Space heating per m2											(98c) / (4) =	98.4928	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	784.6694	617.7185	632.3001	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.4453	0.5139	0.4753	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	349.4510	317.4250	300.5094	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	394.2484	375.3407	345.4141	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	32.2541	43.0893	33.4091	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	8.0635	10.7723	8.3523	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												27.1881	(107)
Energy for space heating												98.4928	(99)
Energy for space cooling												0.7611	(108)
Total												99.2540	(109)
Fabric Energy Efficiency (DFEE)												99.3	(109)

Full SAP Calculation Printout

Property Reference	Flat 5, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	36.71	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.19	**DFEE**	99.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	200.73	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 61.8545 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	87.7654	87.3909	87.0238	85.2997	84.9771	83.4755	83.4755	83.1974	84.0539	84.9771	85.6297	86.3119	(39)
Average = Sum(39)m / 12 =												85.2982	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4570	2.4466	2.4363	2.3880	2.3790	2.3369	2.3369	2.3292	2.3531	2.3790	2.3972	2.4163	(40)
HLP (average)												2.3880	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(64)
12Total per year (kWh/year)												1585	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	277.8715	283.5407	271.4068	262.4222	248.8022	238.2991	227.7022	230.7147	237.6553	247.0206	262.8298	272.8145	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	296.3948	318.9397	331.5583	359.0410	378.9565	377.6332	357.7883	333.9214	309.9769	289.1585	285.6807	288.2564	(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	18.5960	18.6757	18.7544	19.1335	19.2061	19.5517	19.5517	19.6170	19.4171	19.2061	19.0598	18.9091
alpha	2.2397	2.2450	2.2503	2.2756	2.2804	2.3034	2.3034	2.3078	2.2945	2.2804	2.2707	2.2606

util living area													
	0.9776	0.9722	0.9631	0.9391	0.8930	0.8067	0.7064	0.7437	0.8733	0.9460	0.9700	0.9791	(86)
MIT	17.3531	17.5913	18.0655	18.8163	19.5777	20.2715	20.6365	20.5730	20.0218	19.0793	18.1358	17.3503	(87)
Th 2	19.7715	19.7767	19.7819	19.8060	19.8105	19.8315	19.8315	19.8354	19.8234	19.8105	19.8014	19.7918	(88)
util rest of house													
	0.9740	0.9675	0.9563	0.9264	0.8661	0.7462	0.5944	0.6418	0.8304	0.9323	0.9641	0.9757	(89)
MIT 2	16.4556	16.6956	17.1704	17.9280	18.6743	19.3399	19.6504	19.6082	19.1159	18.1955	17.2539	16.4650	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	16.8631	17.1023	17.5768	18.3314	19.0845	19.7629	20.0982	20.0463	19.5273	18.5968	17.6543	16.8670	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.8631	17.1023	17.5768	18.3314	19.0845	19.7629	20.0982	20.0463	19.5273	18.5968	17.6543	16.8670	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9609	0.9524	0.9387	0.9049	0.8449	0.7419	0.6239	0.6636	0.8166	0.9129	0.9488	0.9634	(94)
Useful gains	284.8012	303.7605	311.2236	324.9079	320.1990	280.1601	223.2335	221.5786	253.1192	263.9610	271.0484	277.6953	(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	1102.6079	1066.3725	963.9470	804.4957	627.5128	430.9784	292.0112	303.3634	456.1815	679.5456	903.7634	1093.3114	(97)
Space heating kWh	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98a)
Space heating requirement - total per year (kWh/year)												3552.0626	
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	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3552.0626	
Space heating per m2											(98c) / (4) =	99.4418	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	608.4482	512.4753	485.6262	345.3032	228.6415	0.0000	0.0000	0.0000	0.0000	309.1949	455.5549	606.8184	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	729.5542	614.4788	582.2856	414.0327	274.1504	0.0000	0.0000	0.0000	0.0000	370.7373	546.2288	727.6000	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4799	86.4143	86.2422	85.8488	85.1263	79.8000	79.8000	79.8000	79.8000	85.6258	86.1909	86.4794	(217)
Fuel for water heating, kWh/month	182.5634	160.7140	170.2584	153.1437	149.0268	139.4719	133.3435	145.4829	146.7783	155.2261	164.9206	182.1390	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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	4259.0678	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1883.0685	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	6292.3013	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	4259.0678	0.2100	894.4042	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1883.0685	0.2100	395.4444	(264)
Space and water heating			1289.8486	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1311.2692	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			36.7100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	4259.0678	1.1300	4812.7467	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1883.0685	1.1300	2127.8674	(278)
Space and water heating			6940.6141	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			7169.9956	(286)
Dwelling Primary energy Rate (DPER)			200.7300	(287)

Full SAP Calculation Printout

Property Reference	Flat 5, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	36.71	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.19	**DFEE**	99.25	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	200.73	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor		35.7200 (1b)	x	2.7600 (2b)	=	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	98.5872	(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		2 * 10 =	20.0000 (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) =		20.0000 / (5) =	0.2029 (8)
Number of storeys in the dwelling (ns)			1 (9)
Additional infiltration		[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.6529 (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) =	0.6039 (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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 61.8545 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	87.7654	87.3909	87.0238	85.2997	84.9771	83.4755	83.4755	83.1974	84.0539	84.9771	85.6297	86.3119	(39)
Average = Sum(39)m / 12 =												85.2982	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4570	2.4466	2.4363	2.3880	2.3790	2.3369	2.3369	2.3292	2.3531	2.3790	2.3972	2.4163	(40)
HLP (average)												2.3880	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
									Total per year (kWh/year) = Sum(64)m =			1585.4320	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	335.0888	350.2781	365.2567	385.1381	401.1053	393.2784	373.3833	350.6139	328.6205	315.4033	315.8738	324.9532	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	18.5960	18.6757	18.7544	19.1335	19.2061	19.5517	19.5517	19.6170	19.4171	19.2061	19.0598	18.9091	
alpha	2.2397	2.2450	2.2503	2.2756	2.2804	2.3034	2.3034	2.3078	2.2945	2.2804	2.2707	2.2606	
util living area													

	0.9715	0.9665	0.9556	0.9307	0.8824	0.7953	0.6915	0.7276	0.8609	0.9365	0.9634	0.9734	(86)
MIT	17.4640	17.6799	18.1579	18.8832	19.6265	20.2973	20.6539	20.5945	20.0603	19.1480	18.2211	17.4568	(87)
Th 2	19.7715	19.7767	19.7819	19.8060	19.8105	19.8315	19.8315	19.8354	19.8234	19.8105	19.8014	19.7918	(88)
util rest of house													
	0.9668	0.9610	0.9476	0.9166	0.8536	0.7329	0.5784	0.6238	0.8152	0.9208	0.9564	0.9692	(89)
MIT 2	16.5651	16.7828	17.2608	17.9921	18.7188	19.3604	19.6609	19.6222	19.1490	18.2611	17.3375	16.5702	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	16.9733	17.1901	17.6682	18.3968	19.1310	19.7858	20.1118	20.0637	19.5628	18.6638	17.7388	16.9728	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.9733	17.1901	17.6682	18.3968	19.1310	19.7858	20.1118	20.0637	19.5628	18.6638	17.7388	16.9728	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9514	0.9441	0.9280	0.8941	0.8326	0.7300	0.6095	0.6476	0.8024	0.9002	0.9391	0.9546	(94)
Useful gains	318.8162	330.6838	338.9592	344.3615	333.9720	287.0886	227.5827	227.0407	263.6826	283.9209	296.6470	310.1964	(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													
	1112.2735	1074.0445	971.8953	810.0722	631.4645	432.8893	293.1476	304.8123	459.1733	685.2419	910.9930	1102.4448	(97)
Space heating kWh													
	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98a)
Space heating requirement - total per year (kWh/year)												3447.7661	
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													
	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3447.7661	
Space heating per m2											(98c) / (4) =	96.5220	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	707.8324	598.9669	564.6337	402.0524	265.3890	0.0000	0.0000	0.0000	0.0000	358.0130	530.3707	706.7540	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4344	86.3750	86.1921	85.7958	85.0602	79.8000	79.8000	79.8000	79.8000	85.5597	86.1422	86.4357	(217)
Fuel for water heating, kWh/month													
	182.6594	160.7871	170.3574	153.2383	149.1426	139.4719	133.3435	145.4829	146.7783	155.3459	165.0139	182.2311	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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	4134.0121	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1883.8523	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	6168.0293	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4134.0121	3.6400	150.4780	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1883.8523	3.6400	68.5722	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	105.1650	16.4900	17.3417	(250)
Additional standing charges			92.0000	(251)
Total energy cost			335.8125	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4977	(257)
SAP value		75.7227	
SAP rating (Section 12)		76	(258)
SAP band		C	

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	4134.0121	0.2100	868.1425	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1883.8523	0.2100	395.6090	(264)
Space and water heating			1263.7515	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1285.1721	(272)
CO2 emissions per m2			35.9800	(273)
EI value			78.6654	
EI rating			79	(274)
EI band			C	

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)	
Ground floor		35.7200 (1b)	x	2.7600 (2b)	=	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6643	0.6190	0.6190	0.5888	0.5888	0.5133	0.5133	0.4982	0.5133	0.5737	0.5586	0.6039	(22b)

Effective ac	0.7206	0.6916	0.6916	0.6733	0.6733	0.6317	0.6317	0.6241	0.6317	0.6646	0.6560	0.6823 (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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	61.8545 (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	23.4452	22.4997	22.4997	21.9065	21.9065	20.5531	20.5531	20.3047	20.5531	21.6209	21.3429	22.1994	(38)
Heat transfer coeff	85.2997	84.3542	84.3542	83.7610	83.7610	82.4076	82.4076	82.1592	82.4076	83.4755	83.1974	84.0539	(39)
Average = Sum(39)m / 12 =												83.4699	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3880	2.3615	2.3615	2.3449	2.3449	2.3070	2.3070	2.3001	2.3070	2.3369	2.3292	2.3531	(40)
HLP (average)												2.3368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978 (42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000 (42a)
Hot water usage for baths	51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049 (42b)
Hot water usage for other uses	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209 (42c)
Average daily hot water use (litres/day)												73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	12.7500	0.6300	0.7000	0.7700	22.2104	(74)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	22.2104	37.4555	63.9209	104.7992	137.3944	155.3126	143.6966	116.4577	82.1854	48.0863	27.0677	18.5720	(83)
Total gains	338.7759	352.3347	369.0261	393.3185	408.3454	409.2568	386.9937	363.8648	338.4843	321.3517	320.0907	328.0833	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	19.1335	19.3480	19.3480	19.4850	19.4850	19.8050	19.8050	19.8649	19.8050	19.5517	19.6170	19.4171	
alpha	2.2756	2.2899	2.2899	2.2990	2.2990	2.3203	2.3203	2.3243	2.3203	2.3034	2.3078	2.2945	
util living area	0.9685	0.9632	0.9490	0.9178	0.8532	0.7275	0.5804	0.6241	0.8258	0.9233	0.9581	0.9704	(86)
MIT	17.7158	17.9426	18.4563	19.1451	19.9012	20.5300	20.8227	20.7805	20.2615	19.3986	18.4847	17.7264	(87)
Th 2	19.8060	19.8192	19.8192	19.8275	19.8275	19.8465	19.8465	19.8500	19.8465	19.8315	19.8354	19.8234	(88)
util rest of house	0.9633	0.9571	0.9395	0.9005	0.8153	0.6425	0.4290	0.4806	0.7670	0.9035	0.9499	0.9656	(89)
MIT 2	16.8363	17.0696	17.5791	18.2621	18.9908	19.5688	19.7855	19.7656	19.3478	18.5195	17.6197	16.8576	(90)
Living area fraction									fLA = Living area / (4) =			0.4541	(91)
MIT	17.2356	17.4660	17.9774	18.6630	19.4042	20.0053	20.2565	20.2264	19.7627	18.9187	18.0124	17.2521	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.2356	17.4660	17.9774	18.6630	19.4042	20.0053	20.2565	20.2264	19.7627	18.9187	18.0124	17.2521	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9473	0.9397	0.9192	0.8778	0.7984	0.6560	0.4885	0.5333	0.7617	0.8827	0.9318	0.9502	(94)
Useful gains	320.9160	331.0714	339.2095	345.2587	326.0029	268.4569	189.0625	194.0626	257.8370	283.6706	298.2603	311.7546	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1052.2267	1009.3827	900.6828	750.7523	561.5523	363.0302	218.9136	232.2173	408.9614	627.6261	849.6489	1038.2453	(97)
Space heating kWh	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98a)
Space heating requirement - total per year (kWh/year)												3078.2724	
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	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3078.2724	
Space heating per m2											(98c) / (4) =	86.1778	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	652.3923	546.5530	500.8826	350.0664	210.1304	0.0000	0.0000	0.0000	0.0000	306.8380	476.0190	648.0924	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.3080	86.2298	85.9898	85.5377	84.5727	79.8000	79.8000	79.8000	79.8000	85.2591	85.9576	86.3013	(217)
Fuel for water heating, kWh/month	182.9269	161.0579	170.7581	153.7006	150.0022	139.4719	133.3435	145.4829	146.7783	155.8938	165.3682	182.5149	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3690.9741	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

Efficiency of water heater	79.8000	
Water heating fuel used	1887.2991	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	5728.4382	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3690.9741	5.6000	206.6946	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1887.2991	5.6000	105.6888	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	105.1650	26.0600	27.4060	(250)
Additional standing charges			99.0000	(251)
Total energy cost			450.5163	(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	3690.9741	0.2100	775.1046	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1887.2991	0.2100	396.3328	(264)
Space and water heating			1171.4374	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1192.8580	(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	3690.9741	1.1300	4170.8008	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1887.2991	1.1300	2132.6480	(278)
Space and water heating			6303.4488	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			6532.8303	(286)

SAP 10 EPC IMPROVEMENTS

Flat 5, Proposed

Current energy efficiency rating: C 76
Current environmental impact rating: C 79

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 76
Potential environmental impact rating: C 79

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£39	£39	£0
Mains gas	£411	£411	£0
Space heating	£317	£317	£0
Water heating	£106	£106	£0
Lighting	£27	£27	£0
Total cost of fuels	£450	£450	£0
Total cost of uses	£450	£450	£0
Delivered energy	160 kWh/m²	160 kWh/m²	0 kWh/m²

Carbon dioxide emissions	1.2 tonnes	1.2 tonnes	0.0 tonnes
CO2 emissions per m²	33 kg/m²	33 kg/m²	0 kg/m²
Primary energy	183 kWh/m²	183 kWh/m²	0 kWh/m²

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)	
Ground floor	35.7200 (1b)	x	2.7600 (2b)	=	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	98.5872	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2029 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6529 (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) =	0.6039 (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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K	164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)	17.7700 (36)
Point Thermal bridges	(36a) = 0.0000
Total fabric heat loss	(33) + (36) + (36a) = 61.8545 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	87.7654	87.3909	87.0238	85.2997	84.9771	83.4755	83.4755	83.1974	84.0539	84.9771	85.6297	86.3119	(39)
Average = Sum(39)m / 12 =												85.2982	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.4570	2.4466	2.4363	2.3880	2.3790	2.3369	2.3369	2.3292	2.3531	2.3790	2.3972	2.4163	(40)
HLP (average)												2.3880	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)
Hot water usage for other uses													
	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)
Average daily hot water use (litres/day)												73.3634	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m													
	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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)
Heat gains from water heating, kWh/month													
	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)													
	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)													
	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains													
	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	335.0888	350.2781	365.2567	385.1381	401.1053	393.2784	373.3833	350.6139	328.6205	315.4033	315.8738	324.9532	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	18.5960	18.6757	18.7544	19.1335	19.2061	19.5517	19.5517	19.6170	19.4171	19.2061	19.0598	18.9091	
alpha	2.2397	2.2450	2.2503	2.2756	2.2804	2.3034	2.3034	2.3078	2.2945	2.2804	2.2707	2.2606	
util living area													
	0.9715	0.9665	0.9556	0.9307	0.8824	0.7953	0.6915	0.7276	0.8609	0.9365	0.9634	0.9734	(86)
MIT	17.4640	17.6799	18.1579	18.8832	19.6265	20.2973	20.6539	20.5945	20.0603	19.1480	18.2211	17.4568	(87)
Th 2	19.7715	19.7767	19.7819	19.8060	19.8105	19.8315	19.8315	19.8354	19.8234	19.8105	19.8014	19.7918	(88)
util rest of house													
	0.9668	0.9610	0.9476	0.9166	0.8536	0.7329	0.5784	0.6238	0.8152	0.9208	0.9564	0.9692	(89)
MIT 2	16.5651	16.7828	17.2608	17.9921	18.7188	19.3604	19.6609	19.6222	19.1490	18.2611	17.3375	16.5702	(90)
Living area fraction									fLA = Living area / (4) =			0.4541	(91)
MIT	16.9733	17.1901	17.6682	18.3968	19.1310	19.7858	20.1118	20.0637	19.5628	18.6638	17.7388	16.9728	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.9733	17.1901	17.6682	18.3968	19.1310	19.7858	20.1118	20.0637	19.5628	18.6638	17.7388	16.9728	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Utilisation	0.9514	0.9441	0.9280	0.8941	0.8326	0.7300	0.6095	0.6476	0.8024	0.9002	0.9391	0.9546	(94)
Useful gains	318.8162	330.6838	338.9592	344.3615	333.9720	287.0886	227.5827	227.0407	263.6826	283.9209	296.6470	310.1964	(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	1112.2735	1074.0445	971.8953	810.0722	631.4645	432.8893	293.1476	304.8123	459.1733	685.2419	910.9930	1102.4448	(97)
Space heating kWh	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98a)
Space heating requirement - total per year (kWh/year)												3447.7661	
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	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3447.7661	
Space heating per m2											(98c) / (4) =	96.5220	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	590.3322	499.5384	470.9045	335.3117	221.3344	0.0000	0.0000	0.0000	0.0000	298.5828	442.3292	589.4328	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	707.8324	598.9669	564.6337	402.0524	265.3890	0.0000	0.0000	0.0000	0.0000	358.0130	530.3707	706.7540	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4344	86.3750	86.1921	85.7958	85.0602	79.8000	79.8000	79.8000	79.8000	85.5597	86.1422	86.4357	(217)
Fuel for water heating, kWh/month	182.6594	160.7871	170.3574	153.2383	149.1426	139.4719	133.3435	145.4829	146.7783	155.3459	165.0139	182.2311	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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	4134.0121	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1883.8523	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	6168.0293	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4134.0121	3.6400	150.4780	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1883.8523	3.6400	68.5722	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	105.1650	16.4900	17.3417	(250)
Additional standing charges			92.0000	(251)
Total energy cost			335.8125	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4977 (257)
SAP value		75.7227
SAP rating (Section 12)		76 (258)
SAP band		C

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	4134.0121	0.2100	868.1425	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1883.8523	0.2100	395.6090	(264)
Space and water heating			1263.7515	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1285.1721	(272)
CO2 emissions per m2			35.9800	(273)
EI value			78.6654	
EI rating			79	(274)
EI band			C	

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)	
Ground floor	35.7200	(1b) x	2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6643	0.6190	0.6190	0.5888	0.5888	0.5133	0.5133	0.4982	0.5133	0.5737	0.5586	0.6039	(22b)
Effective ac	0.7206	0.6916	0.6916	0.6733	0.6733	0.6317	0.6317	0.6241	0.6317	0.6646	0.6560	0.6823	(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	
Window (Uw = 1.40)			5.7000	1.3258	7.5568			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.5500	23.0945	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1600	5.7152	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		44.0845			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)

Internal Wall TImber	49.2900	9.0000	443.6100 (32c)
Internal Wall Brick	19.8100	75.0000	1485.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	61.8545 (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	23.4452	22.4997	22.4997	21.9065	21.9065	20.5531	20.5531	20.3047	20.5531	21.6209	21.3429	22.1994	(38)
Heat transfer coeff	85.2997	84.3542	84.3542	83.7610	83.7610	82.4076	82.4076	82.1592	82.4076	83.4755	83.1974	84.0539	(39)
Average = Sum(39)m / 12 =												83.4699	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3880	2.3615	2.3615	2.3449	2.3449	2.3070	2.3070	2.3001	2.3070	2.3369	2.3292	2.3531	(40)
HLP (average)												2.3368	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)
Hot water usage for other uses	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)
Average daily hot water use (litres/day)												73.3634	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	12.7500	0.6300	0.7000	0.7700	22.2104	(74)

Solar gains	22.2104	37.4555	63.9209	104.7992	137.3944	155.3126	143.6966	116.4577	82.1854	48.0863	27.0677	18.5720	(83)
Total gains	338.7759	352.3347	369.0261	393.3185	408.3454	409.2568	386.9937	363.8648	338.4843	321.3517	320.0907	328.0833	(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	19.1335	19.3480	19.3480	19.4850	19.4850	19.8050	19.8050	19.8649	19.8050	19.5517	19.6170	19.4171

alpha	2.2756	2.2899	2.2899	2.2990	2.2990	2.3203	2.3203	2.3243	2.3203	2.3034	2.3078	2.2945	
util living area	0.9685	0.9632	0.9490	0.9178	0.8532	0.7275	0.5804	0.6241	0.8258	0.9233	0.9581	0.9704	(86)
MIT	17.7158	17.9426	18.4563	19.1451	19.9012	20.5300	20.8227	20.7805	20.2615	19.3986	18.4847	17.7264	(87)
Th 2	19.8060	19.8192	19.8192	19.8275	19.8275	19.8465	19.8465	19.8500	19.8465	19.8315	19.8354	19.8234	(88)
util rest of house	0.9633	0.9571	0.9395	0.9005	0.8153	0.6425	0.4290	0.4806	0.7670	0.9035	0.9499	0.9656	(89)
MIT 2	16.8363	17.0696	17.5791	18.2621	18.9908	19.5688	19.7855	19.7656	19.3478	18.5195	17.6197	16.8576	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	17.2356	17.4660	17.9774	18.6630	19.4042	20.0053	20.2565	20.2264	19.7627	18.9187	18.0124	17.2521	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.2356	17.4660	17.9774	18.6630	19.4042	20.0053	20.2565	20.2264	19.7627	18.9187	18.0124	17.2521	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9473	0.9397	0.9192	0.8778	0.7984	0.6560	0.4885	0.5333	0.7617	0.8827	0.9318	0.9502	(94)
Useful gains	320.9160	331.0714	339.2095	345.2587	326.0029	268.4569	189.0625	194.0626	257.8370	283.6706	298.2603	311.7546	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1052.2267	1009.3827	900.6828	750.7523	561.5523	363.0302	218.9136	232.2173	408.9614	627.6261	849.6489	1038.2453	(97)
Space heating kWh	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98a)
Space heating requirement - total per year (kWh/year)												3078.2724	
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	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3078.2724	
Space heating per m2											(98c) / (4) =	86.1778	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	544.0951	455.8252	417.7361	291.9554	175.2487	0.0000	0.0000	0.0000	0.0000	255.9029	396.9998	540.5091	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	652.3923	546.5530	500.8826	350.0664	210.1304	0.0000	0.0000	0.0000	0.0000	306.8380	476.0190	648.0924	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.3080	86.2298	85.9898	85.5377	84.5727	79.8000	79.8000	79.8000	79.8000	85.2591	85.9576	86.3013	(217)
Fuel for water heating, kWh/month	182.9269	161.0579	170.7581	153.7006	150.0022	139.4719	133.3435	145.4829	146.7783	155.8938	165.3682	182.5149	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3690.9741	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1887.2991	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.1650	(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												5728.4382	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3690.9741	5.6000	206.6946	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1887.2991	5.6000	105.6888	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	105.1650	26.0600	27.4060	(250)
Additional standing charges			99.0000	(251)
Total energy cost			450.5163	(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	3690.9741	0.2100	775.1046	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1887.2991	0.2100	396.3328	(264)
Space and water heating			1171.4374	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1192.8580	(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	3690.9741	1.1300	4170.8008	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1887.2991	1.1300	2132.6480	(278)
Space and water heating			6303.4488	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			6532.8303	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 5, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	78 C	**DER**	31.85	**TER**	
Environmental	82 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.03	**DFEE**	80.86	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	174.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	South	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Semi-Detached	
Position of Flat	Mid-floor flat	
Which Floor	1	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	1	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	164.49	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	28.64 m	35.72 m²	2.76 m

8.0 Living Area	16.22	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	5.44	3.74	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area
External Cavity wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.20	60.00	47.69	41.99	0.00	None	5.70	Enter Gross Area

9.1 Party Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Area (m²)	Shelter Res	Shelter
Party Wall 1	Solid Wall	Other	0.00	0.00	19.84	0.00	None

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	49.29
Internal Wall Brick	Dense block, plasterboard on dabs	75.00	19.81

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	35.72	35.72	None	0.00	Enter Gross Area	0.00

11.1 Party Floors

Summary for Input Data

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	35.72

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door			Air Filled	0.00			3.00

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
FW4N	Window	External Cavity wall	North	1.90	0
FW5N	Window	External Cavity wall	North	0.95	0
FW5N	Window	External Cavity wall	North	0.95	0
FW6N	Window	External Cavity wall	North	1.90	0
FD3S	Door	Corridor Brick Wall	South	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K
19.0 Mechanical Ventilation		
Mechanical Ventilation		
Mechanical Ventilation System Present	No	
20.0 Fans, Open Fireplaces, Flues		
Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	
22.0 Lighting		
No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	
Manufacturer	Baxi Heating	
System Type	Combi boiler	

Summary for Input Data

Controls SAP Code	2104
Delayed Start Stat	No
Burner Control	Modulating
HETAS approved System	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Boiler Interlock	No
Combi boiler type	Standard Combi

25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None

28.0 Water Heating

Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No

28.3 Waste Water Heat Recovery System

29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 5, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	78 C	**DER**	31.85	**TER**	
Environmental	82 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.03	**DFEE**	80.86	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	174.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		98.5872	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2029 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6529 (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) =	0.6039 (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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 46.8423 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	72.7532	72.3787	72.0116	70.2875	69.9649	68.4633	68.4633	68.1852	69.0417	69.9649	70.6175	71.2997	(39)

Average = Sum(39)m / 12 = 70.2860

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0368	2.0263	2.0160	1.9677	1.9587	1.9167	1.9167	1.9089	1.9329	1.9587	1.9770	1.9961	(40)
HLP (average)												1.9677	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)

Energy content (annual) Total = Sum(45)m = 1145.2936

Distribution loss (46)m = 0.15 x (45)m												
17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month												
157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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												
157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)

Total per year (kWh/year) = Sum(64)m = 1585.4320 (64)
12Total per year (kWh/year) 1585 (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												
49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)													
-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)													
66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains													
277.8715	283.5407	271.4068	262.4222	248.8022	238.2991	227.7022	230.7147	237.6553	247.0206	262.8298	272.8145	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	296.3948	318.9397	331.5583	359.0410	378.9565	377.6332	357.7883	333.9214	309.9769	289.1585	285.6807	288.2564	(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	22.4332	22.5492	22.6642	23.2201	23.3272	23.8388	23.8388	23.9360	23.6391	23.3272	23.1116	22.8905
alpha	2.4955	2.5033	2.5109	2.5480	2.5551	2.5893	2.5893	2.5957	2.5759	2.5551	2.5408	2.5260

util living area													
	0.9775	0.9714	0.9610	0.9326	0.8771	0.7727	0.6569	0.6989	0.8529	0.9408	0.9688	0.9791	(86)
MIT	17.8840	18.1127	18.5462	19.2387	19.9107	20.4946	20.7715	20.7224	20.2705	19.4408	18.5970	17.8906	(87)
Th 2	19.9816	19.9869	19.9920	20.0161	20.0206	20.0417	20.0417	20.0456	20.0336	20.0206	20.0115	20.0020	(88)
util rest of house													
	0.9742	0.9671	0.9547	0.9204	0.8511	0.7165	0.5604	0.6092	0.8120	0.9278	0.9634	0.9760	(89)
MIT 2	17.1118	17.3424	17.7765	18.4760	19.1321	19.6896	19.9204	19.8894	19.4900	18.6830	17.8412	17.1312	(90)
Living area fraction											fLA = Living area / (4) =	0.4541	(91)
MIT	17.4624	17.6922	18.1260	18.8223	19.4857	20.0551	20.3069	20.2677	19.8444	19.0271	18.1844	17.4760	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.4624	17.6922	18.1260	18.8223	19.4857	20.0551	20.3069	20.2677	19.8444	19.0271	18.1844	17.4760	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9624	0.9534	0.9386	0.9013	0.8339	0.7174	0.5897	0.6325	0.8024	0.9104	0.9495	0.9650	(94)
Useful gains	285.2451	304.0745	311.2054	323.5917	315.9946	270.9089	210.9956	211.1934	248.7104	263.2370	271.2634	278.1572	(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													
	957.6078	925.8842	837.2088	697.4164	544.7229	373.4762	253.7835	263.7187	396.6054	589.6022	782.7542	946.5787	(97)
Space heating kWh													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98a)
Space heating requirement - total per year (kWh/year)												2857.1628	
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													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2857.1628	
Space heating per m2											(98c) / (4) =	79.9878	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	599.8056	501.0265	469.2405	322.7263	204.0454	0.0000	0.0000	0.0000	0.0000	291.1459	441.5748	596.2897	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1721	86.0857	85.8750	85.3804	84.5102	79.8000	79.8000	79.8000	79.8000	85.1537	85.8242	86.1663	(217)
Fuel for water heating, kWh/month													
	183.2154	161.3275	170.9864	153.9838	150.1131	139.4719	133.3435	145.4829	146.7783	156.0867	165.6254	182.8008	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3425.8546	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1889.2157	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.1650	(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												5465.2353	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3425.8546	0.2100	719.4295	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1889.2157	0.2100	396.7353	(264)
Space and water heating			1116.1648	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1137.5854	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			31.8500	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3425.8546	1.1300	3871.2157	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1889.2157	1.1300	2134.8137	(278)
Space and water heating			6006.0295	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			6235.4110	(286)
Dwelling Primary energy Rate (DPER)			174.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 5, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	78 C	**DER**	31.85	**TER**	
Environmental	82 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.03	**DFEE**	80.86	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	174.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)

Internal Wall TImber	49.2900	9.0000	443.6100 (32c)
Internal Wall Brick	19.8100	75.0000	1485.7500 (32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	46.8423 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	72.7532	72.3787	72.0116	70.2875	69.9649	68.4633	68.4633	68.1852	69.0417	69.9649	70.6175	71.2997	(39)
Average = Sum(39)m / 12 =												70.2860	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0368	2.0263	2.0160	1.9677	1.9587	1.9167	1.9167	1.9089	1.9329	1.9587	1.9770	1.9961	(40)
HLP (average)												1.9677	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy			1.2978 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

19.4523	19.1587	18.7409	18.1153	17.5515	16.7754	16.1866	16.9066	17.2845	18.0535	18.8531	19.4369	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day)	43.4195 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	47.3732	46.0642	44.6312	42.9903	41.4112	39.6197	39.0309	40.7663	42.1594	43.9438	45.7586	47.3577	(44)
Energy conte	69.7415	60.9523	63.7770	56.1561	53.3625	45.8189	43.1303	47.9826	48.9028	56.6260	61.8443	69.5483	(45)
Energy content (annual)										Total = Sum(45)m =		677.8428	

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

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)

Total heat required for water heating calculated for each month

59.2803	51.8095	54.2105	47.7327	45.3581	38.9461	36.6608	40.7852	41.5674	48.1321	52.5677	59.1161	(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

59.2803	51.8095	54.2105	47.7327	45.3581	38.9461	36.6608	40.7852	41.5674	48.1321	52.5677	59.1161	(64)
							Total per year (kWh/year) = Sum(64)m =				576.1664	(64)
12Total per year (kWh/year)											576	(64)

Electric shower(s)

36.8218	32.8085	35.8256	34.1880	34.8295	33.2240	34.3314	34.8295	34.1880	35.8256	35.1520	36.8218	(64a)
				Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							418.8457	(64a)

Heat gains from water heating, kWh/month

24.0255	21.1545	22.5090	20.4802	20.0469	18.0425	17.7480	18.9037	18.9388	20.9894	21.9299	23.9845	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	32.2924	31.4799	30.2541	28.4447	26.9448	25.0590	23.8549	25.4082	26.3040	28.2116	30.4582	32.2372	(72)
Total internal gains	244.1074	250.7042	240.3193	234.2810	223.0382	215.7724	207.7263	208.1284	213.8721	220.0087	231.9982	239.1573	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	262.6307	286.1032	300.4708	330.8998	353.1925	355.1064	337.8125	311.3352	286.1938	262.1466	254.8491	254.5992	(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	22.4332	22.5492	22.6642	23.2201	23.3272	23.8388	23.8388	23.9360	23.6391	23.3272	23.1116	22.8905	
alpha	2.4955	2.5033	2.5109	2.5480	2.5551	2.5893	2.5893	2.5957	2.5759	2.5551	2.5408	2.5260	
util living area													
	0.9828	0.9774	0.9684	0.9429	0.8917	0.7923	0.6789	0.7246	0.8718	0.9516	0.9757	0.9842	(86)
MIT	17.7775	18.0109	18.4526	19.1606	19.8510	20.4586	20.7518	20.6954	20.2194	19.3635	18.5012	17.7831	(87)
Th 2	19.3089	19.3159	19.3227	19.3549	19.3610	19.3895	19.3895	19.3948	19.3785	19.3610	19.3487	19.3360	(88)
util rest of house													
	0.9782	0.9712	0.9590	0.9235	0.8480	0.6921	0.5009	0.5591	0.8009	0.9313	0.9680	0.9800	(89)
MIT 2	16.4967	16.7322	17.1742	17.8886	18.5517	19.1059	19.3143	19.2906	18.9132	18.0988	17.2407	16.5183	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	17.0783	17.3129	17.7547	18.4662	19.1417	19.7201	19.9671	19.9285	19.5063	18.6731	17.8131	17.0927	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.0783	17.3129	17.7547	18.4662	19.1417	19.7201	19.9671	19.9285	19.5063	18.6731	17.8131	17.0927	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9690	0.9604	0.9463	0.9093	0.8405	0.7167	0.5744	0.6239	0.8081	0.9194	0.9573	0.9715	(94)
Useful gains	254.4943	274.7806	284.3229	300.8761	296.8756	254.5078	194.0487	194.2514	231.2686	241.0061	243.9704	247.3333	(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													
	929.6616	898.4273	810.4714	672.3829	520.6571	350.5420	230.5200	240.5930	373.2613	564.8324	756.5305	919.2429	(97)
Space heating kWh													
	502.3245	419.0906	391.4545	267.4849	166.4935	0.0000	0.0000	0.0000	0.0000	240.9267	369.0433	499.9008	(98a)
Space heating requirement - total per year (kWh/year)												2856.7188	
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													
	502.3245	419.0906	391.4545	267.4849	166.4935	0.0000	0.0000	0.0000	0.0000	240.9267	369.0433	499.9008	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2856.7188	
Space heating per m2											(98c) / (4) =	79.9753	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W													
	0.0000	0.0000	0.0000	0.0000	0.0000	643.5547	506.6282	518.2074	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5320	0.6069	0.5655	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	342.3704	307.4780	293.0476	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	394.2484	375.3407	345.4141	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	37.3522	50.4899	38.9606	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)													
	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh													
	0.0000	0.0000	0.0000	0.0000	0.0000	9.3380	12.6225	9.7402	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												31.7007	(107)
Energy for space heating												79.9753	(99)
Energy for space cooling												0.8875	(108)
Total												80.8628	(109)
Fabric Energy Efficiency (DFEE)												80.9	(109)

Full SAP Calculation Printout

Property Reference	Flat 5, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	78 C	**DER**	31.85	**TER**	
Environmental	82 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.03	**DFEE**	80.86	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	174.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		98.5872	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2029 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6529 (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) =	0.6039 (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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 46.8423 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	72.7532	72.3787	72.0116	70.2875	69.9649	68.4633	68.4633	68.1852	69.0417	69.9649	70.6175	71.2997	(39)

Average = Sum(39)m / 12 = 70.2860

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0368	2.0263	2.0160	1.9677	1.9587	1.9167	1.9167	1.9089	1.9329	1.9587	1.9770	1.9961	(40)
HLP (average)												1.9677	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)

Energy content (annual) Total = Sum(45)m = 1145.2936

Distribution loss (46)m = 0.15 x (45)m												
17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:												
Total storage loss												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage												
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month												
157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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												
157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)

Total per year (kWh/year) = Sum(64)m = 1585.4320 (64)
12Total per year (kWh/year) 1585 (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												
49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	64.8904	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
58.4086	64.6667	58.4086	60.3556	58.4086	60.3556	58.4086	58.4086	60.3556	58.4086	60.3556	58.4086	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
110.9393	112.0905	109.1895	103.0136	95.2177	87.8906	82.9957	81.8445	84.7455	90.9213	98.7173	106.0443	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	29.4890	(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)													
-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)													
66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains													
277.8715	283.5407	271.4068	262.4222	248.8022	238.2991	227.7022	230.7147	237.6553	247.0206	262.8298	272.8145	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	296.3948	318.9397	331.5583	359.0410	378.9565	377.6332	357.7883	333.9214	309.9769	289.1585	285.6807	288.2564	(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	22.4332	22.5492	22.6642	23.2201	23.3272	23.8388	23.8388	23.9360	23.6391	23.3272	23.1116	22.8905
alpha	2.4955	2.5033	2.5109	2.5480	2.5551	2.5893	2.5893	2.5957	2.5759	2.5551	2.5408	2.5260

util living area													
	0.9775	0.9714	0.9610	0.9326	0.8771	0.7727	0.6569	0.6989	0.8529	0.9408	0.9688	0.9791	(86)
MIT	17.8840	18.1127	18.5462	19.2387	19.9107	20.4946	20.7715	20.7224	20.2705	19.4408	18.5970	17.8906	(87)
Th 2	19.9816	19.9869	19.9920	20.0161	20.0206	20.0417	20.0417	20.0456	20.0336	20.0206	20.0115	20.0020	(88)
util rest of house													
	0.9742	0.9671	0.9547	0.9204	0.8511	0.7165	0.5604	0.6092	0.8120	0.9278	0.9634	0.9760	(89)
MIT 2	17.1118	17.3424	17.7765	18.4760	19.1321	19.6896	19.9204	19.8894	19.4900	18.6830	17.8412	17.1312	(90)
Living area fraction											fLA = Living area / (4) =	0.4541	(91)
MIT	17.4624	17.6922	18.1260	18.8223	19.4857	20.0551	20.3069	20.2677	19.8444	19.0271	18.1844	17.4760	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.4624	17.6922	18.1260	18.8223	19.4857	20.0551	20.3069	20.2677	19.8444	19.0271	18.1844	17.4760	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9624	0.9534	0.9386	0.9013	0.8339	0.7174	0.5897	0.6325	0.8024	0.9104	0.9495	0.9650	(94)
Useful gains	285.2451	304.0745	311.2054	323.5917	315.9946	270.9089	210.9956	211.1934	248.7104	263.2370	271.2634	278.1572	(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													
	957.6078	925.8842	837.2088	697.4164	544.7229	373.4762	253.7835	263.7187	396.6054	589.6022	782.7542	946.5787	(97)
Space heating kWh													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98a)
Space heating requirement - total per year (kWh/year)												2857.1628	
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													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2857.1628	
Space heating per m2											(98c) / (4) =	79.9878	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	500.2379	417.8561	391.3466	269.1537	170.1739	0.0000	0.0000	0.0000	0.0000	242.8157	368.2734	497.3056	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	599.8056	501.0265	469.2405	322.7263	204.0454	0.0000	0.0000	0.0000	0.0000	291.1459	441.5748	596.2897	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1721	86.0857	85.8750	85.3804	84.5102	79.8000	79.8000	79.8000	79.8000	85.1537	85.8242	86.1663	(217)
Fuel for water heating, kWh/month													
	183.2154	161.3275	170.9864	153.9838	150.1131	139.4719	133.3435	145.4829	146.7783	156.0867	165.6254	182.8008	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3425.8546	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1889.2157	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.1650	(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												5465.2353	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	3425.8546	0.2100	719.4295	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1889.2157	0.2100	396.7353	(264)
Space and water heating			1116.1648	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1137.5854	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			31.8500	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	3425.8546	1.1300	3871.2157	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1889.2157	1.1300	2134.8137	(278)
Space and water heating			6006.0295	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			6235.4110	(286)
Dwelling Primary energy Rate (DPER)			174.5600	(287)

Full SAP Calculation Printout

Property Reference	Flat 5, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 5, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	78 C	**DER**	31.85	**TER**	
Environmental	82 B	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.03	**DFEE**	80.86	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	174.56	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	35.7200	(1b)	x 2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.6529	(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) =	0.6039	(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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k) (28)...(30) + (32) + (32a)...(32e) = 5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K 164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area) 17.7700 (36)
Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 46.8423 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	72.7532	72.3787	72.0116	70.2875	69.9649	68.4633	68.4633	68.1852	69.0417	69.9649	70.6175	71.2997	(39)

Average = Sum(39)m / 12 = 70.2860

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0368	2.0263	2.0160	1.9677	1.9587	1.9167	1.9167	1.9089	1.9329	1.9587	1.9770	1.9961	(40)
HLP (average)												1.9677	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)											Total = Sum(45)m =	1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	335.0888	350.2781	365.2567	385.1381	401.1053	393.2784	373.3833	350.6139	328.6205	315.4033	315.8738	324.9532	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)
Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.4332	22.5492	22.6642	23.2201	23.3272	23.8388	23.8388	23.9360	23.6391	23.3272	23.1116	22.8905	
alpha	2.4955	2.5033	2.5109	2.5480	2.5551	2.5893	2.5893	2.5957	2.5759	2.5551	2.5408	2.5260	
util living area													

	0.9706	0.9650	0.9523	0.9227	0.8643	0.7592	0.6404	0.6806	0.8378	0.9295	0.9613	0.9727	(86)
MIT	18.0036	18.2079	18.6449	19.3087	19.9596	20.5180	20.7855	20.7406	20.3082	19.5131	18.6886	18.0056	(87)
Th 2	19.9816	19.9869	19.9920	20.0161	20.0206	20.0417	20.0417	20.0456	20.0336	20.0206	20.0115	20.0020	(88)
util rest of house	0.9663	0.9598	0.9447	0.9090	0.8364	0.7016	0.5436	0.5899	0.7944	0.9145	0.9547	0.9688	(89)
MIT 2	17.2299	17.4362	17.8731	18.5430	19.1765	19.7080	19.9289	19.9012	19.5223	18.7520	17.9311	17.2449	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	17.5812	17.7866	18.2235	18.8907	19.5321	20.0758	20.3179	20.2823	19.8791	19.0976	18.2751	17.5903	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5812	17.7866	18.2235	18.8907	19.5321	20.0758	20.3179	20.2823	19.8791	19.0976	18.2751	17.5903	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9523	0.9444	0.9269	0.8891	0.8198	0.7039	0.5740	0.6148	0.7862	0.8962	0.9391	0.9557	(94)
Useful gains	319.1194	330.8039	338.5661	342.4283	328.8265	276.8337	214.3341	215.5479	258.3528	282.6525	296.6229	310.5447	(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	966.2502	932.7162	844.2318	702.2218	547.9716	374.8945	254.5386	264.7183	399.0016	594.5336	789.1544	954.7278	(97)
Space heating kWh	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98a)
Space heating requirement - total per year (kWh/year)												2750.1954	
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	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2750.1954	
Space heating per m2											(98c) / (4) =	76.9932	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	577.2965	484.9940	451.0975	310.6131	195.4963	0.0000	0.0000	0.0000	0.0000	278.2249	425.2071	574.6670	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1084	86.0303	85.8041	85.3050	84.4189	79.8000	79.8000	79.8000	79.8000	85.0614	85.7555	86.1047	(217)
Fuel for water heating, kWh/month	183.3509	161.4315	171.1277	154.1199	150.2756	139.4719	133.3435	145.4829	146.7783	156.2560	165.7580	182.9316	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3297.5964	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1890.3277	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.1650	(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												5338.0891	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3297.5964	3.6400	120.0325	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1890.3277	3.6400	68.8079	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	105.1650	16.4900	17.3417	(250)
Additional standing charges			92.0000	(251)
Total energy cost			305.6026	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.3629	(257)
SAP value		77.9067	
SAP rating (Section 12)		78	(258)
SAP band		C	

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	3297.5964	0.2100	692.4953	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1890.3277	0.2100	396.9688	(264)
Space and water heating			1089.4641	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1110.8847	(272)
CO2 emissions per m2			31.1000	(273)
EI value			81.5587	
EI rating			82	(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)	
Ground floor		35.7200 (1b)	x	2.7600 (2b)	=	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6643	0.6190	0.6190	0.5888	0.5888	0.5133	0.5133	0.4982	0.5133	0.5737	0.5586	0.6039	(22b)

Effective ac	0.7206	0.6916	0.6916	0.6733	0.6733	0.6317	0.6317	0.6241	0.6317	0.6646	0.6560	0.6823	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	46.8423 (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	23.4452	22.4997	22.4997	21.9065	21.9065	20.5531	20.5531	20.3047	20.5531	21.6209	21.3429	22.1994	(38)
Heat transfer coeff	70.2875	69.3420	69.3420	68.7488	68.7488	67.3954	67.3954	67.1470	67.3954	68.4633	68.1852	69.0417	(39)
Average = Sum(39)m / 12 =												68.4577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.9677	1.9413	1.9413	1.9247	1.9247	1.8868	1.8868	1.8798	1.8868	1.9167	1.9089	1.9329	(40)
HLP (average)												1.9165	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)
Hot water usage for other uses	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)
Average daily hot water use (litres/day)												73.3634	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	12.7500	0.6300	0.7000	0.7700	22.2104	(74)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	22.2104	37.4555	63.9209	104.7992	137.3944	155.3126	143.6966	116.4577	82.1854	48.0863	27.0677	18.5720	(83)
Total gains	338.7759	352.3347	369.0261	393.3185	408.3454	409.2568	386.9937	363.8648	338.4843	321.3517	320.0907	328.0833	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	23.2201	23.5367	23.5367	23.7398	23.7398	24.2165	24.2165	24.3061	24.2165	23.8388	23.9360	23.6391	
alpha	2.5480	2.5691	2.5691	2.5827	2.5827	2.6144	2.6144	2.6204	2.6144	2.5893	2.5957	2.5759	
util living area	0.9671	0.9610	0.9442	0.9067	0.8284	0.6797	0.5199	0.5655	0.7945	0.9132	0.9549	0.9692	(86)
MIT	18.2536	18.4713	18.9338	19.5516	20.1992	20.7020	20.9029	20.8749	20.4826	19.7440	18.9445	18.2694	(87)
Th 2	20.0161	20.0294	20.0294	20.0377	20.0377	20.0566	20.0566	20.0601	20.0566	20.0417	20.0456	20.0336	(88)
util rest of house	0.9623	0.9552	0.9352	0.8899	0.7922	0.6047	0.3999	0.4490	0.7396	0.8941	0.9471	0.9647	(89)
MIT 2	17.5004	17.7248	18.1829	18.7945	19.4139	19.8729	20.0191	20.0070	19.6956	18.9910	18.2065	17.5275	(90)
Living area fraction									fLA = Living area / (4) =			0.4541	(91)
MIT	17.8424	18.0638	18.5239	19.1383	19.7705	20.2494	20.4204	20.4011	20.0530	19.3329	18.5416	17.8644	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.8424	18.0638	18.5239	19.1383	19.7705	20.2494	20.4204	20.4011	20.0530	19.3329	18.5416	17.8644	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9478	0.9394	0.9169	0.8703	0.7804	0.6215	0.4490	0.4943	0.7394	0.8763	0.9308	0.9509	(94)
Useful gains	321.0831	330.9882	338.3575	342.3161	318.6841	254.3340	173.7581	179.8508	250.2630	281.5882	297.9421	311.9742	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	909.6917	871.1971	778.2880	648.8692	486.0871	313.3471	190.0838	201.5144	354.0252	543.1151	732.4200	895.0828	(97)
Space heating kWh	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98a)
Space heating requirement - total per year (kWh/year)												2414.7525	
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	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2414.7525	
Space heating per m2											(98c) / (4) =	67.6023	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	525.0897	435.2762	392.4559	264.6502	149.3379	0.0000	0.0000	0.0000	0.0000	233.3046	375.0889	520.1833	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9456	85.8402	85.5450	84.9812	83.8407	79.8000	79.8000	79.8000	79.8000	84.6955	85.5205	85.9332	(217)
Fuel for water heating, kWh/month	183.6983	161.7890	171.6460	154.7072	151.3119	139.4719	133.3435	145.4829	146.7783	156.9311	166.2135	183.2966	(219)
Space cooling fuel requirement	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(221)
Pumps and Fa	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												2895.3867	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)

Efficiency of water heater	79.8000	
Water heating fuel used	1894.6701	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	4940.2218	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2895.3867	5.6000	162.1417	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1894.6701	5.6000	106.1015	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	105.1650	26.0600	27.4060	(250)
Additional standing charges			99.0000	(251)
Total energy cost			406.3762	(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	2895.3867	0.2100	608.0312	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1894.6701	0.2100	397.8807	(264)
Space and water heating			1005.9119	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1027.3325	(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	2895.3867	1.1300	3271.7870	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1894.6701	1.1300	2140.9772	(278)
Space and water heating			5412.7642	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			5642.1457	(286)

SAP 10 EPC IMPROVEMENTS

Flat 5, Proposed

Current energy efficiency rating: C 78
Current environmental impact rating: B 82

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating: C 78
Potential environmental impact rating: B 82

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£39	£39	£0
Mains gas	£367	£367	£0
Space heating	£273	£273	£0
Water heating	£106	£106	£0
Lighting	£27	£27	£0
Total cost of fuels	£406	£406	£0
Total cost of uses	£406	£406	£0
Delivered energy	138 kWh/m²	138 kWh/m²	0 kWh/m²

Carbon dioxide emissions	1.0 tonnes	1.0 tonnes	0.0 tonnes
CO2 emissions per m²	29 kg/m²	29 kg/m²	0 kg/m²
Primary energy	158 kWh/m²	158 kWh/m²	0 kWh/m²

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)	
Ground floor	35.7200 (1b)	x	2.7600 (2b)	=	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	98.5872	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.2029 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.6529 (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) =	0.6039 (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	0.7700	0.7549	0.7398	0.6643	0.6492	0.5737	0.5737	0.5586	0.6039	0.6492	0.6794	0.7096	(22b)
Effective ac	0.7964	0.7849	0.7736	0.7206	0.7107	0.6646	0.6646	0.6560	0.6823	0.7107	0.7308	0.7518	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)
Internal Wall TImber			49.2900			9.0000	443.6100	(32c)
Internal Wall Brick			19.8100			75.0000	1485.7500	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)		17.7700 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	46.8423 (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	25.9109	25.5364	25.1693	23.4452	23.1226	21.6209	21.6209	21.3429	22.1994	23.1226	23.7752	24.4574	(38)
Heat transfer coeff	72.7532	72.3787	72.0116	70.2875	69.9649	68.4633	68.4633	68.1852	69.0417	69.9649	70.6175	71.2997	(39)
Average = Sum(39)m / 12 =												70.2860	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.0368	2.0263	2.0160	1.9677	1.9587	1.9167	1.9167	1.9089	1.9329	1.9587	1.9770	1.9961	(40)
HLP (average)												1.9677	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.2978	(42)
Hot water usage for mixer showers													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths													
	51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)
Hot water usage for other uses													
	27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)
Average daily hot water use (litres/day)												73.3634	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	
Distribution loss (46)m = 0.15 x (45)m													
	17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)
Total heat required for water heating calculated for each month													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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													
	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
										Total per year (kWh/year) = Sum(64)m =		1585.4320	(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)
Heat gains from water heating, kWh/month													
	49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)													
	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)													
	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains													
	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	10.6334	0.6300	0.7000	0.7700	18.5233	(74)

Solar gains	18.5233	35.3990	60.1515	96.6188	130.1543	139.3341	130.0862	103.2068	72.3216	42.1379	22.8509	15.4419	(83)
Total gains	335.0888	350.2781	365.2567	385.1381	401.1053	393.2784	373.3833	350.6139	328.6205	315.4033	315.8738	324.9532	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	22.4332	22.5492	22.6642	23.2201	23.3272	23.8388	23.8388	23.9360	23.6391	23.3272	23.1116	22.8905	
alpha	2.4955	2.5033	2.5109	2.5480	2.5551	2.5893	2.5893	2.5957	2.5759	2.5551	2.5408	2.5260	
util living area													
	0.9706	0.9650	0.9523	0.9227	0.8643	0.7592	0.6404	0.6806	0.8378	0.9295	0.9613	0.9727	(86)
MIT	18.0036	18.2079	18.6449	19.3087	19.9596	20.5180	20.7855	20.7406	20.3082	19.5131	18.6886	18.0056	(87)
Th 2	19.9816	19.9869	19.9920	20.0161	20.0206	20.0417	20.0417	20.0456	20.0336	20.0206	20.0115	20.0020	(88)
util rest of house													
	0.9663	0.9598	0.9447	0.9090	0.8364	0.7016	0.5436	0.5899	0.7944	0.9145	0.9547	0.9688	(89)
MIT 2	17.2299	17.4362	17.8731	18.5430	19.1765	19.7080	19.9289	19.9012	19.5223	18.7520	17.9311	17.2449	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	17.5812	17.7866	18.2235	18.8907	19.5321	20.0758	20.3179	20.2823	19.8791	19.0976	18.2751	17.5903	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.5812	17.7866	18.2235	18.8907	19.5321	20.0758	20.3179	20.2823	19.8791	19.0976	18.2751	17.5903	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec

Utilisation	0.9523	0.9444	0.9269	0.8891	0.8198	0.7039	0.5740	0.6148	0.7862	0.8962	0.9391	0.9557	(94)
Useful gains	319.1194	330.8039	338.5661	342.4283	328.8265	276.8337	214.3341	215.5479	258.3528	282.6525	296.6229	310.5447	(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	966.2502	932.7162	844.2318	702.2218	547.9716	374.8945	254.5386	264.7183	399.0016	594.5336	789.1544	954.7278	(97)
Space heating kWh	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98a)
Space heating requirement - total per year (kWh/year)												2750.1954	
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	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2750.1954	
Space heating per m2											(98c) / (4) =	76.9932	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	481.4653	404.4850	376.2153	259.0513	163.0439	0.0000	0.0000	0.0000	0.0000	232.0396	354.6227	479.2723	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	577.2965	484.9940	451.0975	310.6131	195.4963	0.0000	0.0000	0.0000	0.0000	278.2249	425.2071	574.6670	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.1084	86.0303	85.8041	85.3050	84.4189	79.8000	79.8000	79.8000	79.8000	85.0614	85.7555	86.1047	(217)
Fuel for water heating, kWh/month	183.3509	161.4315	171.1277	154.1199	150.2756	139.4719	133.3435	145.4829	146.7783	156.2560	165.7580	182.9316	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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												3297.5964	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												1890.3277	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												105.1650	(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												5338.0891	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	3297.5964	3.6400	120.0325	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1890.3277	3.6400	68.8079	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	105.1650	16.4900	17.3417	(250)
Additional standing charges			92.0000	(251)
Total energy cost			305.6026	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600 (256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.3629 (257)
SAP value		77.9067
SAP rating (Section 12)		78 (258)
SAP band		C

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	3297.5964	0.2100	692.4953	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1890.3277	0.2100	396.9688	(264)
Space and water heating			1089.4641	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1110.8847	(272)
CO2 emissions per m2			31.1000	(273)
EI value			81.5587	
EI rating			82	(274)
EI band			B	

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)	
Ground floor	35.7200	(1b) x	2.7600	(2b) =	98.5872	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	35.7200					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	98.5872	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.2029	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.6529	(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) =	0.6039	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6643	0.6190	0.6190	0.5888	0.5888	0.5133	0.5133	0.4982	0.5133	0.5737	0.5586	0.6039	(22b)
Effective ac	0.7206	0.6916	0.6916	0.6733	0.6733	0.6317	0.6317	0.6241	0.6317	0.6646	0.6560	0.6823	(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	
Window (Uw = 1.20)			5.7000	1.1450	6.5267			(27)
Door			1.7000	3.0000	5.1000			(26)
Corridor Brick Wall	5.4400	1.7000	3.7400	0.7000	2.6180	9.0000	33.6600	(29a)
External Cavity wall	47.6900	5.7000	41.9900	0.2000	8.3980	60.0000	2519.4000	(29a)
External Roof 1	35.7200		35.7200	0.1800	6.4296	9.0000	321.4800	(30)
Total net area of external elements Aum(A, m2)			88.8500					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		29.0723			(33)
Party Wall 1			19.8400	0.0000	0.0000	0.0000	0.0000	(32)
Party Floor 1			35.7200			30.0000	1071.6000	(32d)

Internal Wall TImber	49.2900	9.0000	443.6100 (32c)
Internal Wall Brick	19.8100	75.0000	1485.7500 (32c)
Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =		5875.5000 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K			164.4877 (35)
Thermal bridges (Default value 0.200 * total exposed area)			17.7700 (36)
Point Thermal bridges		(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =		46.8423 (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	23.4452	22.4997	22.4997	21.9065	21.9065	20.5531	20.5531	20.3047	20.5531	21.6209	21.3429	22.1994	(38)
Heat transfer coeff	70.2875	69.3420	69.3420	68.7488	68.7488	67.3954	67.3954	67.1470	67.3954	68.4633	68.1852	69.0417	(39)
Average = Sum(39)m / 12 =												68.4577	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	1.9677	1.9413	1.9413	1.9247	1.9247	1.8868	1.8868	1.8798	1.8868	1.9167	1.9089	1.9329	(40)
HLP (average)												1.9165	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.2978 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

51.7459	50.9648	49.8536	48.1894	46.6896	44.6250	43.0586	44.9740	45.9792	48.0250	50.1519	51.7049	(42b)

Hot water usage for other uses

27.9209	26.9055	25.8902	24.8749	23.8596	22.8443	22.8443	23.8596	24.8749	25.8902	26.9055	27.9209	(42c)

Average daily hot water use (litres/day) 73.3634 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	79.6668	77.8704	75.7438	73.0643	70.5492	67.4693	65.9030	68.8336	70.8542	73.9152	77.0574	79.6258	(44)
Energy conte	117.2833	103.0382	108.2363	95.4403	90.9098	78.0260	72.8247	81.0185	82.1873	95.2472	104.1457	116.9363	(45)
Energy content (annual)										Total = Sum(45)m =		1145.2936	

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

17.5925	15.4557	16.2355	14.3160	13.6365	11.7039	10.9237	12.1528	12.3281	14.2871	15.6219	17.5404	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 40.5973	35.8417	38.5982	36.0317	35.9511	33.2725	33.5834	35.0769	34.9418	37.6664	38.0009	40.5764	(61)

Total heat required for water heating calculated for each month

157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(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

157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
								Total per year (kWh/year) = Sum(64)m =			1585.4320	(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

49.1460	43.2206	45.6381	40.7418	39.2153	34.2618	32.6101	35.7079	36.0627	41.0863	44.1287	49.0254	(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	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	77.8685	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	14.8872	13.2227	10.7534	8.1410	6.0855	5.1376	5.5514	7.2159	9.6852	12.2976	14.3531	15.3009	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	165.5810	167.2992	162.9694	153.7517	142.1159	131.1800	123.8741	122.1559	126.4858	135.7035	147.3392	158.2751	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	44.0847	(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)	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	-51.9123	(71)
Water heating gains (Table 5)	66.0565	64.3164	61.3416	56.5859	52.7087	47.5858	43.8307	47.9944	50.0871	55.2235	61.2898	65.8944	(72)
Total internal gains	316.5655	314.8791	305.1052	288.5194	270.9510	253.9443	243.2971	247.4071	256.2989	273.2654	293.0229	309.5113	(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	5.7000	12.7500	0.6300	0.7000	0.7700	22.2104	(74)

Solar gains	22.2104	37.4555	63.9209	104.7992	137.3944	155.3126	143.6966	116.4577	82.1854	48.0863	27.0677	18.5720	(83)
Total gains	338.7759	352.3347	369.0261	393.3185	408.3454	409.2568	386.9937	363.8648	338.4843	321.3517	320.0907	328.0833	(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	23.2201	23.5367	23.5367	23.7398	23.7398	24.2165	24.2165	24.3061	24.2165	23.8388	23.9360	23.6391

alpha	2.5480	2.5691	2.5691	2.5827	2.5827	2.6144	2.6144	2.6204	2.6144	2.5893	2.5957	2.5759	
util living area	0.9671	0.9610	0.9442	0.9067	0.8284	0.6797	0.5199	0.5655	0.7945	0.9132	0.9549	0.9692	(86)
MIT	18.2536	18.4713	18.9338	19.5516	20.1992	20.7020	20.9029	20.8749	20.4826	19.7440	18.9445	18.2694	(87)
Th 2	20.0161	20.0294	20.0294	20.0377	20.0377	20.0566	20.0566	20.0601	20.0566	20.0417	20.0456	20.0336	(88)
util rest of house	0.9623	0.9552	0.9352	0.8899	0.7922	0.6047	0.3999	0.4490	0.7396	0.8941	0.9471	0.9647	(89)
MIT 2	17.5004	17.7248	18.1829	18.7945	19.4139	19.8729	20.0191	20.0070	19.6956	18.9910	18.2065	17.5275	(90)
Living area fraction										fLA = Living area / (4) =		0.4541	(91)
MIT	17.8424	18.0638	18.5239	19.1383	19.7705	20.2494	20.4204	20.4011	20.0530	19.3329	18.5416	17.8644	(92)
Temperature adjustment												0.0000	
adjusted MIT	17.8424	18.0638	18.5239	19.1383	19.7705	20.2494	20.4204	20.4011	20.0530	19.3329	18.5416	17.8644	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.9478	0.9394	0.9169	0.8703	0.7804	0.6215	0.4490	0.4943	0.7394	0.8763	0.9308	0.9509	(94)
Useful gains	321.0831	330.9882	338.3575	342.3161	318.6841	254.3340	173.7581	179.8508	250.2630	281.5882	297.9421	311.9742	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	909.6917	871.1971	778.2880	648.8692	486.0871	313.3471	190.0838	201.5144	354.0252	543.1151	732.4200	895.0828	(97)
Space heating kWh	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98a)
Space heating requirement - total per year (kWh/year)												2414.7525	
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	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												2414.7525	
Space heating per m2											(98c) / (4) =	67.6023	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	437.9248	363.0204	327.3083	220.7182	124.5478	0.0000	0.0000	0.0000	0.0000	194.5760	312.8241	433.8328	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	525.0897	435.2762	392.4559	264.6502	149.3379	0.0000	0.0000	0.0000	0.0000	233.3046	375.0889	520.1833	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	157.8806	138.8799	146.8346	131.4720	126.8609	111.2985	106.4081	116.0953	117.1291	132.9136	142.1466	157.5127	(64)
Efficiency of water heater												79.8000	(216)
(217)m	85.9456	85.8402	85.5450	84.9812	83.8407	79.8000	79.8000	79.8000	79.8000	84.6955	85.5205	85.9332	(217)
Fuel for water heating, kWh/month	183.6983	161.7890	171.6460	154.7072	151.3119	139.4719	133.3435	145.4829	146.7783	156.9311	166.2135	183.2966	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	13.0307	10.4537	9.4124	6.8959	5.3266	4.3519	4.8591	6.3161	8.2039	10.7640	12.1579	13.3928	(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	2895.3867	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	1894.6701	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	105.1650	(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	4940.2218	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	2895.3867	5.6000	162.1417	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1894.6701	5.6000	106.1015	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	105.1650	26.0600	27.4060	(250)
Additional standing charges			99.0000	(251)
Total energy cost			406.3762	(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	2895.3867	0.2100	608.0312	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	1894.6701	0.2100	397.8807	(264)
Space and water heating			1005.9119	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	105.1650	0.1443	15.1786	(268)
Total CO2, kg/year			1027.3325	(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	2895.3867	1.1300	3271.7870	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	1894.6701	1.1300	2140.9772	(278)
Space and water heating			5412.7642	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	105.1650	1.5338	161.3055	(282)
Total Primary energy kWh/year			5642.1457	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 6, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	29.61	**TER**	
Environmental	78 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.52	**DFEE**	81.58	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	163.13	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	North	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Top-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	66.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	38.97 m	56.27 m²	2.76 m

8.0 Living Area 19.73 m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	16.22	14.52	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area
External Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.55	60.00	23.30	15.70	0.00	None	7.60	Enter Gross Area
Solid External Wall	Solid Wall	Other	0.30	0.00	49.90	47.57	0.00	None	2.33	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	51.46

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.16	9.00	56.27	54.43	None	0.00	Enter Gross Area	1.84

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	56.27

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		1.00	1.40
Door	SAP table	Solid Door			Air Filled	0.00			3.00
Rooflight	SAP table	Roof Window	Double Low-E Soft 0.05	≥ 16 mm	Argon Filled	0.63	PVC	0.70	1.70

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
SW1W	Window	Solid External Wall	West	1.11	0
SW2N	Window	External Cavity Wall	North	3.31	0
SW3N	Window	External Cavity Wall	North	0.96	0
SW4N	Window	External Cavity Wall	North	3.33	0
SW5E	Window	Solid External Wall	East	1.22	0
SW6S/R	Rooflight	External Roof 1	South	0.46	35
SW7S/R	Rooflight	External Roof 1	South	0.46	35
SW8S/R	Rooflight	External Roof 1	South	0.46	35
SW9S/R	Rooflight	External Roof 1	South	0.46	35
SD1N	Door	Corridor Brick Wall	North	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation		
Mechanical Ventilation System Present	No	

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0	
Number of open flues	0	
Number of chimneys/flues attached to closed fire	0	
Number of flues attached to solid fuel boiler	0	
Number of flues attached to other heater	0	
Number of blocked chimneys	0	
Number of intermittent extract fans	2	
Number of passive vents	0	
Number of flueless gas fires	0	
21.0 Fixed Cooling System	No	
22.0 Pressure Testing	No	
Property Tested?	Yes	
Test Method	Blower Door	

22.0 Lighting

No Fixed Lighting	No	
Lighting Capacity Calculation	List of Lights	

Name	Efficacy	Power	Capacity	Count
LED	26.40	20.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	

Summary for Input Data

Manufacturer	Baxi Heating	
System Type	Combi boiler	
Controls SAP Code	2104	
Delayed Start Stat	No	
Burner Control	On/Off	
HETAS approved System	No	
Flue Type	Balanced	
Fan Assisted Flue	Yes	
Is MHS Pumped	No pump	
Heating Pump Age	2013 or later	
Heat Emitter	Radiators	
Flow Temperature	Unknown	
Flow Temperature Value	55.00	
Boiler Interlock	No	
Combi boiler type	No Combi	
25.0 Main Heating 2	None	
26.0 Heat Networks	None	
27.0 Secondary Heating	None	
28.0 Water Heating		
Water Heating	Main Heating 1	
SAP Code	901	
Flue Gas Heat Recovery System	No	
Waste Water Heat Recovery Instantaneous System 1	No	
Waste Water Heat Recovery Instantaneous System 2	No	
Waste Water Heat Recovery Storage System	No	
Solar Panel	No	
Water use <= 125 litres/person/day	Yes	
Summer Immersion	No	
Cold Water Source	From header tank	
Bath Count	1	
Supplementary Immersion	No	
Immersion Only Heating Hot Water	No	
28.3 Waste Water Heat Recovery System		
29.0 Hot Water Cylinder	None	
Cylinder Stat	No	
Cylinder In Heated Space	No	
Independent Time Control	No	
Insulation Type	Measured Loss	
Cylinder Volume	150.00	L
Loss	1.61	kWh/day
Pipes insulation	All accessible pipework insulated	
In Airing Cupboard	No	
31.0 Thermal Store	None	

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 6, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	29.61	**TER**	
Environmental	78 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.52	**DFEE**	81.58	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	163.13	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		63.6081				(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges										(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =			92.7461	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	132.3260	131.7842	131.2530	128.7583	128.2915	126.1187	126.1187	125.7163	126.9556	128.2915	129.2358	130.2229	(39)
Average = Sum(39)m / 12 =												128.7560	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3516	2.3420	2.3326	2.2882	2.2799	2.2413	2.2413	2.2342	2.2562	2.2799	2.2967	2.3143	(40)
HLP (average)												2.2882	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(64)
12Total per year (kWh/year)												1921	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.4427	91.2759	82.4427	85.1908	82.4427	85.1908	82.4427	82.4427	85.1908	82.4427	85.1908	82.4427	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	377.0396	385.4608	368.7494	356.6367	337.7053	323.4516	308.9423	312.2906	321.8481	334.4220	356.0056	369.6313	(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	7.6000	10.6334	0.6300	1.0000	0.7700	35.2825	(74)
East	1.2200	19.6403	0.6300	1.0000	0.7700	10.4612	(76)
West	1.1100	19.6403	0.6300	1.0000	0.7700	9.5180	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	87.3889	165.1316	267.5366	398.5402	505.6637	527.5594	498.0278	414.5441	312.5206	193.8791	107.6754	72.8216	(83)
Total gains	464.4285	550.5924	636.2860	755.1769	843.3690	851.0110	806.9702	726.8346	634.3688	528.3011	463.6810	442.4529	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	7.7960	7.8280	7.8597	8.0120	8.0411	8.1797	8.1797	8.2058	8.1257	8.0411	7.9824	7.9219	
alpha	1.5197	1.5219	1.5240	1.5341	1.5361	1.5453	1.5453	1.5471	1.5417	1.5361	1.5322	1.5281	
util living area													
	0.9247	0.9017	0.8662	0.7981	0.7060	0.5910	0.4917	0.5370	0.7004	0.8391	0.9037	0.9294	(86)
MIT	15.9260	16.3531	17.1222	18.2189	19.2549	20.0999	20.5321	20.4424	19.7293	18.3987	17.0015	15.8731	(87)
Th 2	19.8242	19.8290	19.8337	19.8559	19.8600	19.8793	19.8793	19.8829	19.8719	19.8600	19.8516	19.8429	(88)
util rest of house													
	0.9173	0.8920	0.8523	0.7758	0.6695	0.5316	0.4037	0.4516	0.6496	0.8166	0.8927	0.9225	(89)
MIT 2	15.1837	15.6080	16.3696	17.4546	18.4521	19.2478	19.6196	19.5578	18.9280	17.6510	16.2691	15.1419	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.4440	15.8693	16.6335	17.7226	18.7336	19.5466	19.9396	19.8680	19.2090	17.9132	16.5259	15.3983	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.4440	15.8693	16.6335	17.7226	18.7336	19.5466	19.9396	19.8680	19.2090	17.9132	16.5259	15.3983	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8748	0.8438	0.7992	0.7221	0.6260	0.5114	0.4090	0.4503	0.6133	0.7642	0.8456	0.8816	(94)
Useful gains	406.2996	464.5991	508.5233	545.2768	527.9704	435.2100	330.0479	327.2870	389.0484	403.7428	392.0982	390.0742	(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													
	1474.6382	1445.5770	1330.0504	1135.9774	902.3478	623.8573	421.1830	435.9795	648.6099	938.2219	1218.1641	1458.2742	(97)
Space heating kWh													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98a)
Space heating requirement - total per year (kWh/year)												4556.2791	
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													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4556.2791	
Space heating per m2											(98c) / (4) =	80.9717	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	953.0503	790.4282	732.8730	509.9573	333.9770	0.0000	0.0000	0.0000	0.0000	476.8015	713.1504	952.9266	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5900	86.5044	86.3033	85.8783	85.1375	79.8000	79.8000	79.8000	79.8000	85.7368	86.3115	86.5931	(217)
Fuel for water heating, kWh/month													
	220.8961	194.5038	206.1236	185.4712	180.5236	168.9714	161.5469	176.2538	177.8232	187.8142	199.5238	220.3732	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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												5463.1644	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2279.8248	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												235.7793	(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	8023.7685	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5463.1644	0.2100	1147.2645	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2279.8248	0.2100	478.7632	(264)
Space and water heating			1626.0277	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1666.3000	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			29.6100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5463.1644	1.1300	6173.3758	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2279.8248	1.1300	2576.2020	(278)
Space and water heating			8749.5778	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	235.7793	1.5338	361.6461	(282)
Total Primary energy kWh/year			9179.3000	(286)
Dwelling Primary energy Rate (DPER)			163.1300	(287)

Full SAP Calculation Printout

Property Reference	Flat 6, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	29.61	**TER**	
Environmental	78 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.52	**DFEE**	81.58	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	163.13	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1288 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.5788 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788 (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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)

External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	63.6081			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	92.7461 (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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	132.3260	131.7842	131.2530	128.7583	128.2915	126.1187	126.1187	125.7163	126.9556	128.2915	129.2358	130.2229	(39)
Average = Sum(39)m / 12 =												128.7560	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3516	2.3420	2.3326	2.2882	2.2799	2.2413	2.2413	2.2342	2.2562	2.2799	2.2967	2.3143	(40)
HLP (average)												2.2882	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5175	23.1625	22.6575	21.9011	21.2195	20.2812	19.5693	20.4398	20.8967	21.8264	22.7930	23.4989	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												52.5576	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	57.3439	55.7588	54.0237	52.0373	50.1257	47.9573	47.2454	49.3460	51.0329	53.1927	55.3894	57.3252	(44)
Energy conte	84.4201	73.7802	77.1988	67.9738	64.5920	55.4610	52.2076	58.0811	59.1956	68.5441	74.8606	84.1863	(45)
Energy content (annual)										Total = Sum(45)m =		820.5011	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	71.7571	62.7132	65.6190	57.7777	54.9032	47.1419	44.3764	49.3689	50.3162	58.2625	63.6315	71.5584	(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	71.7571	62.7132	65.6190	57.7777	54.9032	47.1419	44.3764	49.3689	50.3162	58.2625	63.6315	71.5584	(64)
									Total per year (kWh/year) = Sum(64)m =			697.4260	(64)
12Total per year (kWh/year)												697	(64)
Electric shower(s)	44.5649	39.7077	43.3592	41.3772	42.1536	40.2105	41.5508	42.1536	41.3772	43.3592	42.5439	44.5649	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							506.9226	(64a)
Heat gains from water heating, kWh/month	29.0805	25.6052	27.2446	24.7887	24.2642	21.8381	21.4818	22.8806	22.9234	25.4054	26.5438	29.0308	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.4427	91.2759	82.4427	85.1908	82.4427	85.1908	82.4427	82.4427	85.1908	82.4427	85.1908	82.4427	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	39.0867	38.1030	36.6190	34.4288	32.6132	30.3307	28.8734	30.7535	31.8380	34.1471	36.8665	39.0199	(72)
Total internal gains	336.0982	345.6438	331.0526	322.5112	306.4614	296.1317	284.7144	284.8984	293.0051	301.6653	318.6189	328.8195	(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	7.6000	10.6334	0.6300	1.0000	0.7700	35.2825	(74)
East	1.2200	19.6403	0.6300	1.0000	0.7700	10.4612	(76)
West	1.1100	19.6403	0.6300	1.0000	0.7700	9.5180	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	87.3889	165.1316	267.5366	398.5402	505.6637	527.5594	498.0278	414.5441	312.5206	193.8791	107.6754	72.8216	(83)
Total gains	423.4871	510.7754	598.5891	721.0514	812.1251	823.6910	782.7422	699.4425	605.5258	495.5444	426.2943	401.6411	(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	7.7960	7.8280	7.8597	8.0120	8.0411	8.1797	8.1797	8.2058	8.1257	8.0411	7.9824	7.9219	
alpha	1.5197	1.5219	1.5240	1.5341	1.5361	1.5453	1.5453	1.5471	1.5417	1.5361	1.5322	1.5281	
util living area	0.9333	0.9106	0.8757	0.8080	0.7161	0.6010	0.5011	0.5489	0.7130	0.8506	0.9136	0.9379	(86)
MIT	15.8285	16.2635	17.0448	18.1603	19.2145	20.0765	20.5186	20.4235	19.6923	18.3351	16.9155	15.7735	(87)
Th 2	19.1092	19.1151	19.1208	19.1481	19.1532	19.1773	19.1773	19.1818	19.1680	19.1532	19.1429	19.1321	(88)
util rest of house	0.9220	0.8954	0.8534	0.7710	0.6543	0.4975	0.3454	0.3968	0.6249	0.8134	0.8963	0.9274	(89)
MIT 2	14.6370	15.0666	15.8347	16.9250	17.9128	18.6818	19.0154	18.9677	18.3879	17.1263	15.7338	14.5953	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.0548	15.4863	16.2590	17.3581	18.3692	19.1708	19.5425	19.4782	18.8453	17.5502	16.1481	15.0084	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.0548	15.4863	16.2590	17.3581	18.3692	19.1708	19.5425	19.4782	18.8453	17.5502	16.1481	15.0084	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8832	0.8508	0.8042	0.7231	0.6214	0.4971	0.3816	0.4262	0.6050	0.7674	0.8532	0.8902	(94)
Useful gains	374.0074	434.5617	481.3865	521.4056	504.6597	409.4536	298.6740	298.1084	366.3511	380.2602	363.7102	357.5529	(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	1423.1360	1395.1017	1280.9003	1089.0494	855.6072	576.4678	371.1019	386.9739	602.4367	891.6490	1169.3413	1407.5055	(97)
Space heating kWh	780.5517	645.4829	594.8382	408.7035	261.1050	0.0000	0.0000	0.0000	0.0000	380.4732	580.0544	781.1648	(98a)
Space heating requirement - total per year (kWh/year)												4432.3737	
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	780.5517	645.4829	594.8382	408.7035	261.1050	0.0000	0.0000	0.0000	0.0000	380.4732	580.0544	781.1648	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4432.3737	
Space heating per m2											(98c) / (4) =	78.7697	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1185.5154	933.2781	955.4437	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.5252	0.5834	0.5412	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	622.6235	544.4847	517.0453	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	908.6779	863.5784	770.4670	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	205.9591	237.4057	188.5458	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	51.4898	59.3514	47.1365	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												157.9777	(107)
Energy for space heating												78.7697	(99)
Energy for space cooling												2.8075	(108)
Total												81.5772	(109)
Fabric Energy Efficiency (DFEE)												81.6	(109)

Full SAP Calculation Printout

Property Reference	Flat 6, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	29.61	**TER**	
Environmental	78 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.52	**DFEE**	81.58	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	163.13	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		63.6081				(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges										(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =			92.7461	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	132.3260	131.7842	131.2530	128.7583	128.2915	126.1187	126.1187	125.7163	126.9556	128.2915	129.2358	130.2229	(39)
Average = Sum(39)m / 12 =												128.7560	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3516	2.3420	2.3326	2.2882	2.2799	2.2413	2.2413	2.2342	2.2562	2.2799	2.2967	2.3143	(40)
HLP (average)												2.2882	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(64)
12Total per year (kWh/year)												1921	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.4427	91.2759	82.4427	85.1908	82.4427	85.1908	82.4427	82.4427	85.1908	82.4427	85.1908	82.4427	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	377.0396	385.4608	368.7494	356.6367	337.7053	323.4516	308.9423	312.2906	321.8481	334.4220	356.0056	369.6313	(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	7.6000	10.6334	0.6300	1.0000	0.7700	35.2825	(74)
East	1.2200	19.6403	0.6300	1.0000	0.7700	10.4612	(76)
West	1.1100	19.6403	0.6300	1.0000	0.7700	9.5180	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	87.3889	165.1316	267.5366	398.5402	505.6637	527.5594	498.0278	414.5441	312.5206	193.8791	107.6754	72.8216	(83)
Total gains	464.4285	550.5924	636.2860	755.1769	843.3690	851.0110	806.9702	726.8346	634.3688	528.3011	463.6810	442.4529	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	7.7960	7.8280	7.8597	8.0120	8.0411	8.1797	8.1797	8.2058	8.1257	8.0411	7.9824	7.9219	
alpha	1.5197	1.5219	1.5240	1.5341	1.5361	1.5453	1.5453	1.5471	1.5417	1.5361	1.5322	1.5281	
util living area													
	0.9247	0.9017	0.8662	0.7981	0.7060	0.5910	0.4917	0.5370	0.7004	0.8391	0.9037	0.9294	(86)
MIT	15.9260	16.3531	17.1222	18.2189	19.2549	20.0999	20.5321	20.4424	19.7293	18.3987	17.0015	15.8731	(87)
Th 2	19.8242	19.8290	19.8337	19.8559	19.8600	19.8793	19.8793	19.8829	19.8719	19.8600	19.8516	19.8429	(88)
util rest of house													
	0.9173	0.8920	0.8523	0.7758	0.6695	0.5316	0.4037	0.4516	0.6496	0.8166	0.8927	0.9225	(89)
MIT 2	15.1837	15.6080	16.3696	17.4546	18.4521	19.2478	19.6196	19.5578	18.9280	17.6510	16.2691	15.1419	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.4440	15.8693	16.6335	17.7226	18.7336	19.5466	19.9396	19.8680	19.2090	17.9132	16.5259	15.3983	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.4440	15.8693	16.6335	17.7226	18.7336	19.5466	19.9396	19.8680	19.2090	17.9132	16.5259	15.3983	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8748	0.8438	0.7992	0.7221	0.6260	0.5114	0.4090	0.4503	0.6133	0.7642	0.8456	0.8816	(94)
Useful gains	406.2996	464.5991	508.5233	545.2768	527.9704	435.2100	330.0479	327.2870	389.0484	403.7428	392.0982	390.0742	(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													
	1474.6382	1445.5770	1330.0504	1135.9774	902.3478	623.8573	421.1830	435.9795	648.6099	938.2219	1218.1641	1458.2742	(97)
Space heating kWh													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98a)
Space heating requirement - total per year (kWh/year)												4556.2791	
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													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4556.2791	
Space heating per m2											(98c) / (4) =	80.9717	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	794.8439	659.2172	611.2161	425.3044	278.5368	0.0000	0.0000	0.0000	0.0000	397.6524	594.7674	794.7408	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	953.0503	790.4282	732.8730	509.9573	333.9770	0.0000	0.0000	0.0000	0.0000	476.8015	713.1504	952.9266	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5900	86.5044	86.3033	85.8783	85.1375	79.8000	79.8000	79.8000	79.8000	85.7368	86.3115	86.5931	(217)
Fuel for water heating, kWh/month													
	220.8961	194.5038	206.1236	185.4712	180.5236	168.9714	161.5469	176.2538	177.8232	187.8142	199.5238	220.3732	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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												5463.1644	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2279.8248	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												235.7793	(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	8023.7685	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5463.1644	0.2100	1147.2645	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2279.8248	0.2100	478.7632	(264)
Space and water heating			1626.0277	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1666.3000	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			29.6100	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5463.1644	1.1300	6173.3758	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2279.8248	1.1300	2576.2020	(278)
Space and water heating			8749.5778	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	235.7793	1.5338	361.6461	(282)
Total Primary energy kWh/year			9179.3000	(286)
Dwelling Primary energy Rate (DPER)			163.1300	(287)

Full SAP Calculation Printout

Property Reference	Flat 6, Notional	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Notional	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	76 C	**DER**	29.61	**TER**	
Environmental	78 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.52	**DFEE**	81.58	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	163.13	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		63.6081				(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges										(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =			92.7461	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	132.3260	131.7842	131.2530	128.7583	128.2915	126.1187	126.1187	125.7163	126.9556	128.2915	129.2358	130.2229	(39)
Average = Sum(39)m / 12 =												128.7560	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3516	2.3420	2.3326	2.2882	2.2799	2.2413	2.2413	2.2342	2.2562	2.2799	2.2967	2.3143	(40)
HLP (average)												2.2882	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3770	29.6452	24.1091	18.2521	13.6437	11.5186	12.4462	16.1781	21.7141	27.5711	32.1795	34.3046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	442.9736	439.6652	424.1457	398.9462	372.4972	348.0532	333.6675	339.9121	354.3629	380.0235	409.1248	432.9407	(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	7.6000	10.6334	0.6300	1.0000	0.7700	35.2825	(74)
East	1.2200	19.6403	0.6300	1.0000	0.7700	10.4612	(76)
West	1.1100	19.6403	0.6300	1.0000	0.7700	9.5180	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	87.3889	165.1316	267.5366	398.5402	505.6637	527.5594	498.0278	414.5441	312.5206	193.8791	107.6754	72.8216	(83)
Total gains	530.3625	604.7968	691.6822	797.4865	878.1608	875.6126	831.6953	754.4562	666.8835	573.9026	516.8002	505.7623	(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	7.7960	7.8280	7.8597	8.0120	8.0411	8.1797	8.1797	8.2058	8.1257	8.0411	7.9824	7.9219	
alpha	1.5197	1.5219	1.5240	1.5341	1.5361	1.5453	1.5453	1.5471	1.5417	1.5361	1.5322	1.5281	
util living area													
	0.9107	0.8895	0.8524	0.7861	0.6949	0.5822	0.4824	0.5254	0.6865	0.8233	0.8897	0.9159	(86)
MIT	16.0785	16.4717	17.2324	18.2892	19.2982	20.1203	20.5453	20.4606	19.7691	18.4839	17.1198	16.0232	(87)
Th 2	19.8242	19.8290	19.8337	19.8559	19.8600	19.8793	19.8793	19.8829	19.8719	19.8600	19.8516	19.8429	(88)
util rest of house													
	0.9020	0.8788	0.8374	0.7629	0.6579	0.5227	0.3951	0.4404	0.6349	0.7992	0.8774	0.9079	(89)
MIT 2	15.3330	15.7235	16.4755	17.5202	18.4903	19.2636	19.6279	19.5697	18.9612	17.7307	16.3838	15.2892	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.5944	15.9858	16.7409	17.7898	18.7736	19.5640	19.9495	19.8821	19.2445	17.9948	16.6418	15.5465	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5944	15.9858	16.7409	17.7898	18.7736	19.5640	19.9495	19.8821	19.2445	17.9948	16.6418	15.5465	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8558	0.8283	0.7831	0.7095	0.6156	0.5037	0.4011	0.4403	0.6002	0.7466	0.8277	0.8631	(94)
Useful gains	453.8742	500.9657	541.6541	565.8560	540.5995	441.0359	333.6313	332.2114	400.2828	428.4995	427.7502	436.5203	(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	1494.5463	1460.9368	1344.1434	1144.6398	907.4767	626.0537	422.4406	437.7556	653.1207	948.6864	1233.1461	1477.5793	(97)
Space heating kWh	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98a)
Space heating requirement - total per year (kWh/year)												4447.5457	
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	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4447.5457	
Space heating per m2											(98c) / (4) =	79.0394	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)												0.0000	(201)
Fraction of space heat from main system(s)												1.0000	(202)
Efficiency of main space heating system 1 (in %)												83.4000	(206)
Efficiency of main space heating system 2 (in %)												0.0000	(207)
Efficiency of secondary/supplementary heating system, %												0.0000	(208)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	928.3694	773.5019	715.8898	499.6695	327.2861	0.0000	0.0000	0.0000	0.0000	464.0516	695.3058	928.7145	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5522	86.4722	86.2659	85.8418	85.0964	79.8000	79.8000	79.8000	79.8000	85.6868	86.2711	86.5561	(217)
Fuel for water heating, kWh/month	220.9925	194.5762	206.2129	185.5500	180.6107	168.9714	161.5469	176.2538	177.8232	187.9240	199.6171	220.4675	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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												5332.7886	(211)
Space heating fuel - main system 2												0.0000	(213)
Space heating fuel - secondary												0.0000	(215)
Efficiency of water heater												79.8000	
Water heating fuel used												2280.5462	(219)
Space cooling fuel												0.0000	(221)
Electricity for pumps and fans:													
main heating flue fan												45.0000	(230e)
Total electricity for the above, kWh/year												45.0000	(231)
Electricity for lighting (calculated in Appendix L)												235.7793	(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	7894.1141	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5332.7886	3.6400	194.1135	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2280.5462	3.6400	83.0119	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	235.7793	16.4900	38.8800	(250)
Additional standing charges			92.0000	(251)
Total energy cost			415.4259	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4768	(257)
SAP value		76.0614	
SAP rating (Section 12)		76	(258)
SAP band		C	

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	5332.7886	0.2100	1119.8856	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2280.5462	0.2100	478.9147	(264)
Space and water heating			1598.8003	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1639.0726	(272)
CO2 emissions per m2			29.1300	(273)
EI value			78.3119	
EI rating			78	(274)
EI band			C	

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)	
Ground floor		56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6367	0.5932	0.5932	0.5643	0.5643	0.4920	0.4920	0.4775	0.4920	0.5498	0.5354	0.5788	(22b)
Effective ac	0.7027	0.6760	0.6760	0.6592	0.6592	0.6210	0.6210	0.6140	0.6210	0.6512	0.6433	0.6675	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	63.6081			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	92.7461 (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	36.0121	34.6440	34.6440	33.7856	33.7856	31.8274	31.8274	31.4679	31.8274	33.3725	32.9701	34.2095	(38)
Heat transfer coeff	128.7583	127.3902	127.3902	126.5318	126.5318	124.5735	124.5735	124.2141	124.5735	126.1187	125.7163	126.9556	(39)
Average = Sum(39)m / 12 =												126.1106	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2882	2.2639	2.2639	2.2487	2.2487	2.2139	2.2139	2.2075	2.2139	2.2413	2.2342	2.2562	(40)
HLP (average)												2.2412	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8745 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)

Hot water usage for other uses

33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)

Average daily hot water use (litres/day)	88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)

Total heat required for water heating calculated for each month

191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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

191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =		1920.7652	(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

59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3770	29.6452	24.1091	18.2521	13.6437	11.5186	12.4462	16.1781	21.7141	27.5711	32.1795	34.3046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)

Total internal gains

	442.9736	439.6652	424.1457	398.9462	372.4972	348.0532	333.6675	339.9121	354.3629	380.0235	409.1248	432.9407 (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	7.6000	12.7500	0.6300	1.0000	0.7700	42.3055	(74)
East	1.2200	23.7835	0.6300	1.0000	0.7700	12.6680	(76)
West	1.1100	23.7835	0.6300	1.0000	0.7700	11.5258	(80)
South	1.8400	52.2745	0.6300	0.7000	1.0000	38.1759	(82)

Solar gains	104.6753	173.6105	280.7852	426.1108	526.9519	581.2765	543.4602	461.2691	350.2643	219.2639	127.2172	87.6212 (83)
Total gains	547.6488	613.2757	704.9308	825.0570	899.4491	929.3297	877.1276	801.1812	704.6272	599.2874	536.3420	520.5619 (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	8.0120	8.0980	8.0980	8.1530	8.1530	8.2811	8.2811	8.3051	8.2811	8.1797	8.2058	8.1257	
alpha	1.5341	1.5399	1.5399	1.5435	1.5435	1.5521	1.5521	1.5537	1.5521	1.5453	1.5471	1.5417	
util living area	0.9011	0.8799	0.8360	0.7596	0.6531	0.5083	0.3873	0.4294	0.6358	0.7955	0.8750	0.9066	(86)
MIT	16.4013	16.7876	17.6066	18.6300	19.6342	20.4018	20.7496	20.6914	20.0312	18.8284	17.4702	16.3728	(87)
Th 2	19.8559	19.8680	19.8680	19.8757	19.8757	19.8931	19.8931	19.8963	19.8931	19.8793	19.8829	19.8719	(88)
util rest of house	0.8915	0.8683	0.8192	0.7333	0.6097	0.4384	0.2848	0.3275	0.5760	0.7670	0.8610	0.8976	(89)
MIT 2	15.6708	16.0581	16.8632	17.8614	18.8146	19.5126	19.7861	19.7534	19.2103	18.0754	16.7473	15.6524	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.9270	16.3139	17.1239	18.1309	19.1020	19.8243	20.1239	20.0823	19.4982	18.3394	17.0008	15.9050	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.9270	16.3139	17.1239	18.1309	19.1020	19.8243	20.1239	20.0823	19.4982	18.3394	17.0008	15.9050	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8436	0.8170	0.7648	0.6824	0.5748	0.4336	0.3080	0.3463	0.5510	0.7161	0.8098	0.8509	(94)
Useful gains	461.9750	501.0470	539.1405	562.9876	517.0268	402.9343	270.1490	277.4587	388.2610	429.1790	434.3410	442.9696	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1419.8137	1377.5784	1251.4659	1066.7822	810.0516	526.2417	314.4153	333.1797	585.2662	875.1890	1156.6855	1397.1450	(97)
Space heating kWh	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98a)
Space heating requirement - total per year (kWh/year)												3974.1997	
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	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3974.1997	
Space heating per m2											(98c) / (4) =	70.6273	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	854.4748	706.2699	635.4557	434.9306	261.4034	0.0000	0.0000	0.0000	0.0000	397.8794	623.6068	851.2069	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4290	86.3328	86.0690	85.5857	84.6289	79.8000	79.8000	79.8000	79.8000	85.3933	86.0920	86.4267	(217)
Fuel for water heating, kWh/month	221.3074	194.8903	206.6847	186.1054	181.6085	168.9714	161.5469	176.2538	177.8232	188.5699	200.0323	220.7975	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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	4765.2274	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2284.5913	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	235.7793	(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	7330.5980	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4765.2274	5.6000	266.8527	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2284.5913	5.6000	127.9371	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	235.7793	26.0600	61.4441	(250)
Additional standing charges			99.0000	(251)
Total energy cost			566.9609	(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	4765.2274	0.2100	1000.6978	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2284.5913	0.2100	479.7642	(264)
Space and water heating			1480.4619	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1520.7342	(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	4765.2274	1.1300	5384.7070	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2284.5913	1.1300	2581.5882	(278)
Space and water heating			7966.2952	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	235.7793	1.5338	361.6461	(282)
Total Primary energy kWh/year			8396.0173	(286)

SAP 10 EPC IMPROVEMENTS

Flat 6, Notional

Current energy efficiency rating:	C 76
Current environmental impact rating:	C 78

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	C 76
Potential environmental impact rating:	C 78

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£73	£73	£0
Mains gas	£494	£494	£0
Space heating	£378	£378	£0
Water heating	£128	£128	£0
Lighting	£61	£61	£0
Total cost of fuels	£567	£567	£0
Total cost of uses	£567	£567	£0
Delivered energy	130 kWh/m²	130 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.5 tonnes	1.5 tonnes	0.0 tonnes
CO2 emissions per m²	27 kg/m²	27 kg/m²	0 kg/m²
Primary energy	149 kWh/m²	149 kWh/m²	0 kWh/m²

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)	
Ground floor	56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.6081			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)							29.1380	(36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 92.7461 (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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	132.3260	131.7842	131.2530	128.7583	128.2915	126.1187	126.1187	125.7163	126.9556	128.2915	129.2358	130.2229	(39)

Average = Sum(39)m / 12 = 128.7560

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.3516	2.3420	2.3326	2.2882	2.2799	2.2413	2.2413	2.2342	2.2562	2.2799	2.2967	2.3143	(40)
HLP (average)												2.2882	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8745 (42)

Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)

Hot water usage for other uses

33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)

Average daily hot water use (litres/day) 88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)

Energy content (annual) Total = Sum(45)m = 1387.5336

Distribution loss (46)m = 0.15 x (45)m												
21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)

Water storage loss:

Total storage loss

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)

If cylinder contains dedicated solar storage

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss 0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss 49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)

Total heat required for water heating calculated for each month

191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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

191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)

Total per year (kWh/year) = Sum(64)m = 1920.7652 (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

59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	33.3770	29.6452	24.1091	18.2521	13.6437	11.5186	12.4462	16.1781	21.7141	27.5711	32.1795	34.3046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	442.9736	439.6652	424.1457	398.9462	372.4972	348.0532	333.6675	339.9121	354.3629	380.0235	409.1248	432.9407	(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	7.6000	10.6334	0.6300	1.0000	0.7700	35.2825	(74)
East	1.2200	19.6403	0.6300	1.0000	0.7700	10.4612	(76)
West	1.1100	19.6403	0.6300	1.0000	0.7700	9.5180	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	87.3889	165.1316	267.5366	398.5402	505.6637	527.5594	498.0278	414.5441	312.5206	193.8791	107.6754	72.8216	(83)
Total gains	530.3625	604.7968	691.6822	797.4865	878.1608	875.6126	831.6953	754.4562	666.8835	573.9026	516.8002	505.7623	(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	7.7960	7.8280	7.8597	8.0120	8.0411	8.1797	8.1797	8.2058	8.1257	8.0411	7.9824	7.9219	
alpha	1.5197	1.5219	1.5240	1.5341	1.5361	1.5453	1.5453	1.5471	1.5417	1.5361	1.5322	1.5281	
util living area	0.9107	0.8895	0.8524	0.7861	0.6949	0.5822	0.4824	0.5254	0.6865	0.8233	0.8897	0.9159	(86)

MIT	16.0785	16.4717	17.2324	18.2892	19.2982	20.1203	20.5453	20.4606	19.7691	18.4839	17.1198	16.0232	(87)
Th 2	19.8242	19.8290	19.8337	19.8559	19.8600	19.8793	19.8793	19.8829	19.8719	19.8600	19.8516	19.8429	(88)
util rest of house	0.9020	0.8788	0.8374	0.7629	0.6579	0.5227	0.3951	0.4404	0.6349	0.7992	0.8774	0.9079	(89)
MIT 2	15.3330	15.7235	16.4755	17.5202	18.4903	19.2636	19.6279	19.5697	18.9612	17.7307	16.3838	15.2892	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.5944	15.9858	16.7409	17.7898	18.7736	19.5640	19.9495	19.8821	19.2445	17.9948	16.6418	15.5465	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5944	15.9858	16.7409	17.7898	18.7736	19.5640	19.9495	19.8821	19.2445	17.9948	16.6418	15.5465	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8558	0.8283	0.7831	0.7095	0.6156	0.5037	0.4011	0.4403	0.6002	0.7466	0.8277	0.8631	(94)
Useful gains	453.8742	500.9657	541.6541	565.8560	540.5995	441.0359	333.6313	332.2114	400.2828	428.4995	427.7502	436.5203	(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	1494.5463	1460.9368	1344.1434	1144.6398	907.4767	626.0537	422.4406	437.7556	653.1207	948.6864	1233.1461	1477.5793	(97)
Space heating kWh	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98a)
Space heating requirement - total per year (kWh/year)												4447.5457	
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	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4447.5457	
Space heating per m2											(98c) / (4) =	79.0394	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	774.2600	645.1006	597.0521	416.7244	272.9566	0.0000	0.0000	0.0000	0.0000	387.0190	579.8850	774.5479	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	928.3694	773.5019	715.8898	499.6695	327.2861	0.0000	0.0000	0.0000	0.0000	464.0516	695.3058	928.7145	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5522	86.4722	86.2659	85.8418	85.0964	79.8000	79.8000	79.8000	79.8000	85.6868	86.2711	86.5561	(217)
Fuel for water heating, kWh/month	220.9925	194.5762	206.2129	185.5500	180.6107	168.9714	161.5469	176.2538	177.8232	187.9240	199.6171	220.4675	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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	5332.7886	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2280.5462	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	235.7793	(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	7894.1141	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5332.7886	3.6400	194.1135	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2280.5462	3.6400	83.0119	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	235.7793	16.4900	38.8800	(250)
Additional standing charges			92.0000	(251)
Total energy cost			415.4259	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4768	(257)
SAP value		76.0614	
SAP rating (Section 12)		76	(258)
SAP band		C	

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	5332.7886	0.2100	1119.8856	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2280.5462	0.2100	478.9147	(264)
Space and water heating			1598.8003	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1639.0726	(272)
CO2 emissions per m2			29.1300	(273)
EI value			78.3119	
EI rating			78	(274)
EI band			C	

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)	
Ground floor	56.2700	(1b) x	2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6367	0.5932	0.5932	0.5643	0.5643	0.4920	0.4920	0.4775	0.4920	0.5498	0.5354	0.5788	(22b)
Effective ac	0.7027	0.6760	0.6760	0.6592	0.6592	0.6210	0.6210	0.6140	0.6210	0.6512	0.6433	0.6675	(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	
Window (Uw = 1.40)			9.9300	1.3258	13.1648			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.9373	0.8911			(27a)
SW7S/R			0.4600	1.9373	0.8911			(27a)
SW8S/R			0.4600	1.9373	0.8911			(27a)
SW9S/R			0.4600	1.9373	0.8911			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.5500	8.6350	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3000	14.2710	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1600	8.7088	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		63.6081			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	92.7461 (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	36.0121	34.6440	34.6440	33.7856	33.7856	31.8274	31.8274	31.4679	31.8274	33.3725	32.9701	34.2095	(38)
Heat transfer coeff	128.7583	127.3902	127.3902	126.5318	126.5318	124.5735	124.5735	124.2141	124.5735	126.1187	125.7163	126.9556	(39)
Average = Sum(39)m / 12 =												126.1106	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2882	2.2639	2.2639	2.2487	2.2487	2.2139	2.2139	2.2075	2.2139	2.2413	2.2342	2.2562	(40)
HLP (average)												2.2412	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8745 (42)
Hot water usage for mixer showers		
0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000 0.0000		(42a)
Hot water usage for baths		
62.6907 61.7443 60.3980 58.3819 56.5649 54.0636 52.1659 54.4864 55.7043 58.1827 60.7595 62.6410		(42b)
Hot water usage for other uses		
33.8264 32.5963 31.3663 30.1362 28.9062 27.6761 27.6761 28.9062 30.1362 31.3663 32.5963 33.8264		(42c)
Average daily hot water use (litres/day)		88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m													
	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
										Total per year (kWh/year) = Sum(64)m =		1920.7652	(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													
	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(65)

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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Metabolic gains (Table 5), Watts													
(66)m	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	33.3770	29.6452	24.1091	18.2521	13.6437	11.5186	12.4462	16.1781	21.7141	27.5711	32.1795	34.3046	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)													
	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)													
	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains													
	442.9736	439.6652	424.1457	398.9462	372.4972	348.0532	333.6675	339.9121	354.3629	380.0235	409.1248	432.9407	(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	7.6000	12.7500	0.6300	1.0000	0.7700	42.3055	(74)
East	1.2200	23.7835	0.6300	1.0000	0.7700	12.6680	(76)
West	1.1100	23.7835	0.6300	1.0000	0.7700	11.5258	(80)
South	1.8400	52.2745	0.6300	0.7000	1.0000	38.1759	(82)

Solar gains	104.6753	173.6105	280.7852	426.1108	526.9519	581.2765	543.4602	461.2691	350.2643	219.2639	127.2172	87.6212	(83)
Total gains	547.6488	613.2757	704.9308	825.0570	899.4491	929.3297	877.1276	801.1812	704.6272	599.2874	536.3420	520.5619	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.0120	8.0980	8.0980	8.1530	8.1530	8.2811	8.2811	8.3051	8.2811	8.1797	8.2058	8.1257	
alpha	1.5341	1.5399	1.5399	1.5435	1.5435	1.5521	1.5521	1.5537	1.5521	1.5453	1.5471	1.5417	
util living area	0.9011	0.8799	0.8360	0.7596	0.6531	0.5083	0.3873	0.4294	0.6358	0.7955	0.8750	0.9066	(86)
MIT	16.4013	16.7876	17.6066	18.6300	19.6342	20.4018	20.7496	20.6914	20.0312	18.8284	17.4702	16.3728	(87)
Th 2	19.8559	19.8680	19.8680	19.8757	19.8757	19.8931	19.8931	19.8963	19.8931	19.8793	19.8829	19.8719	(88)
util rest of house	0.8915	0.8683	0.8192	0.7333	0.6097	0.4384	0.2848	0.3275	0.5760	0.7670	0.8610	0.8976	(89)
MIT 2	15.6708	16.0581	16.8632	17.8614	18.8146	19.5126	19.7861	19.7534	19.2103	18.0754	16.7473	15.6524	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.9270	16.3139	17.1239	18.1309	19.1020	19.8243	20.1239	20.0823	19.4982	18.3394	17.0008	15.9050	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.9270	16.3139	17.1239	18.1309	19.1020	19.8243	20.1239	20.0823	19.4982	18.3394	17.0008	15.9050	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8436	0.8170	0.7648	0.6824	0.5748	0.4336	0.3080	0.3463	0.5510	0.7161	0.8098	0.8509	(94)
Useful gains	461.9750	501.0470	539.1405	562.9876	517.0268	402.9343	270.1490	277.4587	388.2610	429.1790	434.3410	442.9696	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1419.8137	1377.5784	1251.4659	1066.7822	810.0516	526.2417	314.4153	333.1797	585.2662	875.1890	1156.6855	1397.1450	(97)
Space heating kWh	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98a)
Space heating requirement - total per year (kWh/year)												3974.1997	
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	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3974.1997	
Space heating per m2											(98c) / (4) =	70.6273	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	712.6320	589.0291	529.9701	362.7321	218.0104	0.0000	0.0000	0.0000	0.0000	331.8314	520.0880	709.9065	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	854.4748	706.2699	635.4557	434.9306	261.4034	0.0000	0.0000	0.0000	0.0000	397.8794	623.6068	851.2069	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4290	86.3328	86.0690	85.5857	84.6289	79.8000	79.8000	79.8000	79.8000	85.3933	86.0920	86.4267	(217)
Fuel for water heating, kWh/month	221.3074	194.8903	206.6847	186.1054	181.6085	168.9714	161.5469	176.2538	177.8232	188.5699	200.0323	220.7975	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	29.2147	23.4371	21.1025	15.4606	11.9422	9.7569	10.8941	14.1606	18.3932	24.1328	27.2580	30.0267	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	4765.2274	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2284.5913	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	235.7793	(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	7330.5980	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4765.2274	5.6000	266.8527	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2284.5913	5.6000	127.9371	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	235.7793	26.0600	61.4441	(250)
Additional standing charges			99.0000	(251)
Total energy cost			566.9609	(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	4765.2274	0.2100	1000.6978	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2284.5913	0.2100	479.7642	(264)
Space and water heating			1480.4619	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	235.7793	0.1443	34.0302	(268)
Total CO2, kg/year			1520.7342	(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	4765.2274	1.1300	5384.7070	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2284.5913	1.1300	2581.5882	(278)
Space and water heating			7966.2952	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	235.7793	1.5338	361.6461	(282)
Total Primary energy kWh/year			8396.0173	(286)

Summary for Input Data

elmhurst energy

Property Reference	Flat 6, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	28.57	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.47	**DFEE**	77.94	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	156.34	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SUMMARY FOR INPUT DATA FOR: Existing Dwelling

Orientation	North	
Property Tenture	ND	
Transaction Type	5	
Terrain Type	Suburban	
1.0 Property Type	Flat, Detached	
Position of Flat	Top-floor flat	
Which Floor	2	
2.0 Number of Storeys	1	
3.0 Date Built	2024	
3.0 Property Age Band	L	
4.0 Sheltered Sides	0	
5.0 Sunlight/Shade	Average or unknown	
6.0 Thermal Mass Parameter	Precise calculation	
Thermal Mass	66.00	kJ/m²K
7.0 Electricity Tariff	Standard	
Smart electricity meter fitted	No	
Smart gas meter fitted	No	

7.0 Measurements

	Heat Loss Perimeter	Internal Floor Area	Average Storey Height
Ground floor:	38.97 m	56.27 m²	2.76 m

8.0 Living Area	19.73	m²

9.0 External Walls

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Res	Shelter	Openings	Area Calculation Type
Corridor Brick Wall	Solid Wall	Solid wall : plasterboard on dabs, insulation, any outside structure	1.36	9.00	16.22	14.52	0.70	Stairwell Access Corridor 3	1.70	Enter Gross Area
External Cavity Wall	Cavity Wall	Cavity wall : plasterboard on dabs, AAC block, filled cavity, any outside structure	0.20	60.00	23.30	15.70	0.00	None	7.60	Enter Gross Area
Solid External Wall	Solid Wall	Other	0.31	0.00	49.90	47.57	0.00	None	2.33	Enter Gross Area

9.2 Internal Walls

Description	Construction	Kappa (kJ/m²K)	Area (m²)
Internal Wall TImber	Plasterboard on timber frame	9.00	51.46

10.0 External Roofs

Description	Type	Construction	U-Value (W/m²K)	Kappa (kJ/m²K)	Gross Area(m²)	Nett Area (m²)	Shelter Code	Shelter Factor	Calculation Type	Openings
External Roof 1	External Plane Roof	Plasterboard, insulated at ceiling level	0.18	9.00	56.27	54.43	None	0.00	Enter Gross Area	1.84

11.1 Party Floors

Description	Storey Index	Construction	Kappa (kJ/m²K)	Area (m²)
Party Floor 1	Lowest occupied	Timber I-joists, carpeted	20.00	56.27

Summary for Input Data

elmhurst energy

12.0 Opening Types

Description	Data Source	Type	Glazing	Glazing Gap	Filling Type	G-value	Frame Type	Frame Factor	U Value (W/m²K)
Window	Manufacturer	Window	Double Low-E Soft 0.05			0.63		0.70	1.20
Door	SAP table	Solid Door			Air Filled	0.00	Wood		3.00
Rooflight	Manufacturer	Roof Window	Double Low-E Soft 0.05			0.63		0.70	1.40

13.0 Openings

Name	Opening Type	Location	Orientation	Area (m²)	Pitch
SW1W	Window	Solid External Wall	West	1.11	0
SW2N	Window	External Cavity Wall	North	3.31	0
SW3N	Window	External Cavity Wall	North	0.96	0
SW4N	Window	External Cavity Wall	North	3.33	0
SW5E	Window	Solid External Wall	East	1.22	0
SW6S/R	Rooflight	External Roof 1	South	0.46	35
SW7S/R	Rooflight	External Roof 1	South	0.46	35
SW8S/R	Rooflight	External Roof 1	South	0.46	35
SW9S/R	Rooflight	External Roof 1	South	0.46	35
SD1N	Door	Corridor Brick Wall	North	1.70	0

14.0 Conservatory	None	
15.0 Draught Proofing	100	%
16.0 Draught Lobby	No	
17.0 Thermal Bridging	Default	
Y-value	0.20	W/m²K

19.0 Mechanical Ventilation

Mechanical Ventilation

Mechanical Ventilation System Present	No

20.0 Fans, Open Fireplaces, Flues

Number of open chimneys	0
Number of open flues	0
Number of chimneys/flues attached to closed fire	0
Number of flues attached to solid fuel boiler	0
Number of flues attached to other heater	0
Number of blocked chimneys	0
Number of intermittent extract fans	2
Number of passive vents	0
Number of flueless gas fires	0
21.0 Fixed Cooling System	No
22.0 Pressure Testing	No
Property Tested?	Yes
Test Method	Blower Door

22.0 Lighting

No Fixed Lighting	No
Lighting Capacity Calculation	List of Lights

Name	Efficacy	Power	Capacity	Count
LED	66.00	8.00	528.00	15

24.0 Main Heating 1	Database	
Percentage of Heat	100.00	%
Database Ref. No.	18559	
Fuel Type	Mains gas	
SAP Code	0	
In Winter	83.40	
In Summer	79.80	
Model Name	ECO COMPACT 25 COMBI	
Manufacturer	Baxi Heating	

Summary for Input Data

System Type	Combi boiler
Controls SAP Code	2104
Delayed Start Stat	No
Burner Control	Modulating
HETAS approved System	No
Flue Type	Balanced
Fan Assisted Flue	Yes
Is MHS Pumped	No pump
Heating Pump Age	2013 or later
Heat Emitter	Radiators
Flow Temperature	Unknown
Flow Temperature Value	35.00
Boiler Interlock	No
Combi boiler type	Standard Combi
25.0 Main Heating 2	None
26.0 Heat Networks	None
27.0 Secondary Heating	None
28.0 Water Heating	
Water Heating	Main Heating 1
SAP Code	901
Flue Gas Heat Recovery System	No
Waste Water Heat Recovery Instantaneous System 1	No
Waste Water Heat Recovery Instantaneous System 2	No
Waste Water Heat Recovery Storage System	No
Solar Panel	No
Water use <= 125 litres/person/day	Yes
Summer Immersion	No
Cold Water Source	From header tank
Bath Count	1
Supplementary Immersion	No
Immersion Only Heating Hot Water	No
28.3 Waste Water Heat Recovery System	
29.0 Hot Water Cylinder	None
Cylinder Stat	No
Cylinder In Heated Space	No
Independent Time Control	No
In Airing Cupboard	No
31.0 Thermal Store	None

Recommendations

Lower cost measures

None

Further measures to achieve even higher standards

None

Full SAP Calculation Printout

Property Reference	Flat 6, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	28.57	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.47	**DFEE**	77.94	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	156.34	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	155.3052	(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		2 * 10 =	20.0000 (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) =		20.0000 / (5) =	0.1288 (8)
Number of storeys in the dwelling (ns)			1 (9)
Additional infiltration		[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.5788 (18)
Number of sides sheltered			0 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.5788 (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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		56.7577				(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		85.8957	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	125.4756	124.9337	124.4026	121.9078	121.4411	119.2682	119.2682	118.8659	120.1052	121.4411	122.3853	123.3725	(39)
Average = Sum(39)m / 12 =												121.9056	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2299	2.2203	2.2108	2.1665	2.1582	2.1196	2.1196	2.1124	2.1344	2.1582	2.1750	2.1925	(40)
HLP (average)												2.1664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)											Total = Sum(45)m =	1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(64)
12Total per year (kWh/year)												1921	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5338	91.3767	82.5338	85.2849	82.5338	85.2849	82.5338	82.5338	85.2849	82.5338	85.2849	82.5338	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	377.1307	385.5616	368.8405	356.7308	337.7964	323.5458	309.0334	312.3816	321.9422	334.5131	356.0997	369.7223	(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	7.6000	10.6334	0.6300	0.7000	0.7700	24.6977	(74)
East	1.2200	19.6403	0.6300	0.7000	0.7700	7.3228	(76)
West	1.1100	19.6403	0.6300	0.7000	0.7700	6.6626	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	70.8104	133.1786	213.8548	315.1678	396.7765	412.6094	390.0569	326.6759	248.7363	155.8875	87.1443	59.0687	(83)
Total gains	447.9411	518.7402	582.6953	671.8986	734.5730	736.1552	699.0903	639.0576	570.6785	490.4006	443.2440	428.7910	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	8.2216	8.2572	8.2925	8.4622	8.4947	8.6495	8.6495	8.6788	8.5892	8.4947	8.4292	8.3617	
alpha	1.5481	1.5505	1.5528	1.5641	1.5663	1.5766	1.5766	1.5786	1.5726	1.5663	1.5619	1.5574	
util living area	0.9264	0.9063	0.8760	0.8164	0.7334	0.6229	0.5227	0.5639	0.7193	0.8475	0.9065	0.9306	(86)
MIT	16.0086	16.4067	17.1328	18.1864	19.2011	20.0591	20.5080	20.4230	19.7156	18.4194	17.0662	15.9640	(87)
Th 2	19.8851	19.8899	19.8946	19.9168	19.9209	19.9402	19.9402	19.9438	19.9328	19.9209	19.9125	19.9037	(88)
util rest of house	0.9194	0.8973	0.8634	0.7964	0.7002	0.5671	0.4379	0.4825	0.6724	0.8269	0.8962	0.9240	(89)
MIT 2	15.2999	15.6960	16.4167	17.4634	18.4468	19.2627	19.6553	19.5943	18.9598	17.7085	16.3678	15.2663	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.5484	15.9452	16.6678	17.7169	18.7113	19.5420	19.9543	19.8849	19.2248	17.9578	16.6127	15.5109	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5484	15.9452	16.6678	17.7169	18.7113	19.5420	19.9543	19.8849	19.2248	17.9578	16.6127	15.5109	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8780	0.8508	0.8122	0.7432	0.6546	0.5429	0.4391	0.4773	0.6342	0.7756	0.8504	0.8841	(94)
Useful gains	393.2705	441.3363	473.2459	499.3867	480.8838	399.6449	306.9929	305.0247	361.9367	380.3500	376.9178	379.0818	(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	1411.3966	1379.9189	1264.9030	1074.8481	851.4573	589.4185	400.0607	414.2316	615.5118	893.5376	1164.2116	1395.4554	(97)
Space heating kWh	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98a)
Space heating requirement - total per year (kWh/year)												4372.0902	
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	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4372.0902	
Space heating per m2											(98c) / (4) =	77.6984	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	908.2564	756.2680	706.2264	496.8013	330.5835	0.0000	0.0000	0.0000	0.0000	457.8076	679.6781	906.6930	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5202	86.4383	86.2440	85.8315	85.1168	79.8000	79.8000	79.8000	79.8000	85.6615	86.2345	86.5211	(217)
Fuel for water heating, kWh/month	221.0741	194.6525	206.2652	185.5724	180.5675	168.9714	161.5469	176.2538	177.8232	187.9794	199.7019	220.5566	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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	5242.3144	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2280.9650	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	148.6024	(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	7716.8818	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5242.3144	0.2100	1100.8860	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2280.9650	0.2100	479.0026	(264)
Space and water heating			1579.8887	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1607.5786	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			28.5700	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5242.3144	1.1300	5923.8153	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2280.9650	1.1300	2577.4904	(278)
Space and water heating			8501.3057	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	148.6024	1.5338	227.9314	(282)
Total Primary energy kWh/year			8797.3131	(286)
Dwelling Primary energy Rate (DPER)			156.3400	(287)

Full SAP Calculation Printout

Property Reference	Flat 6, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	28.57	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.47	**DFEE**	77.94	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	156.34	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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

---

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =		155.3052	(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	2 * 10 =	20.0000 (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) =	20.0000 / (5) =	0.1288 (8)
Number of storeys in the dwelling (ns)		1 (9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method		Blower Door
Measured/design AP50		15.0000 (17)
Infiltration rate		0.5788 (18)
Number of sides sheltered		0 (19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788 (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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
If exhaust air heat pump using Appendix N, (23b) = (23a) x Fmv (equation (N5)), otherwise (23b) = (23a)												0.0000	(23b)
If balanced with heat recovery: efficiency in % allowing for in-use factor (from Table 4h) =												0.0000	(23c)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)

External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.7577			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	85.8957 (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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	125.4756	124.9337	124.4026	121.9078	121.4411	119.2682	119.2682	118.8659	120.1052	121.4411	122.3853	123.3725	(39)
Average = Sum(39)m / 12 =												121.9056	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2299	2.2203	2.2108	2.1665	2.1582	2.1196	2.1196	2.1124	2.1344	2.1582	2.1750	2.1925	(40)
HLP (average)												2.1664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	23.5175	23.1625	22.6575	21.9011	21.2195	20.2812	19.5693	20.4398	20.8967	21.8264	22.7930	23.4989	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												52.5576	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	57.3439	55.7588	54.0237	52.0373	50.1257	47.9573	47.2454	49.3460	51.0329	53.1927	55.3894	57.3252	(44)
Energy conte	84.4201	73.7802	77.1988	67.9738	64.5920	55.4610	52.2076	58.0811	59.1956	68.5441	74.8606	84.1863	(45)
Energy content (annual)										Total = Sum(45)m =		820.5011	
Distribution loss (46)m = 0.15 x (45)m	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(61)
Total heat required for water heating calculated for each month	71.7571	62.7132	65.6190	57.7777	54.9032	47.1419	44.3764	49.3689	50.3162	58.2625	63.6315	71.5584	(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	71.7571	62.7132	65.6190	57.7777	54.9032	47.1419	44.3764	49.3689	50.3162	58.2625	63.6315	71.5584	(64)
									Total per year (kWh/year) = Sum(64)m =			697.4260	(64)
12Total per year (kWh/year)												697	(64)
Electric shower(s)	44.5649	39.7077	43.3592	41.3772	42.1536	40.2105	41.5508	42.1536	41.3772	43.3592	42.5439	44.5649	(64a)
					Total Energy used by instantaneous electric shower(s) (kWh/year) = Sum(64a)m =							506.9226	(64a)
Heat gains from water heating, kWh/month	29.0805	25.6052	27.2446	24.7887	24.2642	21.8381	21.4818	22.8806	22.9234	25.4054	26.5438	29.0308	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5338	91.3767	82.5338	85.2849	82.5338	85.2849	82.5338	82.5338	85.2849	82.5338	85.2849	82.5338	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	39.0867	38.1030	36.6190	34.4288	32.6132	30.3307	28.8734	30.7535	31.8380	34.1471	36.8665	39.0199	(72)
Total internal gains	336.1893	345.7447	331.1436	322.6053	306.5525	296.2258	284.8055	284.9895	293.0992	301.7564	318.7130	328.9106	(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	7.6000	10.6334	0.6300	0.7000	0.7700	24.6977	(74)
East	1.2200	19.6403	0.6300	0.7000	0.7700	7.3228	(76)
West	1.1100	19.6403	0.6300	0.7000	0.7700	6.6626	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	70.8104	133.1786	213.8548	315.1678	396.7765	412.6094	390.0569	326.6759	248.7363	155.8875	87.1443	59.0687	(83)
Total gains	406.9997	478.9232	544.9984	637.7731	703.3290	708.8352	674.8624	611.6654	541.8355	457.6439	405.8573	387.9793	(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	8.2216	8.2572	8.2925	8.4622	8.4947	8.6495	8.6495	8.6788	8.5892	8.4947	8.4292	8.3617	
alpha	1.5481	1.5505	1.5528	1.5641	1.5663	1.5766	1.5766	1.5786	1.5726	1.5663	1.5619	1.5574	
util living area	0.9353	0.9155	0.8858	0.8269	0.7446	0.6344	0.5337	0.5776	0.7331	0.8596	0.9167	0.9394	(86)
MIT	15.9067	16.3123	17.0501	18.1222	19.1553	20.0316	20.4919	20.4010	19.6748	18.3517	16.9760	15.8600	(87)
Th 2	19.1845	19.1905	19.1965	19.2247	19.2300	19.2548	19.2548	19.2594	19.2452	19.2300	19.2192	19.2081	(88)
util rest of house	0.9245	0.9014	0.8656	0.7935	0.6878	0.5360	0.3811	0.4305	0.6509	0.8253	0.9005	0.9294	(89)
MIT 2	14.7548	15.1565	15.8845	16.9394	17.9182	18.7137	19.0713	19.0225	18.4304	17.1885	15.8351	14.7216	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.1587	15.5617	16.2932	17.3542	18.3520	19.1758	19.5694	19.5058	18.8667	17.5963	16.2352	15.1208	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.1587	15.5617	16.2932	17.3542	18.3520	19.1758	19.5694	19.5058	18.8667	17.5963	16.2352	15.1208	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8868	0.8585	0.8182	0.7458	0.6520	0.5306	0.4134	0.4554	0.6280	0.7800	0.8586	0.8931	(94)
Useful gains	360.9114	411.1323	445.9211	475.6652	458.5365	376.1291	278.9853	278.5762	340.2870	356.9549	348.4737	346.5191	(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	1362.4977	1332.0095	1218.3026	1030.6277	807.8238	545.7516	354.1566	369.1761	572.5099	849.6399	1118.0114	1347.3216	(97)
Space heating kWh	745.1802	618.8295	574.6518	399.5730	259.8698	0.0000	0.0000	0.0000	0.0000	366.5577	554.0671	744.5971	(98a)
Space heating requirement - total per year (kWh/year)												4263.3261	
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	745.1802	618.8295	574.6518	399.5730	259.8698	0.0000	0.0000	0.0000	0.0000	366.5577	554.0671	744.5971	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4263.3261	
Space heating per m2											(98c) / (4) =	75.7655	(99)

8c. Space cooling requirement

Calculated for June, July and August. See Table 10b

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Ext. temp.	4.3000	4.9000	6.5000	8.9000	11.7000	14.6000	16.6000	16.4000	14.1000	10.6000	7.1000	4.2000	
Heat loss rate W	0.0000	0.0000	0.0000	0.0000	0.0000	1121.1214	882.5849	903.3805	0.0000	0.0000	0.0000	0.0000	(100)
Utilisation	0.0000	0.0000	0.0000	0.0000	0.0000	0.4967	0.5562	0.5181	0.0000	0.0000	0.0000	0.0000	(101)
Useful loss	0.0000	0.0000	0.0000	0.0000	0.0000	556.9020	490.8874	468.0740	0.0000	0.0000	0.0000	0.0000	(102)
Total gains	0.0000	0.0000	0.0000	0.0000	0.0000	774.3288	737.3872	667.7752	0.0000	0.0000	0.0000	0.0000	(103)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	156.5473	183.3959	148.5777	0.0000	0.0000	0.0000	0.0000	(104)
Cooled fraction										fC = cooled area / (4) =		1.0000	(105)
Intermittency factor (Table 10b)	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	0.2500	(106)
Space cooling kWh	0.0000	0.0000	0.0000	0.0000	0.0000	39.1368	45.8490	37.1444	0.0000	0.0000	0.0000	0.0000	(107)
Space cooling requirement												122.1302	(107)
Energy for space heating												75.7655	(99)
Energy for space cooling												2.1704	(108)
Total												77.9360	(109)
Fabric Energy Efficiency (DFEE)												77.9	(109)

Full SAP Calculation Printout

Property Reference	Flat 6, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	28.57	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.47	**DFEE**	77.94	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	156.34	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

SAP 10 WORKSHEET FOR Existing dwelling (SAP) (Version 10.2, February 2022)
CALCULATION OF DWELLING EMISSIONS FOR REGULATIONS COMPLIANCE

1. Overall dwelling characteristics

	Area (m2)		Storey height (m)		Volume (m3)	
Ground floor	56.2700	(1b)	x 2.7600	(2b) =	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n) =	155.3052	(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		2 * 10 =	20.0000 (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) =		20.0000 / (5) =	0.1288 (8)
Number of storeys in the dwelling (ns)			1 (9)
Additional infiltration		[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.5788 (18)
Number of sides sheltered			0 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.5788 (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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)							(26)...(30) + (32) =		56.7577				(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)							(28)...(30) + (32) + (32a)...(32e) =					3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges											(36a) =	0.0000	
Total fabric heat loss										(33) + (36) + (36a) =		85.8957	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	125.4756	124.9337	124.4026	121.9078	121.4411	119.2682	119.2682	118.8659	120.1052	121.4411	122.3853	123.3725	(39)
Average = Sum(39)m / 12 =												121.9056	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2299	2.2203	2.2108	2.1665	2.1582	2.1196	2.1196	2.1124	2.1344	2.1582	2.1750	2.1925	(40)
HLP (average)												2.1664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)											Total = Sum(45)m =	1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(64)
12Total per year (kWh/year)												1921	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	93.7231	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	82.5338	91.3767	82.5338	85.2849	82.5338	85.2849	82.5338	82.5338	85.2849	82.5338	85.2849	82.5338	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	163.4519	165.1480	160.8739	151.7747	140.2886	129.4933	122.2813	120.5852	124.8594	133.9586	145.4447	156.2400	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	32.3723	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	377.1307	385.5616	368.8405	356.7308	337.7964	323.5458	309.0334	312.3816	321.9422	334.5131	356.0997	369.7223	(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	7.6000	10.6334	0.6300	0.7000	0.7700	24.6977	(74)
East	1.2200	19.6403	0.6300	0.7000	0.7700	7.3228	(76)
West	1.1100	19.6403	0.6300	0.7000	0.7700	6.6626	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	70.8104	133.1786	213.8548	315.1678	396.7765	412.6094	390.0569	326.6759	248.7363	155.8875	87.1443	59.0687	(83)
Total gains	447.9411	518.7402	582.6953	671.8986	734.5730	736.1552	699.0903	639.0576	570.6785	490.4006	443.2440	428.7910	(84)

7. Mean internal temperature (heating season)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Temperature during heating periods in the living area from Table 9, Th1 (C)												21.0000	(85)
Utilisation factor for gains for living area, nil,m (see Table 9a)													
tau	8.2216	8.2572	8.2925	8.4622	8.4947	8.6495	8.6495	8.6788	8.5892	8.4947	8.4292	8.3617	
alpha	1.5481	1.5505	1.5528	1.5641	1.5663	1.5766	1.5766	1.5786	1.5726	1.5663	1.5619	1.5574	
util living area	0.9264	0.9063	0.8760	0.8164	0.7334	0.6229	0.5227	0.5639	0.7193	0.8475	0.9065	0.9306	(86)
MIT	16.0086	16.4067	17.1328	18.1864	19.2011	20.0591	20.5080	20.4230	19.7156	18.4194	17.0662	15.9640	(87)
Th 2	19.8851	19.8899	19.8946	19.9168	19.9209	19.9402	19.9402	19.9438	19.9328	19.9209	19.9125	19.9037	(88)
util rest of house	0.9194	0.8973	0.8634	0.7964	0.7002	0.5671	0.4379	0.4825	0.6724	0.8269	0.8962	0.9240	(89)
MIT 2	15.2999	15.6960	16.4167	17.4634	18.4468	19.2627	19.6553	19.5943	18.9598	17.7085	16.3678	15.2663	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	15.5484	15.9452	16.6678	17.7169	18.7113	19.5420	19.9543	19.8849	19.2248	17.9578	16.6127	15.5109	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.5484	15.9452	16.6678	17.7169	18.7113	19.5420	19.9543	19.8849	19.2248	17.9578	16.6127	15.5109	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8780	0.8508	0.8122	0.7432	0.6546	0.5429	0.4391	0.4773	0.6342	0.7756	0.8504	0.8841	(94)
Useful gains	393.2705	441.3363	473.2459	499.3867	480.8838	399.6449	306.9929	305.0247	361.9367	380.3500	376.9178	379.0818	(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	1411.3966	1379.9189	1264.9030	1074.8481	851.4573	589.4185	400.0607	414.2316	615.5118	893.5376	1164.2116	1395.4554	(97)
Space heating kWh	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98a)
Space heating requirement - total per year (kWh/year)												4372.0902	
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	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4372.0902	
Space heating per m2											(98c) / (4) =	77.6984	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	757.4858	630.7275	588.9929	414.3323	275.7067	0.0000	0.0000	0.0000	0.0000	381.8116	566.8515	756.1820	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	908.2564	756.2680	706.2264	496.8013	330.5835	0.0000	0.0000	0.0000	0.0000	457.8076	679.6781	906.6930	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.5202	86.4383	86.2440	85.8315	85.1168	79.8000	79.8000	79.8000	79.8000	85.6615	86.2345	86.5211	(217)
Fuel for water heating, kWh/month	221.0741	194.6525	206.2652	185.5724	180.5675	168.9714	161.5469	176.2538	177.8232	187.9794	199.7019	220.5566	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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	5242.3144	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2280.9650	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	148.6024	(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	7716.8818	(238)

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

	Energy kWh/year	Emission factor kg CO2/kWh	Emissions kg CO2/year	
Space heating - main system 1	5242.3144	0.2100	1100.8860	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2280.9650	0.2100	479.0026	(264)
Space and water heating			1579.8887	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1607.5786	(272)
EPC Dwelling Carbon Dioxide Emission Rate (DER)			28.5700	(273)

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

	Energy kWh/year	Primary energy factor kg CO2/kWh	Primary energy kWh/year	
Space heating - main system 1	5242.3144	1.1300	5923.8153	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2280.9650	1.1300	2577.4904	(278)
Space and water heating			8501.3057	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	148.6024	1.5338	227.9314	(282)
Total Primary energy kWh/year			8797.3131	(286)
Dwelling Primary energy Rate (DPER)			156.3400	(287)

Full SAP Calculation Printout

Property Reference	Flat 6, Proposed	**Issued on Date**	23/10/2024
Assessment Reference	Flat 6, Proposed	**Prop Type Ref**	Proposed
Property	Flat 1, 200 Tilehurst Road, Reading, RG30 2LY		

SAP Rating	77 C	**DER**	28.57	**TER**	
Environmental	79 C	**% DER < TER**			N/A
CO_2 Emissions (t/year)	1.47	**DFEE**	77.94	**TFEE**	
Compliance Check	See BREL	**% DFEE < TFEE**			
% DPER < TPER		**DPER**	156.34	**TPER**	

Assessor Details	Mr. Sammit Pancholi	**Assessor ID**	DB55-0001
Client			

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)	
Ground floor		56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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		2 * 10 =	20.0000 (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) =		20.0000 / (5) =	0.1288 (8)
Number of storeys in the dwelling (ns)			1 (9)
Additional infiltration		[(9) - 1] x 0.1 =	0.0000 (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
Pressure Test Method			Blower Door
Measured/design AP50			15.0000 (17)
Infiltration rate			0.5788 (18)
Number of sides sheltered			0 (19)
Shelter factor		(20) = 1 - [0.075 x (19)] =	1.0000 (20)
Infiltration rate adjusted to include shelter factor		(21) = (18) x (20) =	0.5788 (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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)

Fabric heat loss, W/K = Sum (A x U)						(26)...(30) + (32) =		56.7577					(33)
Party Floor 1						56.2700				30.0000		1688.1000	(32d)
Internal Wall TImber						51.4600				9.0000		463.1400	(32c)
Heat capacity Cm = Sum(A x k)								(28)...(30) + (32) + (32a)...(32e) =				3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K												65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)												29.1380	(36)
Point Thermal bridges										(36a) =		0.0000	
Total fabric heat loss									(33) + (36) + (36a) =			85.8957	(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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	125.4756	124.9337	124.4026	121.9078	121.4411	119.2682	119.2682	118.8659	120.1052	121.4411	122.3853	123.3725	(39)
Average = Sum(39)m / 12 =												121.9056	
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2299	2.2203	2.2108	2.1665	2.1582	2.1196	2.1196	2.1124	2.1344	2.1582	2.1750	2.1925	(40)
HLP (average)												2.1664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy												1.8745	(42)
Hot water usage for mixer showers	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)
Hot water usage for baths	62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)
Hot water usage for other uses	33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)
Average daily hot water use (litres/day)												88.8804	(43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
									Total per year (kWh/year) = Sum(64)m =			1920.7652	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0362	18.6842	15.1950	11.5036	8.5991	7.2597	7.8444	10.1964	13.6856	17.3770	20.2815	21.6209	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	430.6328	428.7042	415.2316	392.1977	367.4526	343.7943	329.0656	333.9305	346.3343	369.8294	397.2268	420.2570	(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	7.6000	10.6334	0.6300	0.7000	0.7700	24.6977	(74)
East	1.2200	19.6403	0.6300	0.7000	0.7700	7.3228	(76)
West	1.1100	19.6403	0.6300	0.7000	0.7700	6.6626	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

Solar gains	70.8104	133.1786	213.8548	315.1678	396.7765	412.6094	390.0569	326.6759	248.7363	155.8875	87.1443	59.0687	(83)
Total gains	501.4432	561.8828	629.0864	707.3655	764.2291	756.4038	719.1225	660.6064	595.0706	525.7169	484.3710	479.3256	(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	8.2216	8.2572	8.2925	8.4622	8.4947	8.6495	8.6495	8.6788	8.5892	8.4947	8.4292	8.3617	
alpha	1.5481	1.5505	1.5528	1.5641	1.5663	1.5766	1.5766	1.5786	1.5726	1.5663	1.5619	1.5574	
util living area	0.9146	0.8962	0.8639	0.8056	0.7229	0.6147	0.5139	0.5535	0.7080	0.8346	0.8953	0.9195	(86)
MIT	16.1383	16.5064	17.2316	18.2512	19.2430	20.0788	20.5207	20.4394	19.7487	18.4899	17.1625	16.0895	(87)
Th 2	19.8851	19.8899	19.8946	19.9168	19.9209	19.9402	19.9402	19.9438	19.9328	19.9209	19.9125	19.9037	(88)
util rest of house	0.9067	0.8865	0.8504	0.7848	0.6891	0.5586	0.4294	0.4723	0.6602	0.8127	0.8840	0.9121	(89)
MIT 2	15.4270	15.7932	16.5120	17.5242	18.4843	19.2784	19.6636	19.6056	18.9879	17.7748	16.4614	15.3895	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.6764	16.0433	16.7643	17.7791	18.7503	19.5590	19.9642	19.8979	19.2546	18.0256	16.7072	15.6349	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.6764	16.0433	16.7643	17.7791	18.7503	19.5590	19.9642	19.8979	19.2546	18.0256	16.7072	15.6349	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8620	0.8379	0.7978	0.7318	0.6446	0.5355	0.4315	0.4683	0.6233	0.7611	0.8359	0.8688	(94)
Useful gains	432.2263	470.8027	501.9001	517.6276	492.6106	405.0309	310.3349	309.3315	370.9319	400.1113	404.8901	416.4421	(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	1427.4627	1392.1719	1276.9042	1082.4343	856.1999	591.4538	401.2371	415.7858	619.0988	901.7680	1175.7844	1410.7560	(97)
Space heating kWh	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98a)
Space heating requirement - total per year (kWh/year)												4281.4363	
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	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4281.4363	
Space heating per m2											(98c) / (4) =	76.0874	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11) 0.0000 (201)
Fraction of space heat from main system(s) 1.0000 (202)
Efficiency of main space heating system 1 (in %) 83.4000 (206)
Efficiency of main space heating system 2 (in %) 0.0000 (207)
Efficiency of secondary/supplementary heating system, % 0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	887.8368	742.3982	691.3706	487.6029	324.3531	0.0000	0.0000	0.0000	0.0000	447.5211	665.5202	887.0138	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4866	86.4101	86.2095	85.7977	85.0780	79.8000	79.8000	79.8000	79.8000	85.6189	86.2002	86.4887	(217)
Fuel for water heating, kWh/month	221.1601	194.7159	206.3479	185.6455	180.6496	168.9714	161.5469	176.2538	177.8232	188.0729	199.7813	220.6393	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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 5133.6167 (211)
Space heating fuel - main system 2 0.0000 (213)
Space heating fuel - secondary 0.0000 (215)
Efficiency of water heater 79.8000
Water heating fuel used 2281.6078 (219)
Space cooling fuel 0.0000 (221)

Electricity for pumps and fans:
main heating flue fan 45.0000 (230e)
Total electricity for the above, kWh/year 45.0000 (231)
Electricity for lighting (calculated in Appendix L) 148.6024 (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	7608.8269	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5133.6167	3.6400	186.8636	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2281.6078	3.6400	83.0505	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	148.6024	16.4900	24.5045	(250)
Additional standing charges			92.0000	(251)
Total energy cost			393.8392	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4000	(257)
SAP value		77.3053	
SAP rating (Section 12)		77	(258)
SAP band		C	

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	5133.6167	0.2100	1078.0595	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2281.6078	0.2100	479.1376	(264)
Space and water heating			1557.1971	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1584.8871	(272)
CO2 emissions per m2			28.1700	(273)
EI value			79.0288	
EI rating			79	(274)
EI band			C	

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)	
Ground floor		56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700						(4)
Dwelling volume				(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate													
	0.6367	0.5932	0.5932	0.5643	0.5643	0.4920	0.4920	0.4775	0.4920	0.5498	0.5354	0.5788	(22b)
Effective ac	0.7027	0.6760	0.6760	0.6592	0.6592	0.6210	0.6210	0.6140	0.6210	0.6512	0.6433	0.6675	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.7577			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	85.8957 (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	36.0121	34.6440	34.6440	33.7856	33.7856	31.8274	31.8274	31.4679	31.8274	33.3725	32.9701	34.2095	(38)
Heat transfer coeff													
	121.9078	120.5398	120.5398	119.6813	119.6813	117.7231	117.7231	117.3636	117.7231	119.2682	118.8659	120.1052	(39)
Average = Sum(39)m / 12 =												119.2602	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1665	2.1422	2.1422	2.1269	2.1269	2.0921	2.0921	2.0857	2.0921	2.1196	2.1124	2.1344	(40)
HLP (average)												2.1194	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8745 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)

Hot water usage for other uses

33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)

Average daily hot water use (litres/day)		88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use													
	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m													
	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
										Total per year (kWh/year) = Sum(64)m =		1920.7652	(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													
	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5													
	21.0362	18.6842	15.1950	11.5036	8.5991	7.2597	7.8444	10.1964	13.6856	17.3770	20.2815	21.6209	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5													
	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5													
	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)													
	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)													
	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)

Total internal gains

	430.6328	428.7042	415.2316	392.1977	367.4526	343.7943	329.0656	333.9305	346.3343	369.8294	397.2268	420.2570 (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	7.6000	12.7500	0.6300	0.7000	0.7700	29.6139	(74)
East	1.2200	23.7835	0.6300	0.7000	0.7700	8.8676	(76)
West	1.1100	23.7835	0.6300	0.7000	0.7700	8.0681	(80)
South	1.8400	52.2745	0.6300	0.7000	1.0000	38.1759	(82)

Solar gains	84.7254	139.8050	224.0169	336.3284	412.8041	453.9608	424.9850	362.8382	278.2298	175.9988	102.8349	71.0055 (83)
Total gains	515.3583	568.5092	639.2485	728.5261	780.2566	797.7552	754.0506	696.7687	624.5641	545.8282	500.0617	491.2625 (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	8.4622	8.5582	8.5582	8.6196	8.6196	8.7630	8.7630	8.7898	8.7630	8.6495	8.6788	8.5892	
alpha	1.5641	1.5705	1.5705	1.5746	1.5746	1.5842	1.5842	1.5860	1.5842	1.5766	1.5786	1.5726	
util living area	0.9059	0.8873	0.8488	0.7814	0.6832	0.5424	0.4174	0.4576	0.6599	0.8089	0.8818	0.9109	(86)
MIT	16.4577	16.8227	17.6039	18.5884	19.5826	20.3670	20.7334	20.6761	20.0094	18.8282	17.5082	16.4356	(87)
Th 2	19.9168	19.9289	19.9289	19.9365	19.9365	19.9539	19.9539	19.9571	19.9539	19.9402	19.9438	19.9328	(88)
util rest of house	0.8971	0.8768	0.8336	0.7576	0.6431	0.4752	0.3160	0.3580	0.6041	0.7829	0.8689	0.9026	(89)
MIT 2	15.7616	16.1287	16.8987	17.8636	18.8148	19.5378	19.8329	19.7988	19.2386	18.1148	16.8206	15.7495	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	16.0057	16.3720	17.1460	18.1177	19.0840	19.8285	20.1487	20.1064	19.5089	18.3650	17.0617	15.9901	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.0057	16.3720	17.1460	18.1177	19.0840	19.8285	20.1487	20.1064	19.5089	18.3650	17.0617	15.9901	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8507	0.8273	0.7807	0.7064	0.6052	0.4662	0.3366	0.3737	0.5761	0.7325	0.8194	0.8576	(94)
Useful gains	438.4364	470.3280	499.0697	514.6012	472.1841	371.9178	253.8082	260.4068	359.8242	399.8035	409.7295	421.2850	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1353.8704	1310.5084	1186.8293	1007.4430	764.0495	497.7975	300.0378	317.6350	554.3441	830.6978	1100.8985	1331.9777	(97)
Space heating kWh	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98a)
Space heating requirement - total per year (kWh/year)												3825.1537	
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	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3825.1537	
Space heating per m2										(98c) / (4) =		67.9786	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000 (201)
Fraction of space heat from main system(s)	1.0000 (202)
Efficiency of main space heating system 1 (in %)	83.4000 (206)
Efficiency of main space heating system 2 (in %)	0.0000 (207)
Efficiency of secondary/supplementary heating system, %	0.0000 (208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	816.6462	676.9799	613.5409	425.4750	260.3691	0.0000	0.0000	0.0000	0.0000	384.3949	596.6926	812.4166	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.3594	86.2656	86.0089	85.5439	84.6205	79.8000	79.8000	79.8000	79.8000	85.3255	86.0168	86.3549	(217)
Fuel for water heating, kWh/month	221.4859	195.0422	206.8292	186.1963	181.6265	168.9714	161.5469	176.2538	177.8232	188.7197	200.2073	220.9811	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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	4586.5152	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2285.6834	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	148.6024	(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	7065.8011	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4586.5152	5.6000	256.8449	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2285.6834	5.6000	127.9983	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	148.6024	26.0600	38.7258	(250)
Additional standing charges			99.0000	(251)
Total energy cost			534.2959	(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	4586.5152	0.2100	963.1682	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2285.6834	0.2100	479.9935	(264)
Space and water heating			1443.1617	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1470.8517	(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	4586.5152	1.1300	5182.7622	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2285.6834	1.1300	2582.8223	(278)
Space and water heating			7765.5845	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	148.6024	1.5338	227.9314	(282)
Total Primary energy kWh/year			8061.5918	(286)

SAP 10 EPC IMPROVEMENTS

Flat 6, Proposed

Current energy efficiency rating:	C 77
Current environmental impact rating:	C 79

N Solar water heating	Not applicable
U Solar photovoltaic panels	Not applicable
V2 Wind turbine	Not applicable

Recommended measures:	SAP change	Cost change	CO2 change
(none)			

Recommended measures	Typical annual savings	Energy efficiency	Environmental impact
(none)			
Total Savings	£0	0.00 kg/m²	

Potential energy efficiency rating:	C 77
Potential environmental impact rating:	C 79

Fuel prices for cost data on this page from database revision number 553 TEST (30 Sep 2024)
Recommendation texts revision number 6.1 (11 Jun 2019)

Typical heating and lighting costs of this home (per year, Thames Valley):

	Current	Potential	Saving
Electricity	£50	£50	£0
Mains gas	£484	£484	£0
Space heating	£368	£368	£0
Water heating	£128	£128	£0
Lighting	£39	£39	£0
Total cost of fuels	£534	£534	£0
Total cost of uses	£535	£535	£0
Delivered energy	126 kWh/m²	126 kWh/m²	0 kWh/m²
Carbon dioxide emissions	1.5 tonnes	1.5 tonnes	0.0 tonnes
CO2 emissions per m²	26 kg/m²	26 kg/m²	0 kg/m²
Primary energy	143 kWh/m²	143 kWh/m²	0 kWh/m²

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)	
Ground floor	56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method	Blower Door	
Measured/design AP50	15.0000	(17)
Infiltration rate	0.5788	(18)
Number of sides sheltered	0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] = 1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) = 0.5788	(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	0.7379	0.7235	0.7090	0.6367	0.6222	0.5498	0.5498	0.5354	0.5788	0.6222	0.6511	0.6801	(22b)
Effective ac	0.7723	0.7617	0.7513	0.7027	0.6936	0.6512	0.6512	0.6433	0.6675	0.6936	0.7120	0.7312	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)			(26)...(30) + (32) =		56.7577			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)
Heat capacity Cm = Sum(A x k)					(28)...(30) + (32) + (32a)...(32e) =		3713.7900	(34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K							65.9995	(35)
Thermal bridges (Default value 0.200 * total exposed area)							29.1380	(36)

Point Thermal bridges (36a) = 0.0000
Total fabric heat loss (33) + (36) + (36a) = 85.8957 (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	39.5799	39.0380	38.5069	36.0121	35.5454	33.3725	33.3725	32.9701	34.2095	35.5454	36.4896	37.4768	(38)
Heat transfer coeff	125.4756	124.9337	124.4026	121.9078	121.4411	119.2682	119.2682	118.8659	120.1052	121.4411	122.3853	123.3725	(39)
Average = Sum(39)m / 12 =												121.9056	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.2299	2.2203	2.2108	2.1665	2.1582	2.1196	2.1196	2.1124	2.1344	2.1582	2.1750	2.1925	(40)
HLP (average)												2.1664	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy 1.8745 (42)
Hot water usage for mixer showers

0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)

Hot water usage for other uses

33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)

Average daily hot water use (litres/day) 88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
										Total per year (kWh/year) = Sum(64)m =		1920.7652	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0362	18.6842	15.1950	11.5036	8.5991	7.2597	7.8444	10.1964	13.6856	17.3770	20.2815	21.6209	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	430.6328	428.7042	415.2316	392.1977	367.4526	343.7943	329.0656	333.9305	346.3343	369.8294	397.2268	420.2570	(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	7.6000	10.6334	0.6300	0.7000	0.7700	24.6977	(74)
East	1.2200	19.6403	0.6300	0.7000	0.7700	7.3228	(76)
West	1.1100	19.6403	0.6300	0.7000	0.7700	6.6626	(80)
South	1.8400	43.9921	0.6300	0.7000	1.0000	32.1272	(82)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Solar gains	70.8104	133.1786	213.8548	315.1678	396.7765	412.6094	390.0569	326.6759	248.7363	155.8875	87.1443	59.0687	(83)
Total gains	501.4432	561.8828	629.0864	707.3655	764.2291	756.4038	719.1225	660.6064	595.0706	525.7169	484.3710	479.3256	(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	8.2216	8.2572	8.2925	8.4622	8.4947	8.6495	8.6495	8.6788	8.5892	8.4947	8.4292	8.3617	
alpha	1.5481	1.5505	1.5528	1.5641	1.5663	1.5766	1.5766	1.5786	1.5726	1.5663	1.5619	1.5574	
util living area	0.9146	0.8962	0.8639	0.8056	0.7229	0.6147	0.5139	0.5535	0.7080	0.8346	0.8953	0.9195	(86)

MIT	16.1383	16.5064	17.2316	18.2512	19.2430	20.0788	20.5207	20.4394	19.7487	18.4899	17.1625	16.0895	(87)
Th 2	19.8851	19.8899	19.8946	19.9168	19.9209	19.9402	19.9402	19.9438	19.9328	19.9209	19.9125	19.9037	(88)
util rest of house													
	0.9067	0.8865	0.8504	0.7848	0.6891	0.5586	0.4294	0.4723	0.6602	0.8127	0.8840	0.9121	(89)
MIT 2	15.4270	15.7932	16.5120	17.5242	18.4843	19.2784	19.6636	19.6056	18.9879	17.7748	16.4614	15.3895	(90)
Living area fraction										fLA = Living area / (4) =		0.3506	(91)
MIT	15.6764	16.0433	16.7643	17.7791	18.7503	19.5590	19.9642	19.8979	19.2546	18.0256	16.7072	15.6349	(92)
Temperature adjustment												0.0000	
adjusted MIT	15.6764	16.0433	16.7643	17.7791	18.7503	19.5590	19.9642	19.8979	19.2546	18.0256	16.7072	15.6349	(93)

---

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8620	0.8379	0.7978	0.7318	0.6446	0.5355	0.4315	0.4683	0.6233	0.7611	0.8359	0.8688	(94)
Useful gains	432.2263	470.8027	501.9001	517.6276	492.6106	405.0309	310.3349	309.3315	370.9319	400.1113	404.8901	416.4421	(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													
	1427.4627	1392.1719	1276.9042	1082.4343	856.1999	591.4538	401.2371	415.7858	619.0988	901.7680	1175.7844	1410.7560	(97)
Space heating kWh													
	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98a)
Space heating requirement - total per year (kWh/year)												4281.4363	
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													
	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												4281.4363	
Space heating per m2											(98c) / (4) =	76.0874	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement													
	740.4559	619.1601	576.6031	406.6608	270.5104	0.0000	0.0000	0.0000	0.0000	373.2326	555.0438	739.7695	(98)
Space heating efficiency (main heating system 1)													
	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)													
	887.8368	742.3982	691.3706	487.6029	324.3531	0.0000	0.0000	0.0000	0.0000	447.5211	665.5202	887.0138	(211)
Space heating efficiency (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)													
	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement													
	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.4866	86.4101	86.2095	85.7977	85.0780	79.8000	79.8000	79.8000	79.8000	85.6189	86.2002	86.4887	(217)
Fuel for water heating, kWh/month													
	221.1601	194.7159	206.3479	185.6455	180.6496	168.9714	161.5469	176.2538	177.8232	188.0729	199.7813	220.6393	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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	5133.6167	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2281.6078	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	148.6024	(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	7608.8269	(238)

10a. Fuel costs - using Table 12 prices

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	5133.6167	3.6400	186.8636	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2281.6078	3.6400	83.0505	(247)
Energy for instantaneous electric shower(s)	0.0000	16.4900	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	16.4900	7.4205	(249)
Energy for lighting	148.6024	16.4900	24.5045	(250)
Additional standing charges			92.0000	(251)
Total energy cost			393.8392	(255)

11a. SAP rating - Individual heating systems

Energy cost deflator (Table 12):		0.3600	(256)
Energy cost factor (ECF)	[(255) x (256)] / [(4) + 45.0] =	1.4000	(257)
SAP value		77.3053	
SAP rating (Section 12)		77	(258)
SAP band		C	

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	5133.6167	0.2100	1078.0595	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2281.6078	0.2100	479.1376	(264)
Space and water heating			1557.1971	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1584.8871	(272)
CO2 emissions per m2			28.1700	(273)
EI value			79.0288	
EI rating			79	(274)
EI band			C	

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)	
Ground floor	56.2700 (1b)	x	2.7600 (2b)	=	155.3052	(1b) - (3b)
Total floor area TFA = (1a)+(1b)+(1c)+(1d)+(1e)...(1n)	56.2700					(4)
Dwelling volume			(3a)+(3b)+(3c)+(3d)+(3e)...(3n)	=	155.3052	(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	2 * 10 =	20.0000	(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) =	20.0000 / (5) =	0.1288	(8)
Number of storeys in the dwelling (ns)		1	(9)
Additional infiltration	[(9) - 1] x 0.1 =	0.0000	(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	
Pressure Test Method		Blower Door	
Measured/design AP50		15.0000	(17)
Infiltration rate		0.5788	(18)
Number of sides sheltered		0	(19)
Shelter factor	(20) = 1 - [0.075 x (19)] =	1.0000	(20)
Infiltration rate adjusted to include shelter factor	(21) = (18) x (20) =	0.5788	(21)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Wind speed	4.4000	4.1000	4.1000	3.9000	3.9000	3.4000	3.4000	3.3000	3.4000	3.8000	3.7000	4.0000	(22)
Wind factor	1.1000	1.0250	1.0250	0.9750	0.9750	0.8500	0.8500	0.8250	0.8500	0.9500	0.9250	1.0000	(22a)
Adj infilt rate	0.6367	0.5932	0.5932	0.5643	0.5643	0.4920	0.4920	0.4775	0.4920	0.5498	0.5354	0.5788	(22b)
Effective ac	0.7027	0.6760	0.6760	0.6592	0.6592	0.6210	0.6210	0.6140	0.6210	0.6512	0.6433	0.6675	(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	
Window (Uw = 1.20)			9.9300	1.1450	11.3702			(27)
Door			1.7000	3.0000	5.1000			(26)
SW6S/R			0.4600	1.3258	0.6098			(27a)
SW7S/R			0.4600	1.3258	0.6098			(27a)
SW8S/R			0.4600	1.3258	0.6098			(27a)
SW9S/R			0.4600	1.3258	0.6098			(27a)
Corridor Brick Wall	16.2200	1.7000	14.5200	0.7000	10.1640	9.0000	130.6800	(29a)
External Cavity Wall	23.3000	7.6000	15.7000	0.2000	3.1400	60.0000	942.0000	(29a)
Solid External Wall	49.9000	2.3300	47.5700	0.3100	14.7467	0.0000	0.0000	(29a)
External Roof 1	56.2700	1.8400	54.4300	0.1800	9.7974	9.0000	489.8700	(30)
Total net area of external elements Aum(A, m2)			145.6900					(31)
Fabric heat loss, W/K = Sum (A x U)				(26)...(30) + (32) =	56.7577			(33)
Party Floor 1			56.2700			30.0000	1688.1000	(32d)
Internal Wall TImber			51.4600			9.0000	463.1400	(32c)

Heat capacity Cm = Sum(A x k)	(28)...(30) + (32) + (32a)...(32e) =	3713.7900 (34)
Thermal mass parameter (TMP = Cm / TFA) in kJ/m2K		65.9995 (35)
Thermal bridges (Default value 0.200 * total exposed area)		29.1380 (36)
Point Thermal bridges	(36a) =	0.0000
Total fabric heat loss	(33) + (36) + (36a) =	85.8957 (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	36.0121	34.6440	34.6440	33.7856	33.7856	31.8274	31.8274	31.4679	31.8274	33.3725	32.9701	34.2095	(38)
Heat transfer coeff	121.9078	120.5398	120.5398	119.6813	119.6813	117.7231	117.7231	117.3636	117.7231	119.2682	118.8659	120.1052	(39)
Average = Sum(39)m / 12 =												119.2602	

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
HLP	2.1665	2.1422	2.1422	2.1269	2.1269	2.0921	2.0921	2.0857	2.0921	2.1196	2.1124	2.1344	(40)
HLP (average)												2.1194	
Days in mont	31	28	31	30	31	30	31	31	30	31	30	31	

---

4. Water heating energy requirements (kWh/year)

Assumed occupancy		1.8745 (42)

Hot water usage for mixer showers

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(42a)

Hot water usage for baths

62.6907	61.7443	60.3980	58.3819	56.5649	54.0636	52.1659	54.4864	55.7043	58.1827	60.7595	62.6410	(42b)

Hot water usage for other uses

33.8264	32.5963	31.3663	30.1362	28.9062	27.6761	27.6761	28.9062	30.1362	31.3663	32.5963	33.8264	(42c)

Average daily hot water use (litres/day)		88.8804 (43)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Daily hot water use	96.5170	94.3407	91.7643	88.5181	85.4710	81.7397	79.8420	83.3926	85.8405	89.5489	93.3558	96.4673	(44)
Energy conte	142.0898	124.8318	131.1293	115.6268	110.1381	94.5292	88.2278	98.1546	99.5707	115.3928	126.1734	141.6693	(45)
Energy content (annual)										Total = Sum(45)m =		1387.5336	
Distribution loss (46)m = 0.15 x (45)m	21.3135	18.7248	19.6694	17.3440	16.5207	14.1794	13.2342	14.7232	14.9356	17.3089	18.9260	21.2504	(46)
Water storage loss:													
Total storage loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(56)
If cylinder contains dedicated solar storage	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(57)
Primary loss	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(59)
Combi loss	49.1840	43.4225	46.7621	43.6528	43.5551	40.3100	40.6866	42.4959	42.3323	45.6332	46.0385	49.1587	(61)
Total heat required for water heating calculated for each month	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(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	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
										Total per year (kWh/year) = Sum(64)m =		1920.7652	(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	59.5409	52.3622	55.2910	49.3591	47.5097	41.5085	39.5074	43.2604	43.6903	49.7764	53.4623	59.3947	(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	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	112.4677	(66)
Lighting gains (calculated in Appendix L, equation L9 or L9a), also see Table 5	21.0362	18.6842	15.1950	11.5036	8.5991	7.2597	7.8444	10.1964	13.6856	17.3770	20.2815	21.6209	(67)
Appliances gains (calculated in Appendix L, equation L13 or L13a), also see Table 5	243.9581	246.4896	240.1103	226.5294	209.3859	193.2735	182.5095	179.9779	186.3573	199.9382	217.0816	233.1940	(68)
Cooking gains (calculated in Appendix L, equation L15 or L15a), also see Table 5	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	48.1212	(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)	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	-74.9785	(71)
Water heating gains (Table 5)	80.0280	77.9199	74.3159	68.5543	63.8571	57.6506	53.1013	58.1457	60.6810	66.9038	74.2532	79.8316	(72)
Total internal gains	430.6328	428.7042	415.2316	392.1977	367.4526	343.7943	329.0656	333.9305	346.3343	369.8294	397.2268	420.2570	(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	7.6000	12.7500	0.6300	0.7000	0.7700	29.6139	(74)
East	1.2200	23.7835	0.6300	0.7000	0.7700	8.8676	(76)
West	1.1100	23.7835	0.6300	0.7000	0.7700	8.0681	(80)
South	1.8400	52.2745	0.6300	0.7000	1.0000	38.1759	(82)

Solar gains	84.7254	139.8050	224.0169	336.3284	412.8041	453.9608	424.9850	362.8382	278.2298	175.9988	102.8349	71.0055	(83)
Total gains	515.3583	568.5092	639.2485	728.5261	780.2566	797.7552	754.0506	696.7687	624.5641	545.8282	500.0617	491.2625	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (C) 21.0000 (85)

Utilisation factor for gains for living area, nil,m (see Table 9a)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
tau	8.4622	8.5582	8.5582	8.6196	8.6196	8.7630	8.7630	8.7898	8.7630	8.6495	8.6788	8.5892	
alpha	1.5641	1.5705	1.5705	1.5746	1.5746	1.5842	1.5842	1.5860	1.5842	1.5766	1.5786	1.5726	
util living area	0.9059	0.8873	0.8488	0.7814	0.6832	0.5424	0.4174	0.4576	0.6599	0.8089	0.8818	0.9109	(86)
MIT	16.4577	16.8227	17.6039	18.5884	19.5826	20.3670	20.7334	20.6761	20.0094	18.8282	17.5082	16.4356	(87)
Th 2	19.9168	19.9289	19.9289	19.9365	19.9365	19.9539	19.9539	19.9571	19.9539	19.9402	19.9438	19.9328	(88)
util rest of house	0.8971	0.8768	0.8336	0.7576	0.6431	0.4752	0.3160	0.3580	0.6041	0.7829	0.8689	0.9026	(89)
MIT 2	15.7616	16.1287	16.8987	17.8636	18.8148	19.5378	19.8329	19.7988	19.2386	18.1148	16.8206	15.7495	(90)
Living area fraction									fLA = Living area / (4) =			0.3506	(91)
MIT	16.0057	16.3720	17.1460	18.1177	19.0840	19.8285	20.1487	20.1064	19.5089	18.3650	17.0617	15.9901	(92)
Temperature adjustment												0.0000	
adjusted MIT	16.0057	16.3720	17.1460	18.1177	19.0840	19.8285	20.1487	20.1064	19.5089	18.3650	17.0617	15.9901	(93)

8. Space heating requirement

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Utilisation	0.8507	0.8273	0.7807	0.7064	0.6052	0.4662	0.3366	0.3737	0.5761	0.7325	0.8194	0.8576	(94)
Useful gains	438.4364	470.3280	499.0697	514.6012	472.1841	371.9178	253.8082	260.4068	359.8242	399.8035	409.7295	421.2850	(95)
Ext temp.	4.9000	5.5000	7.3000	9.7000	12.7000	15.6000	17.6000	17.4000	14.8000	11.4000	7.8000	4.9000	(96)
Heat loss rate W	1353.8704	1310.5084	1186.8293	1007.4430	764.0495	497.7975	300.0378	317.6350	554.3441	830.6978	1100.8985	1331.9777	(97)
Space heating kWh	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98a)
Space heating requirement - total per year (kWh/year)												3825.1537	
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	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98c)
Space heating requirement after solar contribution - total per year (kWh/year)												3825.1537	
Space heating per m2										(98c) / (4) =		67.9786	(99)

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

Fraction of space heat from secondary/supplementary system (Table 11)	0.0000	(201)
Fraction of space heat from main system(s)	1.0000	(202)
Efficiency of main space heating system 1 (in %)	83.4000	(206)
Efficiency of main space heating system 2 (in %)	0.0000	(207)
Efficiency of secondary/supplementary heating system, %	0.0000	(208)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	
Space heating requirement	681.0829	564.6012	511.6931	354.8461	217.1478	0.0000	0.0000	0.0000	0.0000	320.5854	497.6416	677.5554	(98)
Space heating efficiency (main heating system 1)	83.4000	83.4000	83.4000	83.4000	83.4000	0.0000	0.0000	0.0000	0.0000	83.4000	83.4000	83.4000	(210)
Space heating fuel (main heating system)	816.6462	676.9799	613.5409	425.4750	260.3691	0.0000	0.0000	0.0000	0.0000	384.3949	596.6926	812.4166	(211)
Space heating efficiency (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(212)
Space heating fuel (main heating system 2)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(213)
Space heating fuel (secondary)	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	(215)
Water heating													
Water heating requirement	191.2738	168.2543	177.8914	159.2795	153.6932	134.8392	128.9144	140.6505	141.9029	161.0260	172.2119	190.8280	(64)
Efficiency of water heater												79.8000	(216)
(217)m	86.3594	86.2656	86.0089	85.5439	84.6205	79.8000	79.8000	79.8000	79.8000	85.3255	86.0168	86.3549	(217)
Fuel for water heating, kWh/month	221.4859	195.0422	206.8292	186.1963	181.6265	168.9714	161.5469	176.2538	177.8232	188.7197	200.2073	220.9811	(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	3.8219	3.4521	3.8219	3.6986	3.8219	3.6986	3.8219	3.8219	3.6986	3.8219	3.6986	3.8219	(231)
Lighting	18.4129	14.7715	13.3001	9.7442	7.5267	6.1494	6.8661	8.9248	11.5925	15.2100	17.1796	18.9246	(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	(235d)

Annual totals kWh/year		
Space heating fuel - main system 1	4586.5152	(211)
Space heating fuel - main system 2	0.0000	(213)
Space heating fuel - secondary	0.0000	(215)
Efficiency of water heater	79.8000	
Water heating fuel used	2285.6834	(219)
Space cooling fuel	0.0000	(221)
Electricity for pumps and fans:		
main heating flue fan	45.0000	(230e)
Total electricity for the above, kWh/year	45.0000	(231)
Electricity for lighting (calculated in Appendix L)	148.6024	(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	7065.8011	(238)

10a. Fuel costs - using BEDF prices (553)

	Fuel kWh/year	Fuel price p/kWh	Fuel cost £/year	
Space heating - main system 1	4586.5152	5.6000	256.8449	(240)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2285.6834	5.6000	127.9983	(247)
Energy for instantaneous electric shower(s)	0.0000	26.0600	0.0000	(247a)
Pumps, fans and electric keep-hot	45.0000	26.0600	11.7270	(249)
Energy for lighting	148.6024	26.0600	38.7258	(250)
Additional standing charges			99.0000	(251)
Total energy cost			534.2959	(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	4586.5152	0.2100	963.1682	(261)
Total CO2 associated with community systems			0.0000	(373)
Water heating (other fuel)	2285.6834	0.2100	479.9935	(264)
Space and water heating			1443.1617	(265)
Pumps, fans and electric keep-hot	45.0000	0.1387	6.2421	(267)
Energy for lighting	148.6024	0.1443	21.4479	(268)
Total CO2, kg/year			1470.8517	(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	4586.5152	1.1300	5182.7622	(275)
Total CO2 associated with community systems			0.0000	(473)
Water heating (other fuel)	2285.6834	1.1300	2582.8223	(278)
Space and water heating			7765.5845	(279)
Pumps, fans and electric keep-hot	45.0000	1.5128	68.0760	(281)
Energy for lighting	148.6024	1.5338	227.9314	(282)
Total Primary energy kWh/year			8061.5918	(286)