

Sustainability Statement J5653 9 Northington Street

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I. EXECUTIVE SUMMARY

This report describes the sustainability strategy for the proposed conversion of 9 Northington Street, London WC1N 2JF. The project consists of the refurbishment of an existing office building into a residential property consisting of four apartment units with an area of approximately $365m^2$. The proposed development will have a lower ground floor, ground floor and two storeys above. The building is curtilage listed due to its connection to 9 John Street at the back of the property.

The guidance and policies used in formulating this report are listed below and the resulting findings are compliant with the content of each;

- Camden Local Planning Documents
- Building Regulations Part L Volume 2

With creating an environmentally friendly scheme being of high priority for the client, the energy strategy proposed aims to achieve the best outcome in terms of sustainability and energy efficiency.

As demonstrated for the proposed energy hierarchy of the development, energy consumption and associated carbon emissions will be reduced through passive and active design measures.

In addition to measures reducing operational energy and associated carbon emissions, the embodied carbon content of materials used will be minimised as far as possible. It is the philosophy of the design team to design efficient, low carbon buildings.

	Regulated residential carbon dioxide savings	
	(Tonnes CO2 per annum)	(%)
Be lean: savings from energy demand reduction	0.2	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.2	9%
Cumulative on site savings	0.4	19%



2. INTRODUCTION

This report describes the sustainability strategy for the proposed conversion of 9 Northington Street, London WC1N 2JF. The project consists of the refurbishment of an existing office building into a residential property consisting of four apartment units with an area of approximately $365m^2$. The proposed development will have a lower ground floor, ground floor and two storeys above. The building is curtilage listed due to its connection to 9 John Street at the back of the property.

This report sets out the sustainability strategy for the proposed development. In developing this strategy local and regional planning policies have been addressed.

Due to the development being below 500m² and less than five units, a full Energy Statement is not required. With the client committed to creating a sustainable and environmentally friendly development, this Sustainability Statement demonstrates that all measures feasible have been implemented to reduce environmental impact and improve efficiency as much as possible despite limitations to planning and building regulation requirements.

The proposed Sustainability Principles and Engineering Concepts incorporate the requirements and guidelines of the relevant British Standards and CIBSE Guides.



3. PLANNING POLICY BACKGROUND

The main planning documents which constitute the statutory development plan for Camden and form the basis on which decisions will be made for the proposed development are:

- Building Regulations Part L Volume 1
- Camden Planning Guidance Local Plan 2017 & Energy Efficiency and Adaptation 2021
- London Plan 2021
- · CIBSE Technical Manuals and Guides

3.1. Building Regulation Compliance

Building Regulations apply to all developments, with Approved Document: Part L Volume 1: Conservation of Fuel and Power in Dwellings.

Based on Part L the property is classified as material change of use, being converted from commercial to residential spaces. Any existing thermal element being renovated should meet limiting standards of Table 4.3. If achieving the values of column (b) is not technically or functionally feasible with a payback of 15 years or less, the elements should be upgraded to as high degree as possible with a payback of 15 years (Section 4.13).

Element	U-value ⁽⁵⁾	ue ^{/5} W/(m²-K)	
	(a) Threshold	(b) Improved	
Roof ⁽²⁾⁽⁾⁽⁴⁾	0.35	0.16	
Wall – cavity insulation ⁽²⁾⁽⁵⁾	0.70	0.55	
Wall – internal or external insulation ⁽²⁾⁽⁶⁾	0.70	0.30	
Floor ⁽⁷⁾⁽⁶⁾	0.70	0.25	

If current windows have a U-value worse than 3.3, they should be replaced by units with a performance as given in Table 4.2. However, in accordance with Section 4.10, single-glazed units that cannot be replaced should be supplemented with secondary glazing. The same applies to any new elements.

Element type	Maximum U-value ⁽¹⁾ W/(m ² -K)		
Roof ⁽²⁾	0.15		
Wall ⁽²⁾⁽³⁾	0.18		
Floor ⁽⁴⁾⁵⁾	0.18		
Swimming pool basin ⁽⁶⁾	0.25		
Window ⁽⁷⁾⁽⁸⁾⁽⁹⁾	1.4 or Window Energy Rating ⁽¹⁰⁾ Band B minimum		
Rooflight ^{(II)(II)}	2.2		
Doors with >60% of internal face glazed ⁽¹³⁾	1.4 or Doorset Energy Rating ⁽¹⁰⁾ Band C minimum		
Other doors(10)04)	1.4 or Doorset Energy Rating 10 Band B minimum		

Additionally to this, area of openings in the dwellings should not exceed 25% of total floor area.



3.2. Camden Planning Guidance 2021

Camden Council strongly encourages refurbishment projects to be energy and resource efficient. Improving environmental sustainability of existing building stock is an important challenge to the borough. All proposed developments are required to minimise use of energy and other non-renewable resources, as well as to facilitate an increase in the use of low and zero carbon technologies to help reduce carbon dioxide (CO₂) emissions and air pollutants harmful to health.

The development is classified as a minor development and will therefore not need to meet the carbon reduction targets set out in the London Plan or the on-site renewable generation targets required for larger developments under the Camden planning guidance.

In accordance with Camden Local Plan, as the development is less than 500m² and less than five residential units, an Energy Statement is not required. However, performance against carbon reduction targets should be included in a Sustainability Statement based on SAP results. The unregulated consumption and associated emissions of the development should also be calculated.

All developments in Camden are expected to reduce carbon emissions through the application of the London Plan Energy Hierarchy:

- Use less energy (Be Lean);
- Supply energy efficiently (Be Clean)
- Use renewable energy (Be Green); and
- Monitor, verify and report on energy performance (Be Seen)

The Camden Plan notes the importance of improving the existing building stock, and of reusing and repurposing existing buildings, but also the limitations on the improvements that can be made with heritage buildings. Guidelines on what improvements may be possible are included in the planning guidance and these are used as the basis of the measures set out in the 'be lean' improvements.

There is some emphasis in the planning guidance on dealing with future climate change while minimising the risk of overheating and providing comfortable environmental conditions. Measures to achieve this are set out under the cooling hierarchy.



4. ENVIRONMENTAL DESIGN STRATEGY

It is proposed to use a number of energy efficiency measures to reduce the energy demand of the development in line with the energy hierarchy of Be Lean, Be Clean, Be Green and Be Seen.

4.1. Be Lean

The first step of the London Plan energy hierarchy is to reduce energy use through both passive and active lean design measures. A number of sustainable design and construction methods have been incorporated into the design of the building which comply with the requirement to reduce energy demand. These include:

High Performance Building Envelope

Element	Building Regulation Part L1 Limit U-Value [W/m²K]	Average U-Value [W/m²K] Design
Upgraded External Wall	0.70	0.30
Upgraded Retained Floor	0.25	0.25
Upgraded Retained Roof	0.35	0.16
Existing Secondary Glazing at GF	3.30	2.70
New Secondary Glazing at Upper	3.30	2.70
Floors		
New Glazing at rear of LGF	1.40 or Window Energy Rating(10)	1.20
	Band B minimum	

Enhanced Air Tightness and Good Detailing

For new elements and where construction elements and thermal fabric are either being retained and upgraded, good detailing shall be achieved in order to avoid the creation of thermal bridges in the fabric and meeting points of elements such as between walls and floors and ceilings. The development should aim to achieve a greater building airtightness than currently present to reduce heatlosses in the building. Good detailing will be required to mitigate risk of surface and interstitial condensation, particularly for the upgraded thermal elements. It has been assumed for the refurbishment, the proposed improvements will result in an approximate air permeability of 5 m³/hr/m².

Limit Overheating

Systems have been designed to minimise internal heat gains by creating as short as possible service runs and the use of low energy lighting. The façade will be designed in such a way as to maximise solar gains in colder winter months while limiting them in summer months. Exposed thermal mass will be utilised wherever possible to create a more comfortable internal environment.



Daylight

The maximisation of daylight is one of the most important environmental factors for buildings. Artificial lighting contributes up to 25% of the energy costs of a typical building, despite operation largely within daylight hours. Anecdotal evidence also suggests that the provision of good levels of natural light can contribute to enhanced health and well-being. The design shall maximise daylight while limiting solar gains during summer months as much as is technically feasible.

Ventilation

Large openable windows will allow for natural ventilation. Mechanical extract will be installed to wet rooms and kitchen.

Heating

It is proposed to heat the development via individual air source heat pumps (ASHP). These units will be able to provide high efficiency heating and hot water.

Efficient Systems

Use of efficient systems and equipment with suitable time and temperature controls which have been appropriately commissioned such that the systems can be operated efficiently.

Minimization of lengths and diameters of 'dead legs'. Efficient components i.e. fans, pumps, refrigeration equipment have been appropriately sized to have no more capacity for demand and standby than is required for the task to operate at their optimum levels.

Insulation of pipework, ductwork and hot water systems have been selected to be in line with the future highest standards.

Minimising Water Usage

The design shall incorporate water saving strategies, such as low flush toilets, and non-concussive spray taps in order to keep the maximum water usage to 105 litres/person per day (in accordance with Policy SI5 Water Infrastructure of London Plan 2021. Water consumption will be monitored. Other features shall include mains leak detection and sanitary shut-off.

Energy Efficient Lighting and Appliances

Provision of the required lighting levels whilst minimizing energy consumption by appropriate specification of light fittings and effective control of lighting systems by:

- Specifying 100% of the fixed internal light fittings as dedicated energy efficient fixtures.
- Having suitable energy consumption metering.
- Ensuring systems have been appropriately commissioned.
- Using lighting systems which are efficient and make use of daylight where possible/practical.
- Provision of low output or energy efficient external lighting.
- Avoiding the use of external lighting when communal spaces are unoccupied or during the day by means PIR, daylight sensors and time controls.

A lighting efficacy of average 95 lumens per circuit watt has been used as the design standard. This will be achieved including LED lighting sources throughout.



4.2. Be Clean

Due to the development location, it is not proposed to connect to an existing low carbon heat network.

4.3. Be Green

The viability of renewable systems such as Photovoltaic Panels, Solar Thermal, and Heat pumps has been assessed. It is currently proposed to utilise ASHP technology to provide heating and hot water. The external units shall be fitted on the roof of the property.

4.4. Be Seen

Sufficient information about the building, the fixed building services and their maintenance requirements will be provided to the users so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances. The systems provided within the development will allow for monitoring to ensure they are run at optimum performance.



5. LOW AND ZERO CARBON TECHNOLOGIES

The following section provides a feasibility analysis of Low or Zero Carbon (LZC) technologies for use at 14 John Street. There are various options when it comes to LZC technology, but a combination of project constraints rules these out. The constraints are:

- Curtilage Listed status
- Capital expenditure
- Return on Investment
- Carbon savings potential
- Clean energy output potential
- Spatial requirements
- Operation and maintenance requirements
- Planning requirements

Out of the technologies considered the following were discounted immediately for this site:

- Ground-source heat pumps: no space for ground-loop or boreholes
- Hydroelectric: there are no suitable water courses or hydroelectric plants near the site.
- Hydrogen: generation and storage are still in the experimental stage at this scale and no systems are currently commercially available.
- Biomass: planning energy and carbon targets rule out the use of a gas boilers or alternatives (including CHP or biomass CHP). It is also considered not a viable solution due to issues with emissions and transport.
- CHP: as above.
- Biomass CHP: as above.
- Wind Turbines: wind turbine technology is not suitable for high density areas and those within close proximity to residential properties.

The feasibility study therefore reviewed the use of the following technologies to offset CO_2 emissions:

- Air Source Heat Pumps
- Photovoltaics
- Solar Thermal Panels



5.1. Feasibility of LZC Technologies

5.1.1. Air Source Heat Pump

An air to water heat pump uses the air as a heat sink and transfers the heat in the external space into the heating system. The temperature of the Low Temperature Hot Water (LTHW) providing the heating also affects the efficiency (coefficient of performance – COP) of the units, with the ideal flow and return temperatures being 45°C/35°C.

This limits the heating output that is possible using traditional radiator systems or underfloor heating systems. To ensure comfort levels in peak winter conditions, fabric upgrades are required to match the heat pump output to the building heat loss.

Air-source heat pumps (ASHP) need to be located externally, away from noise sensitive receptors. It is proposed to place these on the roof.

Considering proposed fabric upgrades and roof space available, ASHPs are considered appropriate for the project and included as part of the Architect's proposals.

5.1.2. Solar Photovoltaic (PV) Panels and Detailed information

Photovoltaic (PV) Panels are a renewable technology which will decrease the amount of electricity from the grid used in the building, particularly during the summer months when the solar irradiance is at its peak. Panels can be integrated within the building roof or stand alone; most efficient when south facing and angled at 30° from the horizontal. Such panels would reduce carbon emissions from the electrical uses within the building.

Installation of PVs will not be part of works as financial priority has been given to improve energy efficiency of the refurbishment.

5.1.3. Solar Thermal Systems

Solar thermal panels would need to be roof-mounted or integrated into a new roof structure. Flat plate or evacuated tube type panels could be used. The solar thermal panels would be used to heat water which can be used for the domestic hot water supply to the dwelling.

With an all-electric building services strategy proposed, PV panels would be considered a more suitable technology.



6. COOLING HIERARCHY

The building will be designed in line with the cooling hierarchy outlined in Policy SI4 Managing heat risk in London Plan 2021 and referenced in the Camden planning guidance. The following measures will be followed at each stage of the hierarchy in order to reduce the demand for cooling.

6.1. Minimising Internal Heat Gains

Stage one of the Cooling Hierarchy is to minimise internal heat generation through energy efficient design.

Heat distribution infrastructure will be designed to minimise pipe lengths. This will be achieved at coordination stage, ensuring pipework is well insulated and that pipe configurations minimise heat loss. Good daylighting and high efficiency light fittings with simple controls will also help to reduce excess heat gains from artificial lighting. Low energy lighting will be specified throughout.

6.2. Reducing Heat Entering the Building

Existing single-glazed windows are to be upgraded with secondary glazing with a solar transmittance that will help limit overheating due to solar gains. Incorporation of internal blinds will also help to limit solar gains in the summer.

6.3. Passive Ventilation

Openable windows in all perimeter rooms will allow sufficient natural cross ventilation to prevent overheating.

6.4. Mechanical Ventilation

Wet rooms will have mechanical extract ventilation to enhance the airflow through natural ventilation to help maintain a comfortable internal environment.

6.5. Active Cooling

It is not proposed to have any active cooling.



7. OVERHEATING RISK ANALYSIS

The measures described in the Cooling Hierarchy set out how overheating risk will be mitigated through passive design measures.

8. ENERGY ASSESSMENT

An energy assessment has been carried out to demonstrate how the targets for regulated CO₂ emissions reduction over and above 2021 Building Regulations will be met using the energy hierarchy outlined in Policy SI2 Minimising greenhouse gas emissions in the London Plan.

Energy consumption and associated carbon emissions have been calculated using approved SAP software and, using the GLA Carbon Emission Reporting Spreadsheet, a sitewide performance has been established. The unregulated energy demands of the development have been estimated based on CIBSE Guide F.

SAP software was used to output a Target Emissions Rate (TER) based on the notional building and a Dwelling Emissions Rate (DER) for the development for each stage of the energy hierarchy outlined below:

- Lean energy efficiency measures. Compared against a notional building with fabric and system efficiencies as stipulated by GLA Energy Assessment Guidance Appendix 3
- Clean Same as Lean
- Green ASHP technology with actual efficiencies providing heating and hot water

See Appendix A for full SAP results.



8.1. SAP Model

As previously part of the energy assessment, the proposed development has been compared against the performance of the existing building with fabric and efficiencies as stipulated by the GLA Energy Assessment Guide Appendix 3. The SAP model for the proposed flats were tested in accordance with the energy hierarchy set by the London and Local Plan.

For each scenario, all representative apartment types varying in factors such as area of external envelope, internal area and orientation within the development have been tested to provide a detailed assessment of onsite energy consumption.

Apartment Type	Area (m²)	Number of Units	
Unit I	97.67	I	
Unit 2	78.66	I	
Unit 3	89.56	I	
Unit 4	111.43	I	

Baseline

The following fabric U-values have been assigned for the baseline that the proposed development will be compared against.

Building Element	U-value (W/m²K)
External Wall	0.30
Roof	0.16
Exposed Floor	0.25

Glazing	U-value (W/m ² K)	g-value	
Double Glazed	1.60	0.63	
Windows			

The airtightness of the flats is calculated via the SAP software. It is assumed it is a masonry building, with a draught lobby, unsealed timber floors and no doors or windows are draught stripped. Each flat is heated by an ASHP with notional heating and hot water efficiencies, and naturally ventilated with mechanical extract in the wet rooms.



Proposed

The following fabric U-values have been assigned for the proposed development.

Building Element	U-value (W/m²K)
External Wall	0.30
Roof	0.16
Exposed Floor	0.25

Glazing	U-value (W/m ² K)	g-value
Double Glazed Windows	1.20	0.40
Secondary Glazing Windows	2.70	0.40

Based on the proposed refurbishment works, it is assumed a good level of detailing and sealing will be possible. An air permeability of 5 m³/hm² @ 50Pa has been assigned. Each flat is heated by an ASHP with notional heating and hot water efficiencies at Be Lean stage, with heating efficiency increased to 300% at Be Green stage, and naturally ventilated with mechanical extract in the wet rooms.



8.2. Unregulated Energy

The unregulated energy uses for the new flats have been estimated by the methods and average values described in CIBSE Guide F and TM54: Evaluating operational energy performance of buildings at the design stage. The table below shows the electrical equipment that is used in the residential development. The number of items of equipment has been estimated based on the number of occupants per flat as shown in the Architect's area schedules.

The power consumption of the equipment has been taken from the CIBSE Guide F 2012, paragraph 12.2. The installed capacity (nameplate rating) does not give an accurate estimate of energy use, so the 'average power consumption' as well as 'sleep mode' consumption have been used for the calculation.

The usage hours of the electrical equipment depend on the operating hours. The number of hours per day takes into account the intermittent usage and the variation of the operation from hour to hour and day to day. Instead of use a diversity factor multiplied by the power consumption, is going to be used an estimated number of hours. Overnight and weekend energy use can contribute significantly to small power energy and has been included. The equation below explains the calculation of the energy consumption.

Annual energy consumption (kWh) =

Number of equipment \times {[average power consumption during operation \times annual hours of operation] + [sleep mode consumption \times (8760 - hours of operation)]}

EQUIPMENT	QUANTITY INSTALLED	AVERAGE POWER DEMAND	SLEEP- MODE POWER DEMAND	HOURS OF OPERATION/DAY	TOTAL HOURS/YEAR	ENERGY CONSUMPTION
		(W)	(W)	hours/day	hours/year	(kWh)
laptops	8	40	4	8	2080	692.32
screens	4	60	10	8	2080	566.00
multifunction devices	4	135	60	2	728	875.04
miscellaneous	8	15		8	2912	349.44
microwave	4	800		0.5	182	582.40
fridge	4	130	20	24	8760	4,555.20
cooking equipment	4	850		2	730	2,482.00
					TOT (kWh)	10,102.40
		<u>'</u>			Unregulated/m2 (kWh/m2/yr)	26.80
					kgCO2/yr	1,404.23
					kgCO2/m2/yr	3.72



8.3. Results

The proposed passive and active design measures along with renewable technologies for the development results in an overall improvement over Part L of 19%, with a 10% improvement observed from energy efficiency measures. As previously outlined, there is no specific degree of improvement over Part L to achieve as a minor development under Local and London Plan.

	Regulated residential carbon dioxide sav	rings
	(Tonnes CO2 per annum)	(%)
Be lean: savings from energy demand reduction	0.2	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.2	9%
Cumulative on site savings	0.4	19%



9. WATER CONSUMPTION

The design shall incorporate water saving strategies, such as low flush toilets, and non-concussive spray taps to keep the water use as low as possible. Water consumption will be monitored. Other features shall include mains leak detection and sanitary shut-off.

10. MATERIALS

The development will maximise the use of recycled, responsibly sourced and low impact materials. As a refurbishment, the development will reuse the existing structure and constructions as much as possible. This will greatly reduce the embodied carbon of the development.

To promote resource efficiency via the effective management and reduction of construction waste. The proposed development will implement a Site Waste Management Plan (SWMP).

Demolition waste will be minimised, reused and recycled, where practicable.

These measures will aid in minimising waste to landfill, with the aim of diverting at least 85% of demolition and construction waste from landfill.

11. OPERATIONAL SUSTAINABILITY

As stated in Section 4.4 Be Seen, sufficient information about the building, the fixed building services and their maintenance requirements will be provided to the users so that the building can be operated in such a manner as to use no more fuel and power than is reasonable in the circumstances. The systems provided within the development will allow for monitoring to ensure they are run at optimum performance via user-friendly controls, and metering.

High efficiency equipment and appliances will be installed throughout. Where white goods are to be provided fridges and freezers will be A+ rated under the EU Energy Efficiency Rating Scheme, washing machines and dishwashers will be A rated.



12. CONCLUSION

In line with the Local and London Plan, Planning Policy, and the project Planning conditions, this Sustainability Statement outlines the Environmental Design Strategy for the development and demonstrates the energy efficiency and renewable energy measures applied are able to achieve significant onsite carbon reductions in line with the energy hierarchy.

The existing building's thermal fabric is being retained and upgraded to a standard in line with Part L Table 4.2. The works consist of providing secondary glazing to existing single-glazed windows and upgrading walls, floor and roof. Together with a new highly efficient heating and hot water, and ventilation system, this results in an overall improvement and reduction of regulated energy consumption and associated carbon emissions of 19% over Part L. In addition to improved thermal comfort and internal environment, this will lead to a saving on annual primary energy bills.

The baseline regulated emissions for the development have been calculated in accordance with Part L of the Building Regulations to be 2.3 tonnes CO₂/year.

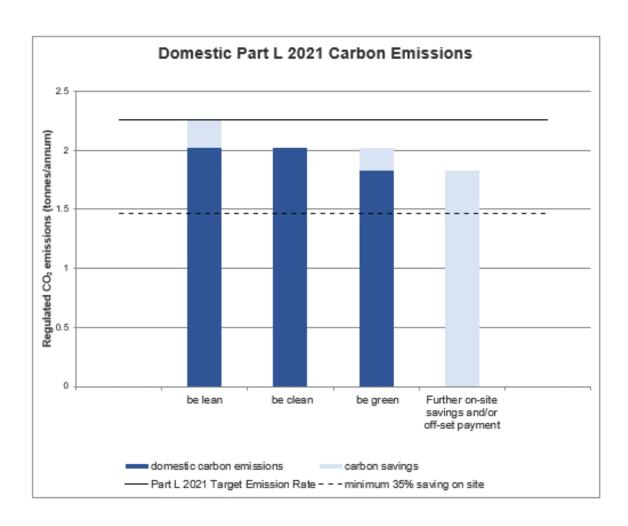
When applying proposed construction details and U-Values to all thermal elements and highly efficient means of distributing heating and hot water within the development, the measures equate to a decrease in CO₂ emissions of 10% over the Part L or 0.2 tonnes CO₂/year savings. The use of ASHPs to supply heating and hot water further reduces energy consumption and associated carbon emissions. A 19% savings in carbon emissions is achieved. The Local and London Plan does not have any specific carbon reduction targets for minor residential refurbishment projects. The final calculated regulated emissions of the development is 1.8 tonnes CO₂/year.

This report demonstrates how the energy and sustainability strategy of the development achieves compliance with Building Regulations, Local and London planning policy. Based on the constraints of the site, the report demonstrates how the most energy and carbon efficient design solution has been achieved. In addition to energy efficiency, the development's adaptability to climate change is demonstrated with the proposed steps of the cooling hierarchy.

	Carbon Dioxide Emissions for residential buildings (Tonnes CO2 per annum)				
	Regulated	Unregulated			
Baseline: Part L 2021 of the Building Regulations Compliant Development	2.3	1.4			
After energy demand reduction (be lean)	2.0	1.4			
After heat network connection (be clean)	2.0	1.4			
After renewable energy (be green)	1.8	1.4			



	Regulated residential carbon dioxide sa	vings
	(Tonnes CO2 per annum)	(%)
Be lean: savings from energy demand reduction	0.2	10%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.2	9%
Cumulative on site savings	0.4	19%





APPENDIX A - SAP CALCULATIONS



Dwelling Reference: J5652

Dwelling Type: New Dwelling Design Stage

WC1N 2JF

1. Overall dwelling dimensions

	Area(m²)	Av. Height(m)		Volume(m³)	
Basement Ground Floor	52.29 (1a 45.38 (1b		(2a) = (2b) =	148.5 147.94	(3a) (3b)
Total floor area TFA Dwelling volume	45.56 (16	, x 3.20	(25) -	97.67 296.44	(4) (5)

	2. Venti	lation	Rate
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Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	4	x 10 =	40	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
		Air changes per hour		

Number of storeys in the dwelling (ns)	0.13	0.13	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc	2	2	(9)
Additional infiltration	0.1	0.1	(10)
Structural infiltration	0.35	0.35	(11)
Suspended wooden ground floor	0.2	0.2	(12)
No draught lobby	0	0	(13)
Percentage of windows and doors draught proofed	0	0	(14)
Window infiltration	0.25	0.25	(15)
Infiltration rate	1.03	1.03	(16)
Air permeability value, AP50, (m³/h/m²)	0	0	(17)
Air permeability value, AP4, (m³/h/m²)	0	0	(17a)
Air permeability value)	1.03	1.03	(18)
Number of sides on which dwelling is sheltered	2	2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.88	(21)





Infiltration rate	modified for	monthly	wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly	average	wind spe	ed from	Table U2										
Wind Fa	5.1 ctor	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Adjusted	1.28 d infiltrat	1.25 ion rate (1.23 allowing	1.1 for shelte	1.08 er and wi	0.95 nd speed	0.95 I)	0.93	1	1.08	1.13	1.18	13.13	(22a)
Calculat	1.12 e effectiv	1.1 e air chai	1.08 nge rate t	0.97 for the ap	0.95 oplicable	0.84 case:	0.84	0.81	0.88	0.95	0.99	1.03	11.55	(22b)
													0	(23a)
													0	(23b)
a) If hal:	anced me	chanical	ventilatio	n with h	eat recov	erv (MV)	1B)						0	(23c)
a) II baic							-		0	0				(24-)
b) If bala	0 anced me	0 chanical	0 ventilatio	0 on withou	0 ut heat re	0 covery (I	0 MV)	0	0	0	0	0		(24a)
	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If who	ole house	extract v	entilatio	n or posit	tive input	ventilati	on from	outside						
	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If nati	ural venti	lation or	whole ho	ouse posi	tive inpu	t ventilat	ion from	loft						
Effective	1.12 e air chan	1.1 ge rate	1.08	0.97	0.95	0.85	0.85	0.83	0.89	0.95	0.99	1.03		(24d)
Effective	1.12 e air chan	1.1 ge rate fr	1.08 rom PCDI	0.97 3:	0.95	0.85	0.85	0.83	0.89	0.95	0.99	1.03		(25)
	1.12	1.1	1.08	0.97	0.95	0.85	0.85	0.83	0.89	0.95	0.99	1.03		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k -value

A X U	A X k	
(• • / • · / • / • / • / • / • / • / • /	KJ/ K	
3.36		(26)
20.36		(27)
0		(27a)
0	0	(28)
13.07	5751.9	(28a)
0	0	(28b)
5.62	3556.8	(29)
21.42	13564.1	(29a)
0	0	(30)
	159.3	(31)
	(W/K) 3.36 20.36 0 0 13.07 0 5.62 21.42	(W/K) kJ/K 3.36 20.36 0 0 0 0 13.07 5751.9 0 0 5.62 3556.8 21.42 13564.1 0 0





Party Wall 0	23700.6 (3	32)
Party floor	•	32a)
Party ceiling		32b)
Internal wall **	0 (3	33c)
Internal floor	0 (3	32d)
Internal ceiling floor	0 (3	32e)
Fabric heat loss, W/K = \sum (A x U)	63.83 (3	33)
Heat capacity $Cm = \sum (A \times k)$	48150.4 (3	34)
Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K	250 (3	35)
Linear Thermal bridges: \sum (L x Ψ) calculated using Appendix K	0 (3	36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available	0 (3	36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$	63.83 (3	37)
Ventilation heat loss calculated monthly		
109.72 107.57 105.42 94.71 92.66 83.07 83.07 81.3 86.76 92.66 96.82 1 Heat transfer coefficient, W/K	.01.12 (3	38)
173.55 171.4 169.25 158.54 156.48 146.9 146.9 145.13 150.59 156.48 160.65 1 Heat loss parameter (HLP), W/m²K	.64.94 (3	39)
	69 (4	10)
Number of days in month (Table 1a)		
31 28 31 30 31 30 31 30 31 30 3	31 (4	11)
4. Water heating energy requirement		
Assumed occupancy, N	2.72 (4	12)
Hot water usage in litres per day for mixer showers, Vd, shower (from Appendix J)		
0 0 0 0 0 0 0 0 0 0) (4	12a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)		
	30.2 (4	12b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)		١٠ ١
42.45 40.91 39.37 37.82 36.28 34.73 34.73 36.28 37.82 39.37 40.91 4 Annual average hot water usage in litres per day Vd,average (from Appendix J)	•	12c) 13)
Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)	110.121 (.	, ,
122.93 120.19 116.96 112.31 108.45 104.33 102.94 106.15 109.51 113.81 118.53 1	1358.76 (4	14)
Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)	1330.70 (.,
194.69 171.15 179.77 153.75 145.99 128.28 124.49 131.44 135.04 154.45 168.86 1	192.05 1879.95 (4	ŀ5)
Distribution loss (46) = 0.15 x (45)	00.04	16)
29.2 25.67 26.96 23.06 21.9 19.24 18.67 19.72 20.26 23.17 25.33 2	28.81 (4	16)



Water storage loss (or HIU loss)

Temperature factor from Table 2b

Storage volume (litres) including any solar or WWHRS storage within same vessel

a) If manufacturer's declared loss factor is known (kWh/day):

0

1.6

0.54

(47)

(48)

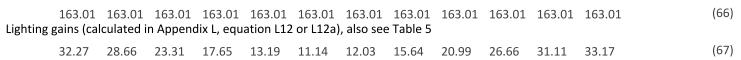
(49)



Energy lost from water storage, kWh/day (48) x (49) =	0.86	(50)
b) If manufacturer's declared loss factor is not known :		, ,
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.86	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) \times (41)		
26.78 24.19 26.78 25.92 26.78 25.92 26.78 25.92 26.78 25.92 26.78 If the vessel contains dedicated solar storage or dedicated WWHRS storage,		(56)
(57)m = (56)m ② [(47) − Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.78 24.19 26.78 25.92 26.78 25.92 26.78 26.78 25.92 26.78 25.92		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only	heat netwo	rks)
23.26 21.01 23.26 22.51 23.26 0 0 0 0 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = $0.85 \times (45) + (46) + (57) + (59) + (61)$		
244.73 216.35 229.81 202.19 196.04 154.2 151.28 158.22 160.96 204.49 217.29 242.09	2377.65	(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water hea	ting)	
		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		(661)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(63b)
		(620)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(63c)
0 0 0 0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)		(030)
244.73 216.35 229.81 202.19 196.04 0 0 0 204.49 217.29 242.09	1753	(64)
Output from water heater for each month, $kWh/month$ (64) = (62) + (63a) + (63b) + (63c) + (63d)	1,33	()
0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
104.77 93.07 99.81 89.87 88.58 63.39 62.82 65.13 65.64 91.39 94.89 103.89		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

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

Metabolic gains (Table 5), watts







Appliance	as gains l	calculate	ad in Anna	andiv L a	auation I	16 or l 1	Sal also	saa Tahla	. 5					
Appliance			370.93		•		• .			308 87	335 35	360 24		(68)
Cooking g									207.03	300.07	333.33	300.21		()
Pumps an	54.02 nd fans g	54.02 ains (Tab	54.02 le 5a)	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02		(69)
Losses e.g	0 g. evapoi	0 ration (ne	0 egative va	0 alues) (Ta	0 ble 5	0	0	0	0	0	0	0		(70)
Water he			-108.68 e 5)	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68		(71)
Total inte	140.82 ernal gair		134.15	124.82	119.06	88.04	84.44	87.54	91.16	122.84	131.79	139.64		(72)
	658.32	656.3	636.75	600.77	564.07	506.11	486.77	489.57	508.4	566.72	606.62	641.41		(73)
6 Sola	ar gains													
0. 30la	ii gaiiis													
Solar gain	ns in wat	ts, calcul	ated for e	each mon	th									
Total gain	93.14 ns – inter		251.25 solar (wat		442.66	459.83	434.78	366.22	286.53	189.96	112.89	78.88		(83)
TOLAI BAII														
_	751.45	822.69	888	956.55	1006.73	965.94	921.55	855.79	794.93	756.68	719.51	720.29		(84)
_	751.45	822.69	888	956.55	1006.73	965.94	921.55	855.79	794.93	756.68	719.51	720.29		(84)
	-	-	888 perature				921.55	855.79	794.93	756.68	719.51	720.29		(84)
	an inter	nal temp	perature	(heating	g season)			794.93	756.68	719.51	720.29	21	(84)
7. Mea Temperat Utilisation	an inter ture duri n factor f	nal temp	perature	(heating	g season ving area m (see Ta) from Tal able 9a)	ble 9, Thí		794.93	756.68	719.51	720.29	21	(85)
7. Mea Temperat Utilisation	an inter ture duri n factor t 0.99	nal temping heating for gains	perature ng period for living 0.98	(heating s in the li area, 21, 0.96	g season ving area .m (see Ta 0.91) from Tal able 9a) 0.79	ble 9, Thí	L (°C)	794.93	0.97	0.99	720.29	21	
7. Mea Temperat Utilisation	an inter ture duri n factor f 0.99 ernal ter 18.88	nal temporation ng heating for gains 0.99 nperatur 19.08	perature ng period for living 0.98 e in living 19.43	(heating s in the li area, 121, 0.96 g area T1 19.99	ying area m (see Ta 0.91 (follow st 20.46	from Tal able 9a) 0.79 ceps 3 and	ole 9, Thí 0.64 d 4 in Tak 20.94	0.69 ole 9c) 20.92					21	(85)
7. Mea Temperat Utilisation Mean inte	an inter ture duri n factor f 0.99 ernal ter 18.88	nal temporation ng heating for gains 0.99 nperatur 19.08	perature ng period for living 0.98 e in living 19.43 ng period	(heating s in the li area, 121, 0.96 g area T1 19.99	ying area m (see Ta 0.91 (follow st 20.46 of dwellin	from Tal able 9a) 0.79 ceps 3 and	ole 9, Thí 0.64 d 4 in Tak 20.94	0.69 ole 9c) 20.92	0.89	0.97	0.99	1	21	(85)
7. Mea Temperat Utilisation Mean inte	an inter ture duri n factor i 0.99 ernal ter 18.88 ture duri	nal tempong heating for gains 0.99 nperatur 19.08 ng heatin	perature ng period for living 0.98 e in living 19.43 ng period	s in the li area, 21, 0.96 area T1 19.99 s in rest o	ying area m (see Ta 0.91 (follow st 20.46 of dwellin	from Tal able 9a) 0.79 ceps 3 and 20.82 og from Ta	0.64 d 4 in Tak 20.94 able 9, Th	0.69 ole 9c) 20.92 n2 (°C) 19.7	0.89 20.66 19.66	0.97 20.1 19.61	0.99 19.47 19.58	1 18.95 19.55	21	(85) (86) (87)
7. Mea Temperat Utilisation Mean inte	an inter ture duri n factor i 0.99 ernal ter 18.88 ture duri	nal tempong heating for gains 0.99 nperatur 19.08 ng heatin	perature ng period for living 0.98 e in living 19.43 ng period	s in the li area, 21, 0.96 area T1 19.99 s in rest o	ving area m (see Ta 0.91 (follow st 20.46 of dwellin 19.61 Utilisation 0.87	from Tal able 9a) 0.79 ceps 3 and 20.82 g from Tal 19.68 factor for 0.69	0.64 d 4 in Tak 20.94 able 9, Th 19.68 or gains fo 0.48	0.69 ble 9c) 20.92 n2 (°C) 19.7 or rest of 0.54	0.89 20.66 19.66 dwelling, 0.82	0.97 20.1 19.61 , 22,m (se 0.96	0.99 19.47 19.58 ee Table 9 0.99	1 18.95 19.55	21	(85) (86) (87)
7. Mea Temperat Utilisation Mean inte Temperat Roof Roof	an inter ture duri n factor f 0.99 ernal ter 18.88 ture duri 19.49	nal temporal ng heating for gains 0.99 nperatur 19.08 ng heatin 19.5	oerature ng period for living 0.98 e in living 19.43 ng period 19.52 0.98	s in the li area, 21, 0.96 area T1 19.99 s in rest of	ving area m (see Ta 0.91 (follow st 20.46 of dwellin 19.61 Utilisation 0.87 Me	from Tal able 9a) 0.79 teps 3 and 20.82 g from Tal 19.68 factor for 0.69 an intern	0.64 d 4 in Tak 20.94 able 9, Th 19.68 or gains fo 0.48 al tempe	0.69 ble 9c) 20.92 12 (°C) 19.7 or rest of 0.54 rature in	0.89 20.66 19.66 dwelling, 0.82 the rest	0.97 20.1 19.61 ,	0.99 19.47 19.58 ee Table 9 0.99 ng T2	1 18.95 19.55 9a) 0.99	21	(85) (86) (87) (88) (89)
7. Mea Temperat Utilisation Mean inte Temperat Roof Roof	an inter ture duri n factor f 0.99 ernal ter 18.88 ture duri 19.49 0.99	nal temporal ng heating for gains 0.99 nperatur 19.08 ng heatin 19.5 0.99	perature ng period for living 0.98 e in living 19.43 ng period 19.52	s in the li area, 21, 0.96 s area T1 19.99 s in rest o	ving area m (see Ta 0.91 (follow st 20.46 of dwellin 19.61 Utilisation 0.87	from Tal able 9a) 0.79 ceps 3 and 20.82 g from Tal 19.68 factor for 0.69	0.64 d 4 in Tak 20.94 able 9, Th 19.68 or gains fo 0.48	0.69 ble 9c) 20.92 n2 (°C) 19.7 or rest of 0.54	0.89 20.66 19.66 dwelling, 0.82	0.97 20.1 19.61 , 22,m (se 0.96	0.99 19.47 19.58 ee Table 9 0.99	1 18.95 19.55 Đa)		(85) (86) (87) (88) (89) (90)
7. Mea Temperat Utilisation Mean inte Temperat Roof Roof	an inter ture duri n factor f 0.99 ernal ter 18.88 ture duri 19.49 0.99	nal temporal name of te	oerature ng period for living 0.98 e in living 19.43 ng period 19.52 0.98	(heating s in the li area, 12, 0.96 g area T1 19.99 s in rest of 19.6 0.95	ving area m (see Ta 0.91 (follow st 20.46 of dwellin 19.61 Itilisation 0.87 Me 19.24	from Tal able 9a) 0.79 teps 3 and 20.82 g from Tal 19.68 factor for 0.69 an intern	0.64 d 4 in Tak 20.94 able 9, Th 19.68 or gains fo 0.48 al tempe	0.69 ble 9c) 20.92 12 (°C) 19.7 or rest of 0.54 rature in	0.89 20.66 19.66 dwelling, 0.82 the rest	0.97 20.1 19.61 ,	0.99 19.47 19.58 ee Table 9 0.99 ng T2	1 18.95 19.55 9a) 0.99	0.2	(85) (86) (87) (88) (89)
7. Mea Temperat Utilisation Mean inte Temperat Roof Roof Living are Mean inte	ture duri n factor f 0.99 ernal ter 18.88 ture duri 19.49 0.99	nal temporal ng heating for gains 0.99 nperatur 19.08 ng heatin 19.5 0.99 17.83 nn nperatur 18.08	oerature ng period for living 0.98 e in living 19.43 ng period 19.52 0.98 18.19 e (for the	s in the li area, 21, 0.96 area T1 19.99 s in rest of 0.95 18.8 whole d	ving area m (see Ta 0.91 (follow st 20.46 of dwellin 19.61 Itilisation 0.87 Me 19.24	from Tal able 9a) 0.79 teps 3 and 20.82 g from Tal 19.68 factor for 0.69 an intern	0.64 d 4 in Tak 20.94 able 9, Th 19.68 or gains fo 0.48 al tempe	0.69 ble 9c) 20.92 12 (°C) 19.7 or rest of 0.54 rature in	0.89 20.66 19.66 dwelling, 0.82 the rest	0.97 20.1 19.61 ,	0.99 19.47 19.58 ee Table 9 0.99 ng T2	1 18.95 19.55 9a) 0.99		(85) (86) (87) (88) (89) (90)

8. Space heating requirement





Utilisation factor for gains,		
0.99 0.98 0.97 0.94 0.86 0.7 0.51 0.57 0.82 0.95 0.98 0.99 Useful gains, mGm , W		(94)
743.11 809.32 863.18 899.56 869.61 679.92 471.02 485.48 654.73 718.58 707.06 713.58 Monthly average external temperature from Table U1		(95)
4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2		(96)
Heat loss rate for mean internal temperature		(07)
2356.71 2259.76 2021.64 1607.94 1218.85 770.92 489.07 512.31 844.71 1338.76 1834.43 2272.91 Space heating requirement for each month		(97)
1200.52 974.7 861.89 510.04 259.84 0 0 0 0 461.41 811.7 1160.14 Solar space heating calculated using Appendix H (negative quantity)		(98a)
0 0 0 0 0 0 0 0 0 0		(98b)
$1200.52\ 974.7 861.89\ 510.04\ 259.84\ 0 \qquad 0 \qquad 0 \qquad 0 \qquad 461.41\ 811.7 1160.14$ Space heating requirement in kWh/m²/year	63.89	(98c) (99)
8c. Space Cooling requirement	-	
oc. space cooming requirement		
Heat loss rate,		
0 0 0 0 0 0 0 0 0 0 0 0 0 0 Utilisation factor for loss		(100)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Useful loss, mLm (watts)		(101)
0 0 0 0 0 0 0 0 0 0 0 0 Gains		(102)
0 0 0 0 0 0 0 0 0 0		(103) (104)
		(104)
Cooled fraction Intermittency factor	0	(105)
0 0 0 0 0 0 0 0 0 0		(106)
Space cooling requirement for month 0	0	
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Space cooling requirement in kWh/m²/year	0	(107) (108)
8f. Space heating requirement		
Fabric Energy Efficiency,	0	(109)

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





Fraction of space l	heat froi	m second	lary/supp	olementa	ry systen	n,	()				0	(201)
Fraction of space l	heat froi	m main sy	ystem(s),									1	(202)
Fraction of main h	eating f	rom mair	system	2,								0	(203)
Fraction of total sp	pace hea	at from m	nain syste	em 1,								1	(204)
Fraction of total sp	pace hea	at from m	ain syste	em 2,								0	(205)
Efficiency of main	•											264	(206)
Efficiency of main	•	· ·	•	•								0	(207)
Efficiency of secor					em, %,							0	(208)
Cooling System Se			•				()				0	(209)
Space heating req	uiremen	nt (calcula	ited abov	/e),									
0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fue	l (main h	neating sy	/stem 1),	kWh/mo	onth		()				0	
454.74		326.47		98.42	0	0	0	0	174	.78 307.46	439.45		(211)
Space heating fue	l (main h	neating sy	/stem 2),	kWh/mo	onth		()				0	
0	0	0	0	0	0	0	0	0	0	0	0		(213)
Space heating fue	l (second	dary), kW	h/montr	1			()				0	
0	0	0	0	0	0	0	0	0	0	0	0		(215)
Output from wate		• •					()				264	(216)
Efficiency of water	r neater												
264	264	264	264	264	264	264	264	26	4 264	264	264		(217)
Fuel for water hea	_												()
92.7 Space Cooling	81.95	87.05	76.59	74.26	0	0	0	0	77.4	16 82.31	91.7	664.01	(219)
_	_			_					_		_		(224)
0 Annual totals	0	0	0	0	0	0	0	0	0	0	0		(221)
Space heating fue	lusad n	nain syste	am 1				kWh,	year	kWh/ye	ar		2262.72	(244)
Space heating fuel												2363.72	(211)
Space heating fuel												0 0	(213) (215)
Water heating fue		ccondary										664.01	(215)
Electricity for insta		us electri	c shower	·(s)								004.01	(219) (64a)
Space cooling fuel		us c.cc		(5)								0	(221)
Electricity for pum		and elec	tric keep	-hot								U	(221)
Mechanical vent fa	•		•		input froi	m outside	e ()	0			0	(230a)
warm air heating s							- (,	O			0	(230a)
Heating circulation	-		pump wi	thin warı	m air hea	ting unit						0	(230c)
Oil boiler auxiliary						-						0	(230d)
Gas boiler auxiliar						,						0	(230e)
Maintaining electr												0	(230t)
Pump for solar wa			, 0									0	(230g)
Pump for storage		_										0	(230h)
Total electricity fo												0	(231)
Electricity for light												227.95	(232)
, 3	_											,.55	(-02)





	ng/generatio						ısed in dw	elling					
Electricity g	enerated by	PVs (App	endix M)	(negativ	e quantit	у)							
0 Electricity g	0 enerated by	0 wind turk	0 oines (Ap	0 pendix M	0 1) (negati	0 ve quant	0 ti ty)	0	0	0	0	0	(233a)
0 Electricity g	0 enerated by	0 hydro-ele	0 ectric ger	0 nerators	0	0	0	0	0	0	0	0	(234a)
0 Electricity u	0 sed or net el	0 ectricity §	0 generate	0 d by micr	0 o-CHP	0	0	0	0	0	0	0	(235a)
	0 ng/generatic enerated by						0 exported	0	0	0	0	0	(235c)
0 Electricity g	0 enerated by	0 wind turk	0 oines (Ap	0 pendix M	0 1) (negati	0 ve quant	0 tity)	0	0	0	0	0	(233b)
0 Electricity g	0 enerated by	0 hydro-ele	0 ectric ger	0 nerators	0	0	0	0	0	0	0	0	(234b)
0 Electricity u	0 sed or net el	0 ectricity _{	0 generate	0 d by micr	0 o-CHP	0	0	0	0	0	0	0	(235b)
0 Appendix Q	0 items: annu	0 al energy	0	0	0	0	0	0	0	0	0	0	(235d)
Appendix Q	, <item 1="" des<="" td=""><td>scription></td><td></td><td></td><td></td><td></td><td>Fuel</td><td>I</td><td>kWh/year</td><td></td><td></td><td></td><td></td></item>	scription>					Fuel	I	kWh/year				
energy save	d											0	(236a)
energy used	ł											0	(237a)
Total delive	red energy f	or all uses	5									3880.35	. ,

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/yea	r
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		389.78	(240a)
Low-rate fraction	0		389.78	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		389.78	(241a)
Low-rate fraction	0		389.78	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		389.78	(242a)





Low-rate fraction	0		389.78	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Space heating - secondary cost (other fuel)	0		0	(242e)
Water heating (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		0	(243)
Low-rate fraction	0		0	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Water heating cost (other fuel)	0		109.5	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247	7)			
Energy For instantaneous electric shower(s)	0		0	(247a)
Space cooling	0		0	(248)
Pumps, fans And electric keep-hot	0		0	(249)
Energy For lighting	0		37.59	(250)
Additional standing charges	0		0	(251)
Energy saving/generation technologies	0		0	(252)
Appendix Q, <item 1="" description=""></item>	Fuel	kWh/year		
energy saved Or generated	0		0	(253)
energy used	0		0	(254)
Total energy cost	0		639.87	(255)
11a. SAP rating – Individual heating systems including micro-CHP				
Energy cost deflator	0		0	(256)
Energy cost factor (ECF)	0		0	(257)
SAP rating	0		0	(258)
11a. SAP rating – Individual heating systems including mic	ro-CHP			
Tid. 3/11 Tacing marviadal neating systems including fine	10 0111			
Energy cost deflator			0.36	(256)
Energy cost factor (ECF)			1.61	(257)
SAP rating			73.83	(258)
12a. CO2 emissions – Individual heating systems including	micro-CHP			
	Energy	Emission factor	Emissions	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			365.59	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			100.21	(264)
Energy for instantaneous electric shower(s)			0	(264a)





Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		0	(267)
Electricity for lighting		32.9	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		571.35	(272)
Dwelling CO2 Emission Rate		5.85	(273)
El rating		95	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy	Emission factor	Emissionsr	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			3717.25	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1034.97	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			0	(281)
Electricity for lighting			349.64	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5994.17	(286)
Dwelling PE Rate			61.37	(287)



Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:37:57

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Maisonette, Mid-terrace
OCDEA Registration	STRO037816	Assessment Date	2024-02-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	98 m ²
Site Reference	J5652 - Northington Unit 1	Plot Reference	J5652
	LEAN		
Address	WC1N 2JF		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate					
Fuel for main heating system	Electricity					
Target carbon dioxide emission rate	12.5 kgCO₂/m²					
Dwelling carbon dioxide emission rate	5.03 kgCO ₂ /m ²	OK				
1b Target primary energy rate and dwelling pri	mary energy					
Target primary energy	67.06 kWh _{PE} /m ²					
Dwelling primary energy	53.04 kWh _{PE} /m ²	OK				
1c Target fabric energy efficiency and dwelling	1c Target fabric energy efficiency and dwelling fabric energy efficiency					
Target fabric energy efficiency	34.1 kWh/m ²					
Dwelling fabric energy efficiency	54.1 kWh/m ²	FAIL				

2a Fabric U-values					
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value		
External walls	0.26	0.3	Exposed (0.3)	FAIL	
Party walls	0.2	0	Party Wall (0)	N/A	
Curtain walls	1.6	0	N/A	N/A	
Floors	0.18	0.25	External Floor (0.25)	FAIL	
Roofs	0.16	N/A	N/A	N/A	
Windows, doors,	1.6	2.15	2 (2.7)	FAIL	
and roof windows					
Rooflights	2.2	N/A	N/A	N/A	

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Exposed	70.44	0.3	
Basement wall: Ground	18.72	0.3	
Party wall: Party Wall	131.67	0 (!)	
Ground floor: External Floor	52.29	0.25	
Exposed roof: Exposed Roof	0	0 (!)	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Doors	3.36	South East	N/A	1 (!)
2, Windows (1)	9.45	North	0.9	2.7
3, Windows (1)	2.26	South East	0.9	2.7
4, Windows (2)	2.78	South East	0.9	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))				
Maximum permitted air permeability at 50Pa 8 m³/hm²				
Dwelling air permeability at 50Pa	5 m ³ /hm ² , Design value	OK		
Air permeability test certificate reference Not Provided				

Date generated: 2024-02-19 17:37:57 Page 1 of 3

4 Space heating			
Main heating system 1: Heat pump with	radiators or underfloor heating - Electricity		
Efficiency	264.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			

5 Hot water	Hot water		
Cylinder/store - type: Cylinder			
Capacity	210 litres		
Declared heat loss	1.6 kWh/day		
Primary pipework insulated	Yes		
Manufacturer			
Model			
Commissioning			
Waste water heat recovery system 1 - type: N/A			
Efficiency			
Manufacturer			
Model			

6 Controls		
Main heating 1 - type: Programmer, TR\	/s, and bypass	
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		

7 Lighting			
Minimum permitted light source efficacy	75 lm/W		
Lowest light source efficacy	95 lm/W	OK	
External lights control	N/A		

8 Mechanical ventilation			
System type: N/A			
Maximum permitted specific fan power	N/A		
Specific fan power	N/A	N/A	
Minimum permitted heat recovery	N/A	·	
efficiency			
Heat recovery efficiency	N/A	N/A	
Manufacturer/Model		·	
Commissioning			

9 Local generation N/A

10 Heat networks N/A

11 Supporting documentary evidence N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the co are a true and accurate reflection based upon the design ir the purpose of carrying out the "As designed" assessment, evidence (SAP Conventions, Appendix 1 (documentary evi documentary evidence required) has been reviewed in the Compliance Report.	nformation submitted for this dwelling for and that the supporting documentary idence) schedules the minimum
Signed:	Assessor ID:
Name:	Date:
b. Client Declaration	
N/A	<u> </u>

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:44:58

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Maisonette, Mid-terrace
OCDEA Registration	STRO037816	Assessment Date	2024-02-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	98 m ²
Site Reference	J5652 - Northington Unit 1	Plot Reference	J5652
	GREEN		
Address	WC1N 2JF		

Client Details		
Name	Not Provided	
Company	Not Provided	
Address	Not Provided, Not Provided, WF10 5QU	

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate	
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	12.5 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	4.55 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	67.06 kWh _{PE} /m ²	
Dwelling primary energy	48.16 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	34.1 kWh/m ²	
Dwelling fabric energy efficiency	54.1 kWh/m ²	FAIL

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.3	Exposed (0.3)	FAIL
Party walls	0.2	0	Party Wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	0.25	External Floor (0.25)	FAIL
Roofs	0.16	N/A	N/A	N/A
Windows, doors,	1.6	2.15	2 (2.7)	FAIL
and roof windows				
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Exposed	70.44	0.3
Basement wall: Ground	18.72	0.3
Party wall: Party Wall	131.67	0 (!)
Ground floor: External Floor	52.29	0.25
Exposed roof: Exposed Roof	0	0 (!)

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Doors	3.36	South East	N/A	1 (!)
2, Windows (1)	9.45	North	0.9	2.7
3, Windows (1)	2.26	South East	0.9	2.7
4, Windows (2)	2.78	South East	0.9	1.2

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa 8 m³/hm²		
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK
Air permeability test certificate reference Not Provided		

Date generated: 2024-02-19 17:44:58 Page 1 of 3

etricity

5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	210 litres	
Declared heat loss	1.6 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		

6 Controls			
Main heating 1 - type: Programmer, TRV	/s, and bypass		
Function			
Ecodesign class			
Manufacturer			
Model			
Water heating - type: Cylinder thermostat and HW separately timed			
Manufacturer			
Model			

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery	N/A	·
efficiency		
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		
Commissioning		

9 Local generation N/A

10 Heat networks N/A

11 Supporting documentary evidence N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the co are a true and accurate reflection based upon the design ir the purpose of carrying out the "As designed" assessment, evidence (SAP Conventions, Appendix 1 (documentary evi documentary evidence required) has been reviewed in the Compliance Report.	nformation submitted for this dwelling for and that the supporting documentary idence) schedules the minimum
Signed:	Assessor ID:
Name:	Date:
b. Client Declaration	
N/A	<u> </u>



Dwelling Reference: J5652

Dwelling Type: New Dwelling Design Stage

WC1N 2JF

1. Overall dwelling dimensions

	Area(m²)	Av. Height(m)		Volume(m³)	
Basement Ground Floor Total floor area TFA Dwelling volume	40.23 (1a 38.43 (1b	•	(2a) = (2b) =	114.25 125.28 78.66 239.53	(3a) (3b) (4) (5)

2.	Ventil	lation	Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	3	x 10 =	30	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
		Air changes per hour		. ,

	0 1		
Number of storeys in the dwelling (ns)	0.12	0.12	(0)
, , ,	0.13	0.13	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc	2	2	(9)
Additional infiltration	0.1	0.1	(10)
Structural infiltration	0.35	0.35	(11)
Suspended wooden ground floor	0.2	0.2	(12)
No draught lobby	0	0	(13)
Percentage of windows and doors draught proofed	0	0	(14)
Window infiltration	0.25	0.25	(15)
Infiltration rate	1.03	1.03	(16)
Air permeability value, AP50, (m³/h/m²)	0	0	(17)
Air permeability value, AP4, (m³/h/m²)	0	0	(17a)
Air permeability value)	1.03	1.03	(18)
Number of sides on which dwelling is sheltered	2	2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.87	(21)
. •		0.07	(21)





	Infiltration	rate modifie	ed for mon	thly wind speed
--	--------------	--------------	------------	-----------------

				•										(00)
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Month	ly average	wind spe	eed from	Table U2	2									
	5.1	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Wind F	actor													
	1.28	1.25	1.23	1.1	1.08	0.95	0.95	0.93	1	1.08	1.13	1.18	13.13	(22a)
Adjuste	ed infiltrat	ion rate (allowing	for shelt	er and w	ind speed	1)							
	1.11	1.09	1.07	0.96	0.94	0.83	0.83	0.81	0.87	0.94	0.98	1.02	11.44	(22b)
Calcula	te effectiv	e air cha	nge rate	for the a _l	pplicable	case:								
													0	(23a)
													0	(23b)
													0	(23c)
a) If ba	lanced me	echanical	ventilation	on with h	eat recov	very (MV	HR)							
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If ba	lanced me	echanical	ventilation	on withou	ut heat re	ecovery (MV)							
	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If wh	ole house	extract v	ventilatio	n or posi	tive inpu	t ventilat	ion from	outside						
	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If na	tural vent	ilation or	whole h	ouse posi	itive inpu	t ventilat	tion from	loft						
	1.11	1.09	1.07	0.96	0.94	0.84	0.84	0.82	0.88	0.94	0.98	1.02		(24d)
Effectiv	e air char	nge rate												
	1.11	1.09	1.07	0.96	0.94	0.84	0.84	0.82	0.88	0.94	0.98	1.02		(25)
Effectiv	e air char	nge rate f	rom PCD	В:										
	1.11	1.09	1.07	0.96	0.94	0.84	0.84	0.82	0.88	0.94	0.98	1.02		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k -value

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	0	(2	26)
Windows	22.99	(2	27)
Roof window	0	(2	27a)
Basement floor	0	0 (2	28)
Ground floor	10.06	4425.3 (2	28a)
Exposed floor	0	0 (3	28b)
Basement wall	16.25	10290.4 (2	29)
External wall	11.6	7349.2 (2	29a)
Roof	0	0 (3	30)
Total area of external elements ∑A, m²		148.36 (3	31)





Party Wall 0	11955.6	(32)
Party floor	0	(32a)
Party ceiling	1322.7	(32b)
Internal wall **	0	(33c)
Internal floor	0	(32d)
Internal ceiling floor	0	(32e)
Fabric heat loss, W/K = \sum (A x U)	60.9	(33)
Heat capacity $Cm = \sum (A \times k)$	35343.2	(34)
Thermal mass parameter (TMP = Cm \div TFA) in kJ/m ² K	250	(35)
Linear Thermal bridges: ∑ (L x Ψ) calculated using Appendix K	0	(36)
Point Thermal bridges: $\sum \chi$ (W/K) if significant point thermal bridge present and values available	0	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$	60.9	(37)
Ventilation heat loss calculated monthly		
87.83 86.11 84.38 75.84 74.21 66.61 66.61 65.21 69.54 74.21 77.51 80.94		(38)
Heat transfer coefficient, W/K		
148.73 147.01 145.29 136.74 135.11 127.51 127.51 126.11 130.44 135.11 138.41 141.84 Heat loss parameter (HLP), W/m²K		(39)
1.89 1.87 1.85 1.74 1.72 1.62 1.62 1.6 1.66 1.72 1.76 1.8 Number of days in month (Table 1a)		(40)
		(41)
31 28 31 30 31 30 31 30 31 30 31		(41)
4. Water heating energy requirement		
Assumed occupancy, N	2.44	(42)
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)	2.44	(42)
0 0 0 0 0 0 0 0 0 0		(42a)
Hot water usage in litres per day for baths, Vd,bath (from Appendix J)		
75.04 73.92 72.36 69.46 67.3 64.89 63.59 65.15 66.85 69.42 72.37 74.79		(42b)
Hot water usage in litres per day for other uses, Vd,other (from Appendix J)		
39.59 38.15 36.71 35.27 33.83 32.39 32.39 33.83 35.27 36.71 38.15 39.59		(42c)
Annual average hot water usage in litres per day Vd, average (from Appendix J)	105.56	(43)
Hot water usage in litres per day for each month $Vd,m = (42a) + (42b) + (42c)$		



Distribution loss $(46) = 0.15 \times (45)$

Water storage loss (or HIU loss)

Temperature factor from Table 2b

(44)

(45)

(46)

(47)

(48)

(49)

1267

1753

0

1.6

0.54

21.6

23.62 26.86

114.63 112.07 109.06 104.73 101.12 97.28 95.98 98.98 102.12 106.13 110.52 114.37

181.54 159.59 167.63 143.37 136.13 119.62 116.08 122.56 125.92 144.02 157.46 179.08

Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)

27.23 23.94 25.14 21.51 20.42 17.94 17.41 18.38 18.89

Storage volume (litres) including any solar or WWHRS storage within same vessel

a) If manufacturer's declared loss factor is known (kWh/day):



Energy lost from water storage, kWh/day (48) x (49) =	0.86	(50)
b) If manufacturer's declared loss factor is not known :		
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.86	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) \times (41)		
26.78 24.19 26.78 25.92 26.78 25.92 26.78 25.92 26.78 25.92 26.78		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m ② [(47) − Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.78 24.19 26.78 25.92 26.78 25.92 26.78 25.92 26.78 25.92 26.78		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only	heat netwo	rks)
23.26 21.01 23.26 22.51 23.26 0 0 0 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = $0.85 \times (45) + (46) + (57) + (59) + (61)$		
231.59 204.79 217.67 191.8 186.18 145.54 142.87 149.34 151.84 194.06 205.89 229.13	2250.7	(62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water hea	ting)	
		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		()
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		(63b)
		(62.)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(63c)
		(62-1)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(63d)
	4664.44	(CA)
231.59 204.79 217.67 191.8 186.18 0 0 0 194.06 205.89 229.13 Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)	1661.11	(64)
		(645)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(64a)
		(65)
100.4 89.23 95.77 86.42 85.3 60.51 60.03 62.18 62.61 87.92 91.1 99.58 include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		(03)

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

Metabolic gains (Table 5), watts

146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 146.22 (66) Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5

26.54 23.57 19.17 14.51 10.85 9.16 9.9 12.86 17.26 21.92 25.58 27.27 (67)





Appliances ga	ins (calculat	ed in App	endix L, e	equation l	_16 or L1	6a), also	see Table	e 5					
	.31 326.66	318.21	300.21	277.49	256.14	241.87	238.52		264.97	287.69	309.04		(68)
52. Pumps and fa	06 52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06		(69)
0 Losses e.g. ev	0	0	0 alues) (Ta	0 able 5	0	0	0	0	0	0	0		(70)
_	.48 -97.48	-97.48			-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48		(71)
	.94 132.78	•	120.02	114.65	84.04	80.68	83.57	86.95	118.18	126.53	133.85		(72)
	5.59 583.81	566.9	535.54	503.79	450.14	433.25	435.75	451.99	505.86	540.6	570.96		(73)
6. Solar ga	nins												
Solar gains in	watts, calcu	lated for e	each mor	nth									
132 Total gains –	27 231.77 internal and			545.75	558.8	531.61	460.31	376.74	261.21	159.55	112.51		(83)
717	.86 815.58	903 69	989 91	1049 54	1008 93	964.86	906 06	929 72	767.08	700 15	683 47		(84)
		303.03	303.31	1013.31	1000.55	704.80	890.00	020.72	707.08	700.13	005.47		,
7 Moon i						704.00	890.00	020.72	707.08	700.13	003.47		
7. Mean ii	nternal tem					304.80	890.00	020.72	707.08	700.13	003.47		
Temperature	nternal tem during heati	perature	e (heating	g season iving area) from Ta			020.72	707.08	700.13	003.47	21	(85)
Temperature Utilisation fac	nternal tem during heati ctor for gains 9 0.98	perature ng period for living 0.97	ls in the li area, 21,	g season iving area ,m (see Ta 0.85) from Ta able 9a) 0.7	ble 9, Th:	1 (°C) 0.6	0.82	0.95	0.98	0.99	21	
Temperature Utilisation fac 0.9 Mean interna	during heati ctor for gains 9 0.98 Il temperatur	perature ng period for living 0.97 re in living 19.51	Is in the ling area, 121, 0.93 Is area T1	g season iving area ,m (see Ta 0.85 (follow st 20.55	from Ta able 9a) 0.7 ceps 3 an 20.87	ble 9, Th: 0.55 d 4 in Tal 20.96	0.6 ole 9c) 20.95					21	(85)
Temperature Utilisation fac 0.9 Mean interna 18. Temperature	during heati tor for gains 9 0.98 Il temperatur 37 19.11 during heati	perature ng period for living 0.97 re in living 19.51	Is in the light area, 121, 0.93 Is area T1 20.1 Is in rest of 19.51	g season iving area ,m (see Ta 0.85 (follow st 20.55 of dwellin 19.53	from Ta able 9a) 0.7 ceps 3 an 20.87 og from T	0.55 d 4 in Tal 20.96 able 9, Tl	0.6 ole 9c) 20.95 n2 (°C) 19.61	0.82 20.73 19.57	0.95 20.16 19.53	0.98 19.48 19.5	0.99 18.92 19.47	21	(85) (86)
Temperature Utilisation fac 0.9 Mean interna 18. Temperature 19. Roof	during heati ctor for gains 9 0.98 Il temperatur 37 19.11 during heati	perature ng period for living 0.97 re in living 19.51 ng period	Is in the light area, 121, 0.93 Is area T1 20.1 Is in rest of 19.51	g season dving area on, (see Ta 0.85 (follow st 20.55 of dwellin 19.53 Utilisation 0.79	from Ta able 9a) 0.7 ceps 3 an 20.87 og from T 19.6 factor fo 0.59	0.55 d 4 in Tal 20.96 able 9, Tl 19.6 or gains fo 0.39	0.6 ble 9c) 20.95 n2 (°C) 19.61 or rest of 0.44	0.82 20.73 19.57 dwelling 0.73	0.95 20.16 19.53 , 22,m (se 0.92	0.98 19.48 19.5 ee Table 9	0.99 18.92 19.47	21	(85) (86) (87)
Temperature Utilisation fac 0.9 Mean interna 18. Temperature 19. Roof 0.9 Roof 17.	during heati ctor for gains 9 0.98 Il temperatur 87 19.11 during heati 41 19.42 9 0.98	perature ng period for living 0.97 re in living 19.51 ng period	ls in the li area, 21, 0.93 g area T1 20.1 ls in rest o	g season dving area on, (see Ta 0.85 (follow st 20.55 of dwellin 19.53 Utilisation 0.79	from Ta able 9a) 0.7 ceps 3 an 20.87 og from T 19.6 factor fo 0.59	0.55 d 4 in Tal 20.96 able 9, Tl 19.6 or gains fo 0.39	0.6 ple 9c) 20.95 n2 (°C) 19.61 pr rest of	0.82 20.73 19.57 dwelling 0.73	0.95 20.16 19.53 , 22,m (se 0.92	0.98 19.48 19.5 ee Table 9	0.99 18.92 19.47 9a)		(85) (86) (87) (88) (89) (90)
Temperature Utilisation fac 0.9 Mean interna 18. Temperature 19. Roof 0.9 Roof	during heatictor for gains 9 0.98 Il temperatur during heati 41 19.42 9 0.98	perature ng period for living 0.97 re in living 19.51 ng period 19.44 0.96	ls in the light area, 21, 0.93 g area T1 20.1 ls in rest of 19.51 0.91 18.83	g season diving area on (see Ta 0.85 (follow st 20.55 of dwellin 19.53 Utilisation 0.79 Med 19.25	from Ta able 9a) 0.7 teps 3 an 20.87 ig from T 19.6 factor fo 0.59 an intern	o.55 d 4 in Tal 20.96 able 9, Tl 19.6 or gains fo 0.39 al tempe	0.6 ole 9c) 20.95 ol (°C) 19.61 or rest of 0.44 erature in	0.82 20.73 19.57 dwelling 0.73 the rest	0.95 20.16 19.53 ,	0.98 19.48 19.5 ee Table 9 0.98 ng T2	0.99 18.92 19.47 9a) 0.99	0.2	(85) (86) (87) (88) (89)
Temperature Utilisation fac 0.9 Mean interna 18. Temperature 19. Roof 0.9 Roof 17. Living area fr.	during heatictor for gains 9 0.98 Il temperatur 87 19.11 during heati 41 19.42 9 0.98 56 17.81 action Il temperatur 82 18.07	perature ng period for living 0.97 re in living 19.51 ng period 19.44 0.96 18.21 re (for the	ls in the lift area, 121, 0.93 garea T1 20.1 ls in rest of 19.51 0.91 18.83 e whole d 19.08	g season diving area on (see Ta 0.85 (follow st 20.55 of dwellin 19.53 Utilisation 0.79 Med 19.25	from Ta able 9a) 0.7 teps 3 an 20.87 ig from T 19.6 factor fo 0.59 an intern	o.55 d 4 in Tal 20.96 able 9, Tl 19.6 or gains fo 0.39 al tempe	0.6 ole 9c) 20.95 ol (°C) 19.61 or rest of 0.44 erature in	0.82 20.73 19.57 dwelling 0.73 the rest	0.95 20.16 19.53 ,	0.98 19.48 19.5 ee Table 9 0.98 ng T2	0.99 18.92 19.47 9a) 0.99		(85) (86) (87) (88) (89) (90)



8. Space heating requirement



	_												
Utilisation factor	•												4
0.98 Useful gains, m	0.97 Gm , W	0.95	0.9	0.79	0.61	0.42	0.47	0.74	0.91	0.97	0.98		(94)
704.4 Monthly averag	9 791.71 ge external					406.34	422.68	611.48	700.77	679.18	672.73		(95)
4.3	4.9	6.5	8.9	11.7	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
Heat loss rate f			•			445.7	426.04	720.02	4456.4	4575.05	. 4040 77		(07)
Space heating r	.57 1935.7 requiremer			1054.34	663.43	415./	436.81	729.02	1156.4	15/5.05	1943.77		(97)
971.7 Solar space hea	'2 768.82 iting calcul			168.48 lix H (neg	_	0 antity)	0	0	338.99	645.03	945.65		(98a)
0 Space heating r	0 equiremer	0 nt for eacl	0 n month :	0 after sola	0 r contrib	0 ution	0	0	0	0	0		(98b)
	'2 768.82	655.7	363.82	168.48		0	0	0	338.99	645.03	945.65	61.76	(98c)
Space nearing i	equiremen		, iii , ycai									01.70	(99)
8c. Space C	ooling req	uiremen	t										
Heat loss rate,													
0 Utilisation factor	0 or for loss	0	0	0	0	0	0	0	0	0	0		(100)
0 Useful loss, mL	0 m (watts)	0	0	0	0	0	0	0	0	0	0		(101)
0	0	0	0	0	0	0	0	0	0	0	0		(102)
Gains	0	•	0	•	0	0	•	•	•	0			(102)
0 Space cooling r	0 equiremen	0 It for mon	0 ith, whole	0 e dwelling	0 g, contini	0 Jous (kW	0 'h)	0	0	0	0		(103) (104)
0	0	0	0	0	0	0	0	0	0	0	0		(104)
Cooled fraction Intermittency f												0	(105)
0	0	0	0	0	0	0	0	0	0	0	0		(106)
Space cooling r				Ü	Ü	Ü	0	O	Ü	Ü	O	0	(===)
0 Space cooling r	0	0 + in k\\/h	0 /m²/yoar	0	0	0	0	0	0	0	0		(107)
space cooling r	equiremen	IL III KVVN/	m⁻/year									0	(108)
8f. Space he	eating req	uiremen	t										
Fabric Energy E	fficiency,						0					0	(109)
													. ,

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





			. ,												
Fraction of space					iry systen	٦,		0						0	(201)
Fraction of space														1	(202)
Fraction of main h	_													0	(203)
Fraction of total s														1	(204)
Fraction of total s			-											0	(205)
Efficiency of main	-													264	(206)
Efficiency of main					0.4									0	(207)
Efficiency of secon					em, %,									0	(208)
Cooling System Se								0						0	(209)
Space heating req	uiremen	it (calcula	ited abov	/e),											
0	0	0	0	0	0	0	0		0	0		0	0		(210)
Space heating fue	l (main h	neating sy	/stem 1),	kWh/mo	onth			0						0	
		248.37			0	0	0		0	128	.41	244.33	358.2		(211)
Space heating fue	l (main h	neating sy	/stem 2),	kWh/mo	onth			0						0	
0	0	0	0	0	0	0	0		0	0		0	0		(213)
Space heating fue	l (second	dary), kW	h/month	1				0						0	
0	0	0	0	0	0	0	0		0	0		0	0		(215)
Output from wate		•						0						264	(216)
Efficiency of wate	r heater														
264	264	264	264	264	264	264	26	4	264	264		264	264		(217)
Fuel for water hea	iting														
87.72	77.57	82.45	72.65	70.52	0	0	0		0	73.5	51	77.99	86.79	629.21	(219)
Space Cooling															
0	0	0	0	0	0	0	0		0	0		0	0		(221)
Annual totals							kW	h/ye	ar	kWh/ye	ear				
Space heating fue	l used, n	nain syste	em 1											1840.23	(211)
Space heating fue	l used, n	nain syste	em 2											0	(213)
Space heating fue	l used, s	econdary	,											0	(215)
Water heating fue														629.21	(219)
Electricity for insta	antaneo	us electri	c shower	(s)										0	(64a)
Space cooling fuel	used													0	(221)
Electricity for pum	ips, fans	and elec	tric keep	-hot											
Mechanical vent f	ans - bal	lanced, ex	xtract or	positive	input froi	m outside	е	0		0				0	(230a)
warm air heating	system f	ans												0	(230b)
Heating circulation	n pump	or water	pump wi	thin war	m air hea	ting unit								0	(230c)
Oil boiler auxiliary	oil pun	np, flue fa	an, etc; e	xcludes	circulatio	n pump)								0	(230d)
Gas boiler auxiliar	y (flue fa	an, etc; ex	xcludes c	irculatio	n pump)									0	(230e)
Maintaining electi	ric keep-	hot facili	ty for gas	combi b	oiler									0	(230f)
Pump for solar wa	iter heat	ing												0	(230g)
Pump for storage	WWHRS	5												0	(230h)
Total electricity fo														0	(231)
Electricity for light														187.46	(232)
-1	J													107.70	(232)





	,					_							
	ng/generation enerated by						ised in dw	elling					
		rvs (App											(222.)
() Clastriaity of	0	0 امرینا اصطنیدی	0 ainas (An	0 nandiy N	0 1) (nagati	0	0	0	0	0	0	0	(233a)
	enerated by	wina turi											
0 Electricity of	0 enerated by	0 hvdro-ole	0 octric gon	0 orators	0	0	0	0	0	0	0	0	(234a)
	•	-	_										(00=)
0 Electricity u	0 sed or net e	0 lectricity	0 generate	0 d by micr	0 o-CHP	0	0	0	0	0	0	0	(235a)
0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)
Energy savi	ng/generation	on techno	logies (A	pendice	s M, N) -	Energy e	exported						, ,
Electricity g	enerated by	PVs (App	endix M)	(negativ	e quantit	y)							
0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)
Electricity g	enerated by	wind turl	oines (Ap	pendix N	1) (negati	ve quant	tity)						
0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)
Electricity g	enerated by	hydro-ele	ectric gen	erators									
0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)
Electricity u	sed or net e	lectricity (generate	d by micr	o-CHP								
0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)
Appendix O	items: annı	ıal energy	,										
Appendix Q	, <item 1="" de<="" td=""><td>scription></td><td>•</td><td></td><td></td><td></td><td>Fue</td><td>l</td><td>kWh/year</td><td></td><td></td><td></td><td></td></item>	scription>	•				Fue	l	kWh/year				
energy save	ed											0	(236a)
energy used	t											0	(237a)
Total delive	red energy	for all use:	S									3246.49	

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/yea	r
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		303.45	(240a)
Low-rate fraction	0		303.45	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		303.45	(241a)
Low-rate fraction	0		303.45	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		303.45	(242a)





Low-rate fraction	0		303.45	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Space heating - secondary cost (other fuel)	0		0	(242e)
Water heating (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		0	(243)
Low-rate fraction	0		0	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Water heating cost (other fuel)	0		103.76	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247	")			
Energy For instantaneous electric shower(s)	0		0	(247a)
Space cooling	0		0	(248)
Pumps, fans And electric keep-hot	0		0	(249)
Energy For lighting	0		30.91	(250)
Additional standing charges	0		0	(251)
Energy saving/generation technologies	0		0	(252)
Appendix Q, <item 1="" description=""></item>	Fuel	kWh/year		
energy saved Or generated	0		0	(253)
energy used	0		0	(254)
Total energy cost	0		535.35	(255)
11a. SAP rating – Individual heating systems including micro-CHP				
Energy cost deflator	0		0	(256)
Energy cost factor (ECF)	0		0	(257)
SAP rating	0		0	(258)
11a. SAP rating – Individual heating systems including micr	o-CHP			
Energy cost deflator			0.36	(256)
Energy cost factor (ECF)			1.56	(257)
SAP rating			74.74	(258)
12a. CO2 emissions – Individual heating systems including	micro-CHP			
	Energy	Emission factor	Emissions	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			285.47	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			94.94	(264)
Energy for instantaneous electric shower(s)			_	



Energy for instantaneous electric shower(s)

0

(264a)



Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		0	(267)
Electricity for lighting		27.06	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		476.04	(272)
Dwelling CO2 Emission Rate		6.05	(273)
El rating		95	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy	Emission factor	Emissionsr	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			2897.11	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			980.69	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			0	(281)
Electricity for lighting			287.53	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5007.53	(286)
Dwelling PE Rate			63.66	(287)



Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:40:03

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Maisonette, Mid-terrace
OCDEA Registration	STRO037816	Assessment Date	2024-02-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	79 m ²
Site Reference	J5652 - Northington Unit 2	Plot Reference	J5652
	LEAN		
Address	WC1N 2JF		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate					
Fuel for main heating system	Electricity					
Target carbon dioxide emission rate	13.23 kgCO ₂ /m ²					
Dwelling carbon dioxide emission rate	5.46 kgCO ₂ /m ²	OK				
1b Target primary energy rate and dwelling pri	1b Target primary energy rate and dwelling primary energy					
Target primary energy	70.76 kWh _{PE} /m ²					
Dwelling primary energy	57.67 kWh _{PE} /m ²	OK				
1c Target fabric energy efficiency and dwelling fabric energy efficiency						
Target fabric energy efficiency	34.1 kWh/m ²					
Dwelling fabric energy efficiency	57.4 kWh/m ²	FAIL				

2a Fabric U-values						
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value			
External walls	0.26	0.3	Exposed (0.3)	FAIL		
Party walls	0.2	0	Party Wall (0)	N/A		
Curtain walls	1.6	0	N/A	N/A		
Floors	0.18	0.25	External Floor (0.25)	FAIL		
Roofs	0.16	N/A	N/A	N/A		
Windows, doors,	1.6	2.38	1 (2.7)	FAIL		
and roof windows						
Rooflights	2.2	N/A	N/A	N/A		

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))					
Name	Net area [m ²]	U-Value [W/m ² K]			
Exposed wall: Exposed	38.68	0.3			
Basement wall: Ground	54.16	0.3			
Party wall: Party Wall	66.42	0 (!)			
Ground floor: External Floor	40.23	0.25			
Exposed roof: Exposed Roof	0	0 (!)			

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	7.88	North	0.9	2.7
2, Windows (2)	3.25	South West	0.9	1.2
3, Windows (1)	4.16	South West	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²		
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK	
Air permeability test certificate reference	Not Provided		

Date generated: 2024-02-19 17:40:03 Page 1 of 3

4 Space heating			
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity			
Efficiency	264.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			
5 Hot water			

5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	210 litres	
Declared heat loss	1.6 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		

6 Controls			
Main heating 1 - type: Programmer, TR\	/s, and bypass		
Function			
Ecodesign class			
Manufacturer			
Model			
Water heating - type: Cylinder thermostat and HW separately timed			
Manufacturer			
Model			

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery	N/A	
efficiency		
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		•
Commissioning		

9 Local generation N/A

10 Heat networks

11 Supporting documentary evidence N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed:	Assessor ID:
Name:	Date:
b. Client Declaration	
N/A	

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:45:38

Project Information				
Assessed By	Webb Yates Engineers	Building Type	Maisonette, Mid-terrace	
OCDEA Registration	STRO037816	Assessment Date	2024-02-05	

Dwelling Details			
Assessment Type	As designed	Total Floor Area	79 m ²
Site Reference	J5652 - Northington Unit 2	Plot Reference	J5652
	GREEN		
Address	WC1N 2JF		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate			
Fuel for main heating system	Electricity			
Target carbon dioxide emission rate	13.23 kgCO ₂ /m ²			
Dwelling carbon dioxide emission rate	4.94 kgCO ₂ /m ²	OK		
1b Target primary energy rate and dwelling primary energy				
Target primary energy	70.76 kWh _{PE} /m ²			
Dwelling primary energy	52.44 kWh _{PE} /m ²	OK		
1c Target fabric energy efficiency and dwelling fabric energy efficiency				
Target fabric energy efficiency	34.1 kWh/m ²			
Dwelling fabric energy efficiency	57.4 kWh/m ²	FAIL		

2a Fabric U-values					
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value		
External walls	0.26	0.3	Exposed (0.3)	FAIL	
Party walls	0.2	0	Party Wall (0)	N/A	
Curtain walls	1.6	0	N/A	N/A	
Floors	0.18	0.25	External Floor (0.25)	FAIL	
Roofs	0.16	N/A	N/A	N/A	
Windows, doors,	1.6	2.38	1 (2.7)	FAIL	
and roof windows					
Rooflights	2.2	N/A	N/A	N/A	

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Exposed	38.68	0.3	
Basement wall: Ground	54.16	0.3	
Party wall: Party Wall	66.42	0 (!)	
Ground floor: External Floor	40.23	0.25	
Exposed roof: Exposed Roof	0	0 (!)	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m ²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	7.88	North	0.9	2.7
2, Windows (2)	3.25	South West	0.9	1.2
3, Windows (1)	4.16	South West	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²		
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK	
Air permeability test certificate reference	Not Provided		

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4 Space heating			
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity			
Efficiency	300.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			
5 Hot water			

5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	210 litres	
Declared heat loss	1.6 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		

6 Controls				
Main heating 1 - type: Programmer, TRVs, and bypass				
Function				
Ecodesign class				
Manufacturer				
Model				
Water heating - type: Cylinder thermostat and HW separately timed				
Manufacturer				
Model				

7 Lighting			
Minimum permitted light source efficacy	75 lm/W		
Lowest light source efficacy	95 lm/W	OK	
External lights control	N/A		

8 Mechanical ventilation				
System type: N/A				
Maximum permitted specific fan power	N/A			
Specific fan power	N/A	N/A		
Minimum permitted heat recovery	N/A			
efficiency				
Heat recovery efficiency	N/A	N/A		
Manufacturer/Model		•		
Commissioning				

9 Local generation N/A

10 Heat networks

11 Supporting documentary evidence N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the co are a true and accurate reflection based upon the design ir the purpose of carrying out the "As designed" assessment, evidence (SAP Conventions, Appendix 1 (documentary evi documentary evidence required) has been reviewed in the Compliance Report.	nformation submitted for this dwelling for and that the supporting documentary idence) schedules the minimum
Signed:	Assessor ID:
Name:	Date:
b. Client Declaration	
N/A	



Dwelling Reference: J5652

Dwelling Type: New Dwelling Design Stage

WC1N 2JF

 Overall dwelling dimension 	าร
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	Area(m²)	Av. Height(m)		Volume(m³)	
Ground Floor Total floor area TFA Dwelling volume	89.56 (1a)	x 3.68	(2a) =	329.58 89.56 329.58	(3a) (4) (5)

Dwelling volume							329.58	(5)
2. Ventilation Rate								
Chimneys/Flues		0		x 80	=		0	(6a)
Open chimneys		0		x 20	=		0	(6b)
Chimneys / flues attached to closed fire		0		x 10	=		0	(6c)
Flues attached to solid fuel boiler		0		x 20	=		0	(6d)
Flues attached to other heater		0		x 35	=		0	(6e)
Number of blocked chimneys		0		x 20	=		0	(6f)
Number of intermittent extract fans		4		x 10	=		40	(7a)
Number of passive vents		0		x 10	=		0	(7b)
Number of flueless gas fires		0		x 40	=		0	(7c)
				Air ch	nanges per	hour		
Number of storeys in the dwelling (ns)					(0.12	0.12	(8)
Infiltration due to chimneys, flues, fans, PSVs, etc						1	1	(9)
Additional infiltration Structural infiltration						0	0	(10)
Suspended wooden ground floor						0.35	0.35	(11)
No draught lobby						0.2 0	0.2 0	(12) (13)
Percentage of windows and doors draught proofed						0	0	(14)
Window infiltration					(0.25	0.25	(15)
Infiltration rate					(0.92	0.92	(16)
Air permeability value, AP50, (m³/h/m²)						0	0	(17)
Air permeability value, AP4, (m³/h/m²)						0	0	(17a)
Air permeability value)					(0.92	0.92	(18)
Number of sides on which dwelling is sheltered Shelter factor						2	2	(19)
Infiltration rate incorporating shelter factor							0.85	(20)
Infiltration rate modified for monthly wind speed							0.78	(21)
Jan Feb Mar Apr May Jun	Jul	Aug	Sep	Oct	t Nov	Dec	Total	(22)





Monthly	Monthly average wind speed from Table U2													
Wind Fa	5.1 actor	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Adjuste	1.28 d infiltrat	1.25 ion rate (1.23 allowing	1.1 for shelte	1.08 er and wi	0.95 nd speed	0.95)	0.93	1	1.08	1.13	1.18	13.13	(22a)
Calculat	1 e effectiv	0.98 e air cha	0.96 nge rate	0.86 for the ap	0.84 plicable	0.74 case:	0.74	0.72	0.78	0.84	0.88	0.92	10.28	(22b)
													0 0 0	(23a) (23b) (23c)
a) If bala	anced me	chanical	ventilatio	on with he	eat recov	ery (MVI	HR)							
b) If bala	0 anced me	0 echanical	0 ventilatio	0 on withou	0 it heat re	0 covery (N	0 MV)	0	0	0	0	0		(24a)
c) If who	0 ole house	0 extract v	0 ⁄entilatio	0 n or posit	0 ive input	0 ventilati	0 on from	0 outside	0	0	0	0		(24b)
d) If nat	0 ural venti	0 ilation or	0 whole ho	0 ouse posi	0 tive inpu	0 t ventilat	0 ion from	0 loft	0	0	0	0		(24c)
Effective	1 e air chan	0.98 ge rate	0.96	0.87	0.85	0.78	0.78	0.76	0.81	0.85	0.89	0.92		(24d)
Effective	1 e air chan	0.98 ge rate f	0.96 rom PCDI	0.87 3:	0.85	0.78	0.78	0.76	0.81	0.85	0.89	0.92		(25)
	1	0.98	0.96	0.87	0.85	0.78	0.78	0.76	0.81	0.85	0.89	0.92		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k-value **ELEMENT** AXUAXkkJ/K (W/K) Doors 0 (26)Windows 34.23 (27)Roof window 0 (27a) Basement floor 0 0 (28)Ground floor 0 0 (28a) Exposed floor 0 0 (28b)Basement wall 0 0 (29)External wall 24.44 15477.4 (29a) Roof 0 0 (30)Total area of external elements ∑A, m² 104.22 (31)Party Wall 0 21375 (32)Party floor 3582.4 (32a) Party ceiling 2686.8 (32b)





Internal wall **	0	(33c)
Internal floor	0	(32d)
Internal ceiling floor	0	(32e)
Fabric heat loss, W/K = \sum (A x U)	58.66	(33)
Heat capacity $Cm = \sum (A \times k)$	43121.6	(34)
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m^2K	250	(35)
Linear Thermal bridges: ∑ (L x Ψ) calculated using Appendix K	0	(36)
Point Thermal bridges: ∑χ (W/K) if significant point thermal bridge present and values available	0	(36a)
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$	58.66	(37)
Ventilation heat loss calculated monthly		
108.6 106.5 104.43 94.74 92.93 84.48 84.48 82.92 87.73 92.93 96.59 100.43 Heat transfer coefficient, W/K		(38)
167.27 165.16 163.1 153.4 151.59 143.15 143.15 141.58 146.4 151.59 155.26 159.09 Heat loss parameter (HLP), W/m²K		(39)
1.87 1.84 1.82 1.71 1.69 1.6 1.6 1.58 1.63 1.69 1.73 1.78 Number of days in month (Table 1a)		(40)
31 28 31 30 31 30 31 30 31 30 31		(41)
4. Water heating energy requirement	2.62	(42)
Assumed occupancy, N Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)	2.62	(42)
		(42-)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Hot water usage in litres per day for baths, Vd,bath (from Appendix J)		(42a)
78.59 77.42 75.78 72.74 70.48 67.96 66.6 68.23 70.01 72.7 75.79 78.32 Hot water usage in litres per day for other uses, Vd,other (from Appendix J)		(42b)
41.46 39.95 38.44 36.94 35.43 33.92 33.92 35.43 36.94 38.44 39.95 41.46		(42c)
Annual average hot water usage in litres per day Vd, average (from Appendix J)	110.55	(43)
Hot water usage in litres per day for each month $Vd,m = (42a) + (42b) + (42c)$		
120.04 117.37 114.22 109.68 105.9 101.88 100.52 103.66 106.94 111.14 115.75 119.78 Energy content of hot water used = 4.18 x Vd,m x nm x DTm / 3600 kWh/month (from Appendix J)	1326.89	9 (44)
190.12 167.13 175.55 150.15 142.57 125.27 121.57 128.35 131.87 150.82 164.9 187.54 Distribution loss (46) = 0.15 x (45)	1835.85	5 (45)
28.52 25.07 26.33 22.52 21.38 18.79 18.24 19.25 19.78 22.62 24.74 28.13		(46)
Storage volume (litres) including any solar or WWHRS storage within same vessel	0	(47)
Water storage loss (or HIU loss)		
a) If manufacturer's declared loss factor is known (kWh/day):	1.6	(48)
Temperature factor from Table 2b	0.54	(49)
Energy lost from water storage, kWh/day (48) x (49) =	0.86	(50)
b) If manufacturer's declared loss factor is not known :	0.00	(00)



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

(51)



Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.86	(55)
Water storage (or HIU) loss calculated for each month (56) = $(55) \times (41)$		(= -)
26.78 24.19 26.78 25.92 26.78 25.92 26.78 25.92 26.78 25.92 26.78 If the vessel contains dedicated solar storage or dedicated WWHRS storage,		(56)
(57)m = (56)m ② (47) − Vs] ÷ (47), else (57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		(==)
26.78 24.19 26.78 25.92 26.78 25.92 26.78 25.92 26.78 25.92 26.78 Primary circuit loss for each month from Table 3		(57)
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only	heat netwo	rks)
23.26 21.01 23.26 22.51 23.26 0 0 0 23.26 22.51 23.26 Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		(59)
0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = $0.85 \times (45) + (46) + (57) + (59) + (61)$		
240.17 212.34 225.6 198.58 192.61 151.19 148.36 155.14 157.79 200.87 213.33 237.59 CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water hea	2333.56 ting)	(62)
0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0		(63b)
0 0 0 0 0 0 0 0 0 0		(63c)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(63d)
240.17 212.34 225.6 198.58 192.61 0 0 0 200.87 213.33 237.59	1721.08	(64)
Output from water heater for each month, kWh/month $(64) = (62) + (63a) + (63b) + (63c) + (63d)$	1721.00	(01)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0		(64a)
103.25 91.73 98.41 88.67 87.44 62.39 61.85 64.1 64.58 90.19 93.57 102.4		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		
5. Internal gains (see Tables 5 and 5a)		
Matabalia gains (Tabla E) watts		
Metabolic gains (Table 5), watts		(CC)
157.18 157.18 157.18 157.18 157.18 157.18 157.18 157.18 157.18 157.18 157.18 157.18 Lighting gains (calculated in Appendix L, equation L12 or L12a), also see Table 5		(66)



(67)

(68)

29.19 25.93 21.08 15.96 11.93 10.07 10.88 14.15 18.99 24.11 28.14 30

355.62 359.31 350.01 330.21 305.22 281.74 266.05 262.36 271.66 291.45 316.44 339.93

Appliances gains (calculated in Appendix L, equation L16 or L16a), also see Table 5



Cooking	g gains (cal	culated i	n Append	lix L, equ	ation L18	or L18a)	, also see	Table 5						
Dumns	53.34 and fans g	53.34 ains (Tah	53.34 le 5a)	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34		(69)
i unips	0	0	0	0	0	0	0	0	0	0	0	0		(70)
Losses	e.g. evapor	-	-	_		U	Ü	O	Ü	Ü	O	· ·		(, 0)
Water l	-104.79 neating gai			-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79		(71)
Total in	138.78 ternal gair		132.27	123.15	117.53	86.65	83.13	86.16	89.7	121.22	129.97	137.63		(72)
	629.32	627.48	609.09	575.06	540.41	484.19	465.79	468.4	486.08	542.51	580.28	613.29		(73)
6. Sc	lar gains													
Solar ga	ains in wat	ts, calcula	ated for e	ach mon	th									
J	152.82	273.64	415.02	590.79	737.75	767.5	725.23	609.14	474.3	312.88	185.34	129.36		(83)
Total ga	ains – inter			-										()
	782.14	901.12	1024.11	1165.85	1278.17	1251.69	1191.02	1077.53	960.37	855.39	765.62	742.65		(84)
7. M	ean interi	nal temp	erature	(heating	g season)								
	ean interi rature duri						ole 9, Th1	L (°C)					21	(85)
Temper		ng heatir	ng period:	s in the li	ving area	from Tal	ole 9, Th1	L (°C)					21	(85)
Temper Utilisati	rature duri	ng heatir for gains [.] 0.99	ng periods for living 0.97	s in the li area, 121, 0.93	ving area m (see Ta 0.83	from Tal able 9a) 0.66	0.51	0.57	0.81	0.95	0.99	0.99	21	(85) (86)
Temper Utilisati Mean ir	rature duri on factor f 0.99	ng heatir for gains 0.99 nperature 19.12	ng periods for living 0.97 e in living 19.54	s in the li area, 21, 0.93 area T1 20.16	ving area m (see Ta 0.83 (follow st	from Tal able 9a) 0.66 eps 3 and	0.51 d 4 in Tab 20.97	0.57 ble 9c) 20.96	0.81	0.95	0.99	0.99	21	
Temper Utilisati Mean ir	rature duri ion factor f 0.99 nternal ten 18.86	ng heatir for gains 0.99 nperature 19.12	ng periods for living 0.97 e in living 19.54	s in the li area, 21, 0.93 area T1 20.16	ving area m (see Ta 0.83 (follow st 20.61 of dwellin	from Tal able 9a) 0.66 eps 3 and	0.51 d 4 in Tak 20.97	0.57 ble 9c) 20.96					21	(86)
Temper Utilisati Mean ir	rature duri ion factor f 0.99 nternal ten 18.86 rature duri 19.42	ng heatir for gains 0.99 nperature 19.12 ng heatir 19.44	ng period: for living 0.97 in living 19.54 ng period: 19.46	s in the li area, 21, 0.93 area T1 20.16 s in rest o	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 (tilisation	from Tak able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo	0.51 d 4 in Tak 20.97 able 9, Th 19.61 rr gains fo	0.57 ble 9c) 20.96 b2 (°C) 19.63 or rest of	20.75 19.59 dwelling,	20.17 19.55 22,m (se	19.48 19.52 ee Table 9	18.92 19.49 Đa)	21	(86) (87) (88)
Temper Utilisati Mean in Temper	rature duri ion factor f 0.99 nternal ten 18.86 rature duri	ng heatir for gains 0.99 nperature 19.12 ng heatir	ng period: for living 0.97 e in living 19.54 ng period:	s in the li area, 21, 0.93 area T1 20.16 s in rest o	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 (tilisation 0.76	from Tab able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54	0.51 d 4 in Tak 20.97 able 9, Th 19.61 or gains fo 0.36	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42	20.75 19.59 dwelling, 0.72	20.17 19.55 22,m (se 0.93	19.48 19.52 ee Table 9 0.98	18.92 19.49 Đa)	21	(86) (87)
Temper Utilisati Mean in	rature duri on factor f 0.99 nternal ten 18.86 rature duri 19.42 0.99	ng heatin for gains 0.99 nperature 19.12 ng heatin 19.44	ng period: for living 0.97 e in living 19.54 ng period: 19.46 0.96	s in the li area, 21, 0.93 area T1 20.16 s in rest o 19.53 U	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 Itilisation 0.76 Mea	from Tab able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54 an intern	0.51 d 4 in Tab 20.97 able 9, Th 19.61 or gains fo 0.36 al tempe	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42 rature in	20.75 19.59 dwelling, 0.72 the rest	20.17 19.55 22,m (se 0.93 of dwellin	19.48 19.52 ee Table 9 0.98	18.92 19.49 9a) 0.99	21	(86) (87) (88) (89)
Temper Utilisati Mean in Temper Roof Roof Living a	nature duri ion factor f 0.99 nternal ten 18.86 rature duri 19.42 0.99	ng heatin for gains 0.99 nperature 19.12 ng heatin 19.44 0.98	ng period: for living 0.97 in living 19.54 ng period: 19.46 0.96	s in the li area, 121, 0.93 area T1 20.16 s in rest o 19.53 U 0.9	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 ctilisation 0.76 Mea	from Tab able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54	0.51 d 4 in Tak 20.97 able 9, Th 19.61 or gains fo 0.36	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42	20.75 19.59 dwelling, 0.72	20.17 19.55 22,m (se 0.93	19.48 19.52 ee Table 9 0.98 ng T2	18.92 19.49 Đa)	0.3	(86) (87) (88)
Temper Utilisati Mean in Temper Roof Roof Living a	nature duri on factor f 0.99 nternal ten 18.86 rature duri 19.42 0.99 17.56 rea fractio	ng heatin for gains 0.99 nperature 19.12 ng heatin 19.44 0.98	ng period: for living 0.97 e in living 19.54 ng period: 19.46 0.96 18.25 e (for the	s in the li area, 21, 0.93 area T1 20.16 s in rest o 19.53 U 0.9	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 (tilisation 0.76 Mea 19.31 welling)	from Tak able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54 an intern 19.57	0.51 d 4 in Tab 20.97 able 9, Th 19.61 or gains fo 0.36 al tempe 19.61	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42 rature in 19.62	20.75 19.59 dwelling, 0.72 the rest of 19.46	20.17 19.55 22,m (se 0.93 of dwellin 18.93	19.48 19.52 ee Table 9 0.98 ng T2 18.24	18.92 19.49 9a) 0.99 17.66		(86) (87) (88) (89) (90) (91)
Temper Utilisati Mean in Temper Roof Roof Living a Mean in	rature duri on factor f 0.99 nternal ten 18.86 rature duri 19.42 0.99 17.56 rea fractio	ng heatin for gains of the constraint of the con	ng period: for living 0.97 e in living 19.54 ng period: 19.46 0.96 18.25 e (for the	s in the li area, 21, 0.93 area T1 20.16 s in rest o 19.53 U 0.9 18.9 whole do	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 ctilisation 0.76 Mea	from Tab able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54 an intern	0.51 d 4 in Tab 20.97 able 9, Th 19.61 or gains fo 0.36 al tempe	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42 rature in	20.75 19.59 dwelling, 0.72 the rest	20.17 19.55 22,m (se 0.93 of dwellin	19.48 19.52 ee Table 9 0.98 ng T2	18.92 19.49 9a) 0.99		(86) (87) (88) (89) (90)
Temper Utilisati Mean in Temper Roof Roof Living a Mean in	nature duri on factor f 0.99 nternal ten 18.86 rature duri 19.42 0.99 17.56 rea fractio	ng heatin for gains of the constraint of the con	ng period: for living 0.97 e in living 19.54 ng period: 19.46 0.96 18.25 e (for the	s in the li area, 21, 0.93 area T1 20.16 s in rest o 19.53 U 0.9 18.9 whole do	ving area m (see Ta 0.83 (follow st 20.61 of dwellin 19.55 (tilisation 0.76 Mea 19.31 welling)	from Tak able 9a) 0.66 eps 3 and 20.9 g from Ta 19.61 factor fo 0.54 an intern 19.57	0.51 d 4 in Tab 20.97 able 9, Th 19.61 or gains fo 0.36 al tempe 19.61	0.57 ple 9c) 20.96 n2 (°C) 19.63 or rest of 0.42 rature in 19.62	20.75 19.59 dwelling, 0.72 the rest of 19.46	20.17 19.55 22,m (se 0.93 of dwellin 18.93	19.48 19.52 ee Table 9 0.98 ng T2 18.24	18.92 19.49 9a) 0.99 17.66		(86) (87) (88) (89) (90) (91)



8. Space heating requirement



Utilisation factor for gains,		
0.98 0.97 0.95 0.89 0.77 0.58 0.4 0.46 0.74 0.92 0.97 0.99 Useful gains, mGm , W		(94)
769.68 877.51 973.75 1037.83 981.47 720.46 480.83 498.22 708.84 787.08 745.8 732.82 Monthly average external temperature from Table U1		(95)
4.3 4.9 6.5 8.9 11.7 14.6 16.6 16.4 14.1 10.6 7.1 4.2 Heat loss rate for mean internal temperature		(96)
2284.69 2199.72 1980.13 1592.15 1213.51 769.52 490.01 513.19 842.21 1319.98 1788.46 2202.83 Space heating requirement for each month		(97)
1127.17 888.53 748.74 399.11 172.63 0 0 0 396.48 750.71 1093.69		(98a)
Solar space heating calculated using Appendix H (negative quantity) 0 0 0 0 0 0 0 0 0 0 0 0		(98b)
Space heating requirement for each month after solar contribution		(00.)
1127.17 888.53 748.74 399.11 172.63 0 0 0 396.48 750.71 1093.69 Space heating requirement in kWh/m²/year	62.27	(98c) (99)
8c. Space Cooling requirement		
Heat loss rate,		
0 0 0 0 0 0 0 0 0 0 0 0 0 0 Utilisation factor for loss		(100)
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Useful loss, mLm (watts)		(101)
0 0 0 0 0 0 0 0 0 0 0 0 0 Gains		(102)
0 0 0 0 0 0 0 0 0 0		(103) (104)
0 0 0 0 0 0 0 0 0 0 0		(104)
Cooled fraction Intermittency factor	0	(105)
0 0 0 0 0 0 0 0 0 0		(106)
Space cooling requirement for month 0	0	. ,
0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 Space cooling requirement in kWh/m²/year	0	(107) (108)
8f. Space heating requirement		
Fabric Energy Efficiency, 0	0	(109)

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





Fraction of space Fraction of space Fraction of main h Fraction of total s Fraction of total s Efficiency of main	heat from neating f pace hea pace hea space h	m main so rom mair at from m at from m eating sys	ystem(s), n system nain syste nain syste stem 1 (i	2, em 1, em 2, n %),	ry systen	1,		0						0 1 0 1 0 264	(201) (202) (203) (204) (205) (206)
Efficiency of main space heating system 2 (in %), Efficiency of secondary/supplementary heating system, %,												0	(207)		
Cooling System Seasonal Energy Efficiency Ratio, 0												0	(208) (209)		
Space heating requirement (calculated above),													(===)		
0 Space heating fue	0 el (main h	0 neating sy	0 /stem 1),	0 kWh/mc	0 onth	0	0	0	0	0		0	0	0	(210)
426.96 Space heating fue		283.62 neating sy			0 onth	0	0	0	0	150	.18	284.36	414.28	0	(211)
0 Space heating fue	0 el (secono	0 dary), kW	0 h/month	0 1	0	0	0	0	0	0		0	0	0	(213)
0 Output from wate Efficiency of wate		•	0	0	0	0	0	0	0	0		0	0	264	(215) (216)
264 Fuel for water hea	264 ating	264	264	264	264	264	26	4	264	264		264	264		(217)
90.97 Space Cooling	80.43	85.45	75.22	72.96	0	0	0		0	76.0)9	80.81	90	651.92	(219)
0 Annual totals	0	0	0	0	0	0	0 kW	/h/ye	0 ar	0 kWh/ye	ear	0	0		(221)
Space heating fue	l used, n	nain syste	em 1											2112.52	(211)
Space heating fue														0	(213)
Space heating fue		econdary												0	(215)
Water heating fue														651.92	(219)
Electricity for inst		us electri	c shower	(s)										0	(64a)
Space cooling fue Electricity for pun		and elec	tric kaan	-hot										0	(221)
Mechanical vent f					innut from	m autside	2	0		0				0	(2202)
warm air heating			Acract of	positive	input iroi	ii oatsiat	_	U		U				0	(230a) (230b)
Heating circulatio	-		pump wi	thin warı	m air hea	ting unit								0	(230c)
Oil boiler auxiliary			•			_								0	(230d)
Gas boiler auxiliar	y (flue fa	an, etc; e	xcludes c	irculation	n pump)									0	(230e)
Maintaining elect	ric keep-	hot facili	ty for gas	combi b	oiler									0	(230f)
Pump for solar wa	ater heat	ting												0	(230g)
Pump for storage														0	(230h)
Total electricity fo		ove												0	(231)
Electricity for ligh	ting													206.2	(232)





Energy sav								ed in dwe	lling					
Electricity	genera	ted by P\	/s (Apper	ndix M) (r	negative	quantity)								
(Electricity) genera	0 ted by w	0 ind turbir	0 nes (Appe	0 endix M)	0 (negative	0 e quantity	0 y)	0	0	0	0	0	(233a)
(Electricity) genera	0 ted by hy	0 /dro-elec	0 tric gene	0 rators	0	0	0	0	0	0	0	0	(234a)
(Electricity) used oi	0 r net elec	0 ctricity ge	0 nerated l	0 by micro	0 -CHP	0	0	0	0	0	0	0	(235a)
Energy sav Electricity								0 oorted	0	0	0	0	0	(235c)
(Electricity) genera	0 ted by w	0 ind turbir	0 nes (Appe	0 endix M)	0 (negative	0 e quantity	0 y)	0	0	0	0	0	(233b)
(Electricity) genera	0 ted by hy	0 /dro-elec	0 tric gene	0 rators	0	0	0	0	0	0	0	0	(234b)
(Electricity) used o	0 r net elec	0 ctricity ge	0 nerated l	0 by micro	0 -CHP	0	0	0	0	0	0	0	(235b)
(Appendix () Q items	0 s: annual	0 energy	0	0	0	0	0	0	0	0	0	0	(235d)
Appendix (Q, <iter< td=""><td>n 1 descr</td><td>ription></td><td></td><td></td><td></td><td></td><td>Fuel</td><td></td><td>kWh/year</td><td></td><td></td><td></td><td></td></iter<>	n 1 descr	ription>					Fuel		kWh/year				
energy sav	⁄ed												0	(236a)
energy use	ed												0	(237a)
Total deliv	ered er	nergy for	all uses										3583.12	

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/yea	r
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		348.36	(240a)
Low-rate fraction	0		348.36	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		348.36	(241a)
Low-rate fraction	0		348.36	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		348.36	(242a)





Low-rate fraction	0		348.36	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Space heating - secondary cost (other fuel)	0		0	(242e)
Water heating (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		0	(243)
Low-rate fraction	0		0	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Water heating cost (other fuel)	0		107.5	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247)			
Energy For instantaneous electric shower(s)	0		0	(247a)
Space cooling	0		0	(248)
Pumps, fans And electric keep-hot	0		0	(249)
Energy For lighting	0		34	(250)
Additional standing charges	0		0	(251)
Energy saving/generation technologies	0		0	(252)
Appendix Q, <item 1="" description=""></item>	Fuel	kWh/year		
energy saved Or generated	0		0	(253)
energy used	0		0	(254)
Total energy cost	0		590.86	(255)
11a. SAP rating – Individual heating systems including micro-CHP				
Energy cost deflator	0		0	(256)
Energy cost factor (ECF)	0		0	(257)
SAP rating	0		0	(258)
11a. SAP rating – Individual heating systems including micr	ro-CHP			
Trail of it facing marriadal nearing systems including mich	,			
Energy cost deflator			0.36	(256)
Energy cost factor (ECF)			1.58	(257)
SAP rating			74.38	(258)
12a. CO2 emissions – Individual heating systems including	micro-CHP			
	_			
	Energy	Emission factor	Emissions	
Change heating main quatum 1	KWh/year	kg	kg CO2/year	(0.5.)
Space heating - main system 1			327.98	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			98.38	(264)
Energy for instantaneous electric shower(s)			0	(264a)





Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		0	(267)
Electricity for lighting		29.76	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		527.35	(272)
Dwelling CO2 Emission Rate		5.89	(273)
El rating		95	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy	Emission factor	Emissionsr	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			3326.79	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1016.12	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			0	(281)
Electricity for lighting			316.27	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			5534.07	(286)
Dwelling PE Rate			61.79	(287)



Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:27:31

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Flat, Mid-terrace
OCDEA Registration	STRO037816	Assessment Date	2024-02-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	90 m ²
Site Reference	J5652 - Northington Unit 3	Plot Reference	J5652
	LEAN		
Address	WC1N 2JF		•

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate			
Fuel for main heating system	Electricity			
Target carbon dioxide emission rate	13.58 kgCO ₂ /m ²			
Dwelling carbon dioxide emission rate	5.69 kgCO ₂ /m ²	OK		
1b Target primary energy rate and dwelling primary energy				
Target primary energy	72.76 kWh _{PE} /m ²			
Dwelling primary energy	59.89 kWh _{PE} /m ²	OK		
1c Target fabric energy efficiency and dwelling fabric energy efficiency				
Target fabric energy efficiency	38.3 kWh/m ²			
Dwelling fabric energy efficiency	63.7 kWh/m ²	FAIL		

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.3	Exposed (0.3)	FAIL
Party walls	0.2	0	Party Wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	N/A	N/A	N/A
Windows, doors,	1.6	2.7	1 (2.7)	FAIL
and roof windows				
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Exposed	81.46	0.3	
Party wall: Party Wall	118.75	0 (!)	
Exposed roof: Exposed Roof	0	0 (!)	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	16.27	North	0.9	2.7
2, Windows (1)	4.23	South West	0.9	2.7
3. Windows (1)	2.26	South East	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa 8 m³/hm²			
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK	
Air permeability test certificate reference	Not Provided	·	

Date generated: 2024-02-19 17:27:32 Page 1 of 3

4 Space heating			
Main heating system 1: Heat pump with radiators or underfloor heating - Electricity			
Efficiency	264.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			
5 Hot water			

5 Hot water			
Cylinder/store - type: Cylinder	Cylinder/store - type: Cylinder		
Capacity	210 litres		
Declared heat loss	1.6 kWh/day		
Primary pipework insulated	Yes		
Manufacturer			
Model			
Commissioning			
Waste water heat recovery system 1 - type: N/A			
Efficiency			
Manufacturer			
Model			

6 Controls			
Main heating 1 - type: Programmer, TR\	Main heating 1 - type: Programmer, TRVs, and bypass		
Function			
Ecodesign class			
Manufacturer			
Model			
Water heating - type: Cylinder thermostat and HW separately timed			
Manufacturer			
Model			

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery	N/A	
efficiency		
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		•
Commissioning		

9 Local generation N/A

10 Heat networks

11 Supporting documentary evidence N/A

12 Declarations	
a. Assessor Declaration	
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.	
Signed:	Assessor ID:
Name:	Date:
b. Client Declaration	
N/A	

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:46:42

Project Information			
Assessed By	Webb Yates Engineers	Building Type	Flat, Mid-terrace
OCDEA Registration	STRO037816	Assessment Date	2024-02-05

Dwelling Details			
Assessment Type	As designed	Total Floor Area	90 m ²
Site Reference	J5652 - Northington Unit 3	Plot Reference	J5652
	GREEN		
Address	WC1N 2JF		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate	
Fuel for main heating system	Electricity	
Target carbon dioxide emission rate	13.58 kgCO ₂ /m ²	
Dwelling carbon dioxide emission rate	5.14 kgCO ₂ /m ²	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	72.76 kWh _{PE} /m ²	
Dwelling primary energy	54.26 kWh _{PE} /m ²	OK
1c Target fabric energy efficiency and dwelling fabric energy efficiency		
Target fabric energy efficiency	38.3 kWh/m ²	
Dwelling fabric energy efficiency	63.7 kWh/m ²	FAIL

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.3	Exposed (0.3)	FAIL
Party walls	0.2	0	Party Wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	N/A	N/A	N/A
Windows, doors,	1.6	2.7	1 (2.7)	FAIL
and roof windows				
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))		
Name	Net area [m ²]	U-Value [W/m ² K]
Exposed wall: Exposed	81.46	0.3
Party wall: Party Wall	118.75	0 (!)
Exposed roof: Exposed Roof	0	0 (!)

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	16.27	North	0.9	2.7
2, Windows (1)	4.23	South West	0.9	2.7
3, Windows (1)	2.26	South East	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!))
Building part 1 - Main Dwelling : SAP default y-value (0.2 W/m ² K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))		
Maximum permitted air permeability at 50Pa	8 m ³ /hm ²	
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK
Air permeability test certificate reference	Not Provided	

Date generated: 2024-02-19 17:46:42 Page 1 of 3

4 Space heating			
Main heating system 1: Heat pump with	Main heating system 1: Heat pump with radiators or underfloor heating - Electricity		
Efficiency	300.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			
5 Hot water			

5 Hot water						
Cylinder/store - type: Cylinder						
Capacity	210 litres					
Declared heat loss	1.6 kWh/day					
Primary pipework insulated	Yes					
Manufacturer						
Model						
Commissioning						
Waste water heat recovery system 1 -	Waste water heat recovery system 1 - type: N/A					
Efficiency						
Manufacturer						
Model						

6 Controls							
Main heating 1 - type: Programmer, TR\	Main heating 1 - type: Programmer, TRVs, and bypass						
Function							
Ecodesign class							
Manufacturer							
Model							
Water heating - type: Cylinder thermostat and HW separately timed							
Manufacturer							
Model							

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation		
System type: N/A		
Maximum permitted specific fan power	N/A	
Specific fan power	N/A	N/A
Minimum permitted heat recovery	N/A	
efficiency		
Heat recovery efficiency	N/A	N/A
Manufacturer/Model		•
Commissioning		

9 Local generation N/A

10 Heat networks

11 Supporting documentary evidence N/A

12 Declarations					
a. Assessor Declaration					
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.					
Signed:	Assessor ID:				
Name:	Date:				
b. Client Declaration					
N/A	<u> </u>				



Dwelling Reference: J5652

Dwelling Type: New Dwelling Design Stage

WC1N 2JF

1. Overall dwelling dimensions

	Area(m²)	Av. Height(m)		Volume(m³)	
Ground Floor First Floor Total floor area TFA Dwelling volume		1a) x 2.72 1b) x 3.68	(2a) = (2b) =	289.33 18.62 111.43 307.95	(3a) (3b) (4) (5)

2. ۱	√entil	lation	Rate

Chimneys/Flues	0	x 80 =	0	(6a)
Open chimneys	0	x 20 =	0	(6b)
Chimneys / flues attached to closed fire	0	x 10 =	0	(6c)
Flues attached to solid fuel boiler	0	x 20 =	0	(6d)
Flues attached to other heater	0	x 35 =	0	(6e)
Number of blocked chimneys	0	x 20 =	0	(6f)
Number of intermittent extract fans	4	x 10 =	40	(7a)
Number of passive vents	0	x 10 =	0	(7b)
Number of flueless gas fires	0	x 40 =	0	(7c)
		Air changes per hour		, ,

	All changes per flour					
Number of storeys in the dwelling (ns)	0.13	0.13	(8)			
Infiltration due to chimneys, flues, fans, PSVs, etc	2	2	(9)			
Additional infiltration	0.1	0.1	(10)			
Structural infiltration	0.35	0.35	(11)			
Suspended wooden ground floor	0.2	0.2	(12)			
No draught lobby	0	0	(13)			
Percentage of windows and doors draught proofed	0	0	(14)			
Window infiltration	0.25	0.25	(15)			
Infiltration rate	1.03	1.03	(16)			
Air permeability value, AP50, (m³/h/m²)	0	0	(17)			
Air permeability value, AP4, (m³/h/m²)	0	0	(17a)			
Air permeability value)	1.03	1.03	(18)			
Number of sides on which dwelling is sheltered	1	1	(19)			
Shelter factor		0.92	(20)			
Infiltration rate incorporating shelter factor		0.95	(21)			



Infiltration rate modified for monthly wind speed	Infiltration	rate modified	for monthly	wind speed
---	--------------	---------------	-------------	------------

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	(22)
Monthly average wind speed from Table U2														
Wind Fa	5.1 actor	5	4.9	4.4	4.3	3.8	3.8	3.7	4	4.3	4.5	4.7	52.5	(22)
Adjuste	1.28 d infiltrat	1.25 ion rate (1.23 allowing	1.1 for shelt	1.08 er and wi	0.95 nd speed	0.95 d)	0.93	1	1.08	1.13	1.18	13.13	(22a)
Calculat	1.21 e effectiv	1.19 e air cha	1.17 nge rate	1.05 for the ap	1.02 oplicable	0.91 case:	0.91	0.88	0.95	1.02	1.07	1.12	12.5	(22b)
													0	(23a)
													0	(23b)
a) If bala	ancod ma	chanical	vontilatio	an wiith h	oot roco	.om. (NA\/I	⊔D\						0	(23c)
a) II Dale	anced me					• •	•							(0.1.)
b) If bala	0 anced me	0 echanical	0 ventilatio	0 on withou	0 ut heat re	0 ecovery (I	0 MV)	0	0	0	0	0		(24a)
c) If who	0 ole house	0 extract v	0 ventilatio	0 n or nosit	0 tive input	0 t ventilati	0 ion from	0 outside	0	0	0	0		(24b)
c, 11 11 111	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If nat	ural venti	•	•	•	•	•	•	•	U	U	U	U		(240)
·	1.21 e air chan	1.19	1.17	1.05	1.02	0.91	0.91	0.89	0.95	1.02	1.07	1.12		(24d)
Effective	1.21 e air chan	1.19 ge rate f	1.17 rom PCDI	1.05 B:	1.02	0.91	0.91	0.89	0.95	1.02	1.07	1.12		(25)
	1.21	1.19	1.17	1.05	1.02	0.91	0.91	0.89	0.95	1.02	1.07	1.12		(25)

3. Heat losses and heat loss parameter

Items in the table below are to be expanded as necessary to allow for all different types of element e.g. 4 wall types. The k -value

ELEMENT	A X U (W/K)	A X k kJ/K
Doors	0	(26)
Windows	40.66	(27)
Roof window	0	(27a)
Basement floor	0	0 (28)
Ground floor	0	0 (28a)
Exposed floor	0	0 (28b)
Basement wall	0	0 (29)
External wall	30.05	19032.3 (29a)
Roof	17.02	957.33 (30)
Total area of external elements ∑A, m²		233.58 (31)





Party Wall 0		10287	(32)								
Party floor				4254.8	(32a)						
Party ceiling				0	(32b)						
Internal wall **				0	(33c)						
Internal floor				0	(32d)						
Internal ceiling floor				0	(32e)						
Fabric heat loss, W/K = \sum (A x U)				87.73	(33)						
Heat capacity Cm = \sum (A x k)				34531.43	(34)						
Thermal mass parameter (TMP = $Cm \div TFA$) in kJ/m^2K	250	(35)									
Linear Thermal bridges: \sum (L x Ψ) calculated using Appendix K	0	(36)									
Point Thermal bridges: Σχ (W/K) if significant point thermal bridge present and values av	0	(36a)									
Total fabric heat loss $H = \sum (A \times U) + \sum (L \times \Psi) + \sum \chi$	87.73	(37)									
Ventilation heat loss calculated monthly											
123.43 121.01 118.59 106.49 104.07 92.43 92.43 90.27 96.92 Heat transfer coefficient, W/K	104.07	108.91	113.75		(38)						
211.17 208.75 206.33 194.22 191.8 180.16 180.16 178 184.66 Heat loss parameter (HLP), W/m²K	191.8	196.64	201.48		(39)						
1.9 1.87 1.85 1.74 1.72 1.62 1.62 1.6 1.66 Number of days in month (Table 1a)		(40)									
31 28 31 30 31 30 31 30	31	30	31		(41)						
4. Water heating energy requirement											
Assumed occupancy, N	2.82	(42)									
Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)											
0 0 0 0 0 0 0 0 0 0 0 0 Hot water usage in litres per day for baths, Vd,bath (from Appendix J)		(42a)									
82.54 81.31 79.58 76.4 74.02 71.38 69.95 71.66 73.53 76.36 79.6 82.26 Hot water usage in litres per day for other uses, Vd,other (from Appendix J)											

Hot water usage in litres per day for mixer showers, Vd,shower (from Appendix J)												2.02	(42)	
Hot wate	0 r usage i	0 n litres po	0 er day fo	0 r baths, V	0 'd,bath (f	0 rom App	0 endix J)	0	0	0	0	0		(42a)
Hot wate	82.54 r usage i		79.58 er day fo		74.02 ses, Vd,ot			71.66 dix J)	73.53	76.36	79.6	82.26		(42b)
Annual av	verage h		usage in	litres per		verage (f			38.79	40.38	41.96	43.54	116.11	(42c) (43)
Energy co		123.27 hot wate						108.87 h/month				125.8	1393.59	(44)
Distributi		175.53 46) = 0.1!		157.69	149.73	131.57	127.68	134.81	138.5	158.4	173.19	196.97	1928.13	(45)
29.95 26.33 27.66 23.65 22.46 19.74 19.15 20.22 20.78 23.76 25.98 29.55 Storage volume (litres) including any solar or WWHRS storage within same vessel Water storage loss (or HIU loss) a) If manufacturer's declared loss factor is known (kWh/day):								0	(46) (47)					
Tempera						,, , , ,							0.54	(46) (49)

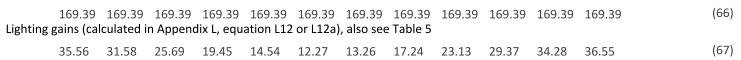




Energy lost from water storage, kWh/day (48) x (49) =	0.86	(50)
b) If manufacturer's declared loss factor is not known :		,
Hot water storage loss factor from Table 2 (kWh/litre/day)	0	(51)
Volume factor from Table 2a	0	(52)
Temperature factor from Table 2b	0	(53)
Energy lost from water storage, kWh/day	0	(54)
Enter (50) or (54) in (55)	0.86	(55)
Water storage (or HIU) loss calculated for each month (56) = (55) \times (41)		,
26.78 24.19 26.78 25.92 26.78 25.92 26.78 26.78 25.92 26.78 25.92 26.78		(56)
If the vessel contains dedicated solar storage or dedicated WWHRS storage,		
(57)m = (56)m		
where Vs is Vww from Appendix G3 or (H12) from Appendix H (as applicable).		
26.78 24.19 26.78 25.92 26.78 25.92 26.78 26.78 25.92 26.78 25.92 26.78		(57)
Primary circuit loss for each month from Table 3		
modified by factor from Table H4 if there is solar water heating and a cylinder thermostat, although not for DHW-only	heat netwo	rks)
23.26 21.01 23.26 22.51 23.26 0 0 0 0 23.26 22.51 23.26		(59)
Combi loss for each month from Table 3a, 3b or 3c (enter 0 if not a combi boiler)		
0 0 0 0 0 0 0 0 0 0		(61)
Total heat required for water heating calculated for each month (62) = $0.85 \times (45) + (46) + (57) + (59) + (61)$		
249.72 220.74 234.42 206.13 199.78 157.49 154.47 161.59 164.42 208.45 221.62 247.02	2425.84	1 (62)
CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water hea	iting)	
0 0 0 0 0 0 0 0 0 0		(63a)
PV diverter DHW input calculated using Appendix G (negative quantity) (enter 0 if no PV diverter contribution)		
0 0 0 0 0 0 0 0 0 0		(63b)
Solar DHW input calculated using Appendix H (negative quantity) (enter 0 if no solar contribution to water heating)		
0 0 0 0 0 0 0 0 0 0		(63c)
FGHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no FGHRS contribution to water heating)		
0 0 0 0 0 0 0 0 0 0		(63d)
Output from water heater for each month, $kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)$		
249.72 220.74 234.42 206.13 199.78 0 0 0 0 208.45 221.62 247.02	1787.87	7 (64)
Output from water heater for each month, $kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)$		
0 0 0 0 0 0 0 0 0 0 0 0		(64a)
Heat gains from water heating, kWh/month $0.25 \times [0.85 \times (45) + (61) + (64a)] + 0.8 \times [(46) + (57) + (59)]$		
106.43 94.53 101.34 91.18 89.82 64.48 63.88 66.25 66.79 92.71 96.33 105.53		(65)
include (57) m in calculation of (65) m only if hot water store is in the dwelling or hot water is from heat network		

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

Metabolic gains (Table 5), watts







Applianc	es gains (calculate	d in Appe	endix L, e	quation l	.16 or L10	5a), also s	see Table	5					
		412.59	401.91	379.18	350.48	323.51	305.49	301.26		334.67	363.36	390.33		(68)
	54.76 nd fans g	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76		(69)
·	0 .g. evapoi	0	0	0 ilues) (Ta	0 ble 5	0	0	0	0	0	0	0		(70)
	-	-112.93	-112.93		-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93		(71)
Total int	143.05 ernal gair		136.21	126.64	120.73	89.56	85.86	89.05	92.76	124.61	133.79	141.84		(72)
	698.19	696.06	675.03	636.49	596.97	536.57	515.84	518.76	539.06	599.87	642.67	679.95		(73)
6. Sol	ar gains													
Solar gai	ns in wat	ts, calcula	ated for e	ach mon	th									
Total gai	221.65 ns – inter				944.37	970.31	921.73	792.87	642.16	440.8	267.63	188.36		(83)
	919.83	1086.07	1246.59	1416.2	1541.34	1506.88	1437.57	1311 63	1181 22	1040.67	910.3	868.3		(84)
								1311.03	1101.22	20.0.07				
7. Me	ean inter	nal temp	perature	(heating	g season			1311.03	1101.22					
	ean inter)			1101.12				21	(85)
Tempera		ng heatir	ng period:	s in the li	ving area) from Tal							21	(85)
Tempera Utilisatio	ature duri	ng heatir for gains 0.99	ng periods for living 0.97	s in the li area, 🛚 1,	ving area .m (see Ta	from Tal able 9a) 0.68	ole 9, Th1 0.53	l (°C) 0.58	0.82	0.95	0.99	0.99	21	(85)
Tempera Utilisatio	ature duri on factor t 0.99	ng heatir for gains 0.99 nperaturo	ng periods for living 0.97 e in living 19.48	s in the li area, 21, 0.93 area T1 20.1	ving area m (see Ta 0.84 (follow st 20.57	from Tal able 9a) 0.68 eps 3 and	ole 9, Th1 0.53 d 4 in Tab 20.97	0.58 ole 9c) 20.95					21	
Tempera Utilisatio	ature duri on factor t 0.99 ternal ter 18.79	ng heatir for gains 0.99 nperaturo	ng periods for living 0.97 e in living 19.48	s in the li area, 21, 0.93 area T1 20.1 s in rest c	ving area m (see Ta 0.84 (follow st 20.57	from Tal able 9a) 0.68 eps 3 and 20.88 g from Ta	0.53 d 4 in Tab 20.97 able 9, Th	0.58 ble 9c) 20.95 n2 (°C) 19.62	0.82 20.73 19.57	0.95 20.13 19.53	0.99 19.41 19.49	0.99 18.83 19.46	21	(86)
Tempera Utilisation Mean int Tempera	ature duri on factor f 0.99 ternal ter 18.79 ature duri	ing heatir for gains 0.99 mperature 19.05 ing heatir	ng period: for living 0.97 e in living 19.48 ng period:	s in the li area, 21, 0.93 area T1 20.1 s in rest c	ving area m (see Ta 0.84 (follow st 20.57 of dwellin 19.53 Utilisation 0.78	from Tal able 9a) 0.68 eps 3 and 20.88 g from Ta 19.6 factor fo 0.56	0.53 d 4 in Tak 20.97 able 9, Th 19.6 r gains fo	0.58 ble 9c) 20.95 n2 (°C) 19.62 or rest of 0.43	0.82 20.73 19.57 dwelling, 0.73	0.95 20.13 19.53 22,m (se 0.93	0.99 19.41 19.49 ee Table 9 0.98	0.99 18.83 19.46	21	(86) (87)
Tempera Utilisation Mean into Tempera Roof	oture duri 0.99 ternal ter 18.79 ature duri 19.4	ng heatir for gains 0.99 nperature 19.05 ng heatir 19.42 0.98	ng period: for living 0.97 e in living 19.48 ng period: 19.43	s in the li area, 21, 0.93 area T1 20.1 s in rest c	ving area m (see Ta 0.84 (follow st 20.57 of dwellin 19.53 Utilisation 0.78	from Tal able 9a) 0.68 eps 3 and 20.88 g from Ta 19.6 factor fo 0.56	0.53 d 4 in Tak 20.97 able 9, Th 19.6 r gains fo	0.58 ole 9c) 20.95 n2 (°C) 19.62 or rest of	0.82 20.73 19.57 dwelling, 0.73	0.95 20.13 19.53 22,m (se 0.93	0.99 19.41 19.49 ee Table 9 0.98	0.99 18.83 19.46 Đa)		(86) (87) (88) (89) (90)
Tempera Utilisation Mean interpera Roof Roof Living are	on factor for factor for factor for factor f	ng heatir for gains 0.99 nperature 19.05 ng heatir 19.42 0.98	ng period: for living 0.97 e in living 19.48 ng period: 19.43 0.96	s in the li area, 121, 0.93 area T1 20.1 s in rest o 19.51 U 0.9	ving area m (see Ta 0.84 (follow st 20.57 of dwellin 19.53 Itilisation 0.78 Mes 19.26	from Tal able 9a) 0.68 eps 3 and 20.88 g from Ta 19.6 factor fo 0.56 an intern	0.53 d 4 in Tab 20.97 able 9, Th 19.6 r gains fo 0.37 al tempe	0.58 ble 9c) 20.95 ble (°C) 19.62 or rest of 0.43 rature in	0.82 20.73 19.57 dwelling, 0.73 the rest	0.95 20.13 19.53 22,m (se 0.93 of dwellir	0.99 19.41 19.49 ee Table 9 0.98 ng T2	0.99 18.83 19.46 9a) 0.99	0.25	(86) (87) (88) (89)
Tempera Utilisation Mean interperation Temperation Roof Roof Living are Mean interperation	0.99 ternal ter 18.79 ature duri 19.4 0.99 17.47 ea fractio	ng heatir for gains 0.99 mperature 19.05 ng heatir 19.42 0.98 17.75 m	ng period: for living 0.97 e in living 19.48 ng period: 19.43 0.96 18.18 e (for the	s in the li area, 21, 0.93 area T1 20.1 s in rest o 19.51 U 0.9 18.83 whole do	ving area m (see Ta 0.84 (follow st 20.57 of dwellin 19.53 Itilisation 0.78 Mes 19.26	from Tal able 9a) 0.68 eps 3 and 20.88 g from Ta 19.6 factor fo 0.56 an intern	0.53 d 4 in Tab 20.97 able 9, Th 19.6 r gains fo 0.37 al tempe	0.58 ble 9c) 20.95 ble (°C) 19.62 or rest of 0.43 rature in	0.82 20.73 19.57 dwelling, 0.73 the rest	0.95 20.13 19.53 22,m (se 0.93 of dwellir	0.99 19.41 19.49 ee Table 9 0.98 ng T2	0.99 18.83 19.46 9a) 0.99		(86) (87) (88) (89) (90)



8. Space heating requirement



Utilisation factor for	gains,											
0.99 0.9 Useful gains, mGm, V	98 0.95 W	0.9	0.78	0.59	0.41	0.47	0.74	0.92	0.98	0.99		(94)
907.07 10 Monthly average ext)59.52 1187.93 ernal tempera				588.77	610.68	874.55	961.05	889.17	858.52		(95)
4.3 4.9 Heat loss rate for me		8.9 mperatur	11.7 e	14.6	16.6	16.4	14.1	10.6	7.1	4.2		(96)
2850.88 27 Space heating require	749.99 2476.79 ement for eac		1512.81	951.98	600.98	629.99	1044.97	1647.4	2236.16	2756.07		(97)
1446.2 11 Solar space heating c	136 958.91	520.15		0 ative qua	0 ntity)	0	0	510.64	969.83	1411.78		(98a)
0 0 Space heating require	0	0	0	0	0	0	0	0	0	0		(98b)
1446.2 11 Space heating require	136 958.91	520.15		0	0	0	0	510.64	969.83	1411.78	64.48	(98c) (99)
		• • •									04.40	(33)
8c. Space Cooling	g requiremen	t										
Heat less note												'
Heat loss rate,	0	0	0	0	0	0	0	0	0	0		(100)
Utilisation factor for	0 loss	U	U	0	0	0	0	0	U	0		(100)
0 0 Useful loss, mLm (wa	otts)	0	0	0	0	0	0	0	0	0		(101)
0 0 Gains	0	0	0	0	0	0	0	0	0	0		(102)
0 0 Space cooling require	0 ement for mor	0 nth, whole	0 e dwelling	0 g, continu	0 ious (kW	0 h)	0	0	0	0		(103) (104)
0 0	0	0	0	0	0	0	0	0	0	0		(104)
Cooled fraction Intermittency factor											0	(105)
0 0 Space cooling require	0 ement for mor	0 nth	0	0	0	0 0	0	0	0	0	0	(106)
0 0	0	0	0	0	0	0	0	0	0	0	U	(107)
Space cooling require	_	-									0	(108)
0.0												
8f. Space heating	requiremen	τ										
Fabric Energy Efficier	ncy,					0					0	(109)



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



Fraction of space heat from secondary/supplementary system, Fraction of space heat from main system(s), Fraction of main heating from main system 2, Fraction of total space heat from main system 1, Fraction of total space heat from main system 2, Efficiency of main space heating system 1 (in %), Efficiency of main space heating system 2 (in %), Efficiency of secondary/supplementary heating system, %, Cooling System Seasonal Energy Efficiency Ratio, Space heating requirement (calculated above),									0 1 0 1 0 264 0 0	(201) (202) (203) (204) (205) (206) (207) (208) (209)				
Space heating rec	luiremer	nt (calcula	ted abov	/e),										
0	0	0	0	0	0	0	0		0	0	0	0		(210)
Space heating fue								0					0	(0.1.1)
547.8 Space heating fue	430.3 d (main b		197.03		0 onth	0	0	0	0	193.	13 367.36	534.76	0	(211)
						0	0	0	0	0	0	0	0	(212)
0 Space heating fue	0 el (secono	0 darv). kW	0 h/month	0 1	0	0	0	0	0	0	0	0	0	(213)
0	0	0	0	0	0	0	0	Ü	0	0	0	0	O	(215)
Output from wate	0	-	U	O	U	U	U	0	U	U	O	U	264	(216)
Efficiency of wate	r heater													()
264	264	264	264	264	264	264	26	4	264	264	264	264		(217)
Fuel for water hea	ating													
94.59 Space Cooling	83.61	88.8	78.08	75.67	0	0	0		0	78.9	83.95	93.57	677.22	(219)
0	0	0	0	0	0	0	0		0	0	0	0		(221)
Annual totals							kW	h/ye	ar	kWh/yea	r			
Space heating fue													2721.71	(211)
Space heating fue													0	(213)
Space heating fue		econdary											0	(215)
Water heating fue													677.22	(219)
Electricity for inst		us electri	c shower	(s)									0	(64a)
Space cooling fue		ممامامم	مرم ما ماسه	h-4									0	(221)
Electricity for pun					innut fra	m autsida	_						•	(222.)
Mechanical vent f warm air heating			KLI aCL OI	positive	iliput iroi	ii outside	E	0		0			0	(230a)
Heating circulatio			numn wi	thin war	m air haa	ting unit							0	(230b)
Oil boiler auxiliary						_							0	(230c)
Gas boiler auxiliar		· ·				т риптр)							0	(230d)
Maintaining elect													0	(230e)
Pump for solar wa			., 101 gas		Cilci								0	(230f) (230g)
Pump for storage		_											0	(230g) (230h)
Total electricity for													0	(23011)
Electricity for ligh													251.2	(232)
-,	J												231.2	(232)





					ppendice			ısed in dv	velling					
	0	0	0	0	(negativo 0 pendix M	0	0	0	0	0	0	0	0	(233a)
Electricit	0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)
Electricit	0 :y used c	0 or net ele	0 ctricity g	0 generate	0 d by micr	0 o-CHP	0	0	0	0	0	0	0	(235a)
					0 ppendice			0 exported	0	0	0	0	0	(235c)
	0	0	0	0	(negativo 0 pendix M	0	0	0 city)	0	0	0	0	0	(233b)
Electricit	0 :y genera	0 ated by h	0 nydro-ele	0 ectric ger	0 nerators	0	0	0	0	0	0	0	0	(234b)
Electricit	0 cy used c	0 or net ele	0 ectricity §	0 generate	0 d by micr	0 o-CHP	0	0	0	0	0	0	0	(235b)
Appendi	0 x Q item	0 is: annua	0 I energy	0	0	0	0	0	0	0	0	0	0	(235d)
Appendi energy s energy u	aved	m 1 desc	cription>					Fue	el	kWh/year	r		0	(236a) (237a)
Total del	livered e	nergy fo	r all uses	5									4288.1	. ,

10a. Fuel costs – Individual heating systems including micro-CHP

Fuel required	kWh/year	Fuel price	Fuel cost £/yea	r
Space heating - main system 1 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		448.81	(240a)
Low-rate fraction	0		448.81	(240b)
High-rate cost	0		0	(240c)
Low-rate cost	0		0	(240d)
Space heating - main system 1 cost (other fuel)	0		0	(240e)
Space heating - main system 2 (electric off-peak tariff				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		448.81	(241a)
Low-rate fraction	0		448.81	(241b)
High-rate cost	0		0	(241c)
Low-rate cost	0		0	(241d)
Space heating - main system 2 cost (other fuel)	0		0	(241e)
Space heating - secondary (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		448.81	(242a)





Low-rate fraction	0		448.81	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Space heating - secondary cost (other fuel)	0		0	(242e)
Water heating (electric off-peak tariff)				
High-rate fraction (Table 12a, or Appendix F for electric CPSU)	0		0	(243)
Low-rate fraction	0		0	(242b)
High-rate cost	0		0	(242c)
Low-rate cost	0		0	(242d)
Water heating cost (other fuel)	0		111.67	(247)
(for a DHW-only heat network use (342a) or (342b) instead of (247	7)			
Energy For instantaneous electric shower(s)	0		0	(247a)
Space cooling	0		0	(248)
Pumps, fans And electric keep-hot	0		0	(249)
Energy For lighting	0		41.42	(250)
Additional standing charges	0		0	(251)
Energy saving/generation technologies	0		0	(252)
Appendix Q, <item 1="" description=""></item>	Fuel k\	Vh/year		
energy saved Or generated	0		0	(253)
energy used	0		0	(254)
Total energy cost	0		707.11	(255)
11a. SAP rating – Individual heating systems including micro-CHP				
Energy cost deflator	0		0	(256)
Energy cost factor (ECF)	0		0	(257)
SAP rating	0		0	(258)
	CLID			
11a. SAP rating – Individual heating systems including mic	ro-CHP			
Energy cost deflator			0.36	(256)
Energy cost factor (ECF)			1.63	(257)
SAP rating			73.62	(258)
12a. CO2 emissions – Individual heating systems including	micro-CHP			
	Energy Emis	sion factor	Emissions	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			422.42	(261)
Space heating - main system 2			0	(262)
Space heating - secondary			0	(263)
Energy for water heating			102.2	(264)
Energy for instantaneous electric shower(s)			0	(264a)





Space and water heating		0	(265)
Space cooling		0	(266)
Electricity for pumps, fans and electric keep		0	(267)
Electricity for lighting		36.26	(268)
energy saved or generated	0	0	(269b)
Appendix Q items			
energy saved	0	0	
energy used	0	0	
energy saved	0	0	(270b)
energy used		0	(271b)
Total CO2, kg/year		635.08	(272)
Dwelling CO2 Emission Rate		5.7	(273)
El rating		95	(274)

13a. Primary Energy – Individual heating systems including micro-CHP

	Energy	Emission factor	Emissionsr	
	KWh/year	kg	kg CO2/year	
Space heating - main system 1			4285.62	(275)
Space heating - main system 2			0	(276)
Space heating - secondary			0	(277)
Energy for water heating			1055.57	(278)
Energy for instantaneous electric shower(s)			0	(278a)
Space and water heating			0	(279)
Space cooling			0	(280)
Electricity for pumps, fans and electric keep			0	(281)
Electricity for lighting			385.3	(282)
energy saved or generated	0		0	
Appendix Q items				
energy saved	0		0	
energy used	0		0	
energy saved	0		0	(284b)
energy used			0	(285b)
Total PE, kWh/year			6637.81	(286)
Dwelling PE Rate			59.57	(287)



Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:30:22

Project Information						
Assessed By	Webb Yates Engineers	Building Type	Flat, Mid-terrace			
OCDEA Registration	STRO037816	Assessment Date	2024-02-05			

Dwelling Details			
Assessment Type	As designed	Total Floor Area	111 m ²
Site Reference	J5652 - Northington Unit 4	Plot Reference	J5652
	LEAN		
Address	WC1N 2JF		

Client Details					
Name	Not Provided				
Company	Not Provided				
Address	Not Provided, Not Provided, WF10 5QU				

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission	rate			
Fuel for main heating system	Electricity			
Target carbon dioxide emission rate	12.17 kgCO ₂ /m ²			
Dwelling carbon dioxide emission rate	5.32 kgCO ₂ /m ²	OK		
1b Target primary energy rate and dwelling primary energy				
Target primary energy	65.28 kWh _{PE} /m ²			
Dwelling primary energy	55.81 kWh _{PE} /m ²	OK		
1c Target fabric energy efficiency and dwelling fabric energy efficiency				
Target fabric energy efficiency	35.9 kWh/m ²			
Dwelling fabric energy efficiency	63.1 kWh/m ²	FAIL		

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.3	Exposed (0.3)	FAIL
Party walls	0.2	0	Party Wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.16	Roof (0.16)	OK
Windows, doors,	1.6	2.7	1 (2.7)	FAIL
and roof windows				
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Exposed	100.17	0.3	
Party wall: Party Wall	57.15	0 (!)	
Exposed roof: Roof	106.37	0.16	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	15.2	North	0.9	2.7
2, Windows (1)	8.19	South East	0.9	2.7
3. Windows (1)	3.65	South West	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa 8 m³/hm²			
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK	
Air permeability test certificate reference Not Provided			

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4 Space heating		
Main heating system 1: Heat pump with	radiators or underfloor heating - Electricity	
Efficiency	264.0%	
Emitter type	Radiators	
Flow temperature		
System type		
Manufacturer		
Model		
Commissioning		
Secondary heating system: N/A		
Fuel	N/A	
Efficiency	N/A	
Commissioning		
5 Hot water		

5 Hot water			
Cylinder/store - type: Cylinder	Cylinder/store - type: Cylinder		
Capacity	210 litres		
Declared heat loss	1.6 kWh/day		
Primary pipework insulated	Yes		
Manufacturer			
Model			
Commissioning			
Waste water heat recovery system 1 - type: N/A			
Efficiency			
Manufacturer			
Model			

6 Controls		
Main heating 1 - type: Programmer, TR\	/s, and bypass	
Function		
Ecodesign class		
Manufacturer		
Model		
Water heating - type: Cylinder thermostat and HW separately timed		
Manufacturer		
Model		

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation			
System type: N/A			
Maximum permitted specific fan power	N/A		
Specific fan power	N/A	N/A	
Minimum permitted heat recovery	N/A		
efficiency			
Heat recovery efficiency	N/A	N/A	
Manufacturer/Model			
Commissioning			

9 Local generation N/A

10 Heat networks N/A

11 Supporting documentary evidence N/A

12 Declarations		
a. Assessor Declaration		
This declaration by the assessor is confirmation that the contents of this BREL Compliance Report are a true and accurate reflection based upon the design information submitted for this dwelling for the purpose of carrying out the "As designed" assessment, and that the supporting documentary evidence (SAP Conventions, Appendix 1 (documentary evidence) schedules the minimum documentary evidence required) has been reviewed in the course of preparing this BREL Compliance Report.		
Signed:	Assessor ID:	
Name:	Date:	
b. Client Declaration		
N/A		

Building Regulations England Part L (BREL) Compliance Report

Approved Document L1 2021 Edition, England assessed by Stroma SAP 10.2 SAP 10 program, 10.2

Date: Mon 19 Feb 2024 17:47:26

Project Information				
Assessed By	Webb Yates Engineers	Building Type	Flat, Mid-terrace	
OCDEA Registration	STRO037816	Assessment Date	2024-02-05	

Dwelling Details			
Assessment Type	As designed	Total Floor Area	111 m ²
Site Reference	J5652 - Northington Unit 4	Plot Reference	J5652
	GREEN		
Address	WC1N 2JF		

Client Details	
Name	Not Provided
Company	Not Provided
Address	Not Provided, Not Provided, WF10 5QU

This report covers items included within the SAP calculations. It is not a complete report of regulations compliance.

1a Target emission rate and dwelling emission rate				
Fuel for main heating system	Electricity			
Target carbon dioxide emission rate	12.17 kgCO ₂ /m ²			
Dwelling carbon dioxide emission rate	4.8 kgCO ₂ /m ²	OK		
1b Target primary energy rate and dwelling primary energy				
Target primary energy	65.28 kWh _{PE} /m ²			
Dwelling primary energy	50.46 kWh _{PE} /m ²	OK		
1c Target fabric energy efficiency and dwelling fabric energy efficiency				
Target fabric energy efficiency	35.9 kWh/m ²			
Dwelling fabric energy efficiency	63.1 kWh/m ²	FAIL		

2a Fabric U-values				
Element	Maximum permitted average U-Value [W/m²K]	Dwelling average U-Value [W/m²K]	Element with highest individual U-Value	
External walls	0.26	0.3	Exposed (0.3)	FAIL
Party walls	0.2	0	Party Wall (0)	N/A
Curtain walls	1.6	0	N/A	N/A
Floors	0.18	N/A	N/A	N/A
Roofs	0.16	0.16	Roof (0.16)	OK
Windows, doors,	1.6	2.7	1 (2.7)	FAIL
and roof windows				
Rooflights	2.2	N/A	N/A	N/A

2b Envelope elements (better than typically expected values are flagged with a subsequent (!))			
Name	Net area [m ²]	U-Value [W/m ² K]	
Exposed wall: Exposed	100.17	0.3	
Party wall: Party Wall	57.15	0 (!)	
Exposed roof: Roof	106.37	0.16	

2c Openings (better than typically expected values are flagged with a subsequent (!))				
Name	Area [m²]	Orientation	Frame factor	U-Value [W/m ² K]
1, Windows (1)	15.2	North	0.9	2.7
2, Windows (1)	8.19	South East	0.9	2.7
3. Windows (1)	3.65	South West	0.9	2.7

2d Thermal bridging (better than typically expected values are flagged with a subsequent (!)) Building part 1 - Main Dwelling: SAP default y-value (0.2 W/m²K) used for thermal bridging

3 Air permeability (better than typically expected values are flagged with a subsequent (!))			
Maximum permitted air permeability at 50Pa 8 m³/hm²			
Dwelling air permeability at 50Pa	5 m³/hm², Design value	OK	
Air permeability test certificate reference Not Provided			

Date generated: 2024-02-19 17:47:26 Page 1 of 3

4 Space heating			
Main heating system 1: Heat pump with	Main heating system 1: Heat pump with radiators or underfloor heating - Electricity		
Efficiency	300.0%		
Emitter type	Radiators		
Flow temperature			
System type			
Manufacturer			
Model			
Commissioning			
Secondary heating system: N/A			
Fuel	N/A		
Efficiency	N/A		
Commissioning			
5 Hot water			

5 Hot water		
Cylinder/store - type: Cylinder		
Capacity	210 litres	
Declared heat loss	1.6 kWh/day	
Primary pipework insulated	Yes	
Manufacturer		
Model		
Commissioning		
Waste water heat recovery system 1 - type: N/A		
Efficiency		
Manufacturer		
Model		

6 Controls			
Main heating 1 - type: Programmer, TR\	/s, and bypass		
Function			
Ecodesign class			
Manufacturer			
Model			
Water heating - type: Cylinder thermostat and HW separately timed			
Manufacturer			
Model			

7 Lighting		
Minimum permitted light source efficacy	75 lm/W	
Lowest light source efficacy	95 lm/W	OK
External lights control	N/A	

8 Mechanical ventilation			
System type: N/A			
Maximum permitted specific fan power	N/A		
Specific fan power	N/A	N/A	
Minimum permitted heat recovery	N/A	·	
efficiency			
Heat recovery efficiency	N/A	N/A	
Manufacturer/Model			
Commissioning			

9 Local generation N/A

10 Heat networks N/A

11 Supporting documentary evidence N/A

12 Declarations						
a. Assessor Declaration						
This declaration by the assessor is confirmation that the co are a true and accurate reflection based upon the design ir the purpose of carrying out the "As designed" assessment, evidence (SAP Conventions, Appendix 1 (documentary evi documentary evidence required) has been reviewed in the Compliance Report.	nformation submitted for this dwelling for and that the supporting documentary idence) schedules the minimum					
Signed:	Assessor ID:					
Name:	Date:					
b. Client Declaration						
N/A						



APPENDIX B – GLA SPREADSHEET

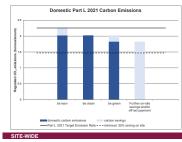
	The applicant should complete all the light blue cells including information on the modelled units, the area per unit, the number of units, the TER/DER/BER and the TFEE/DFEE.																		
						1	ı		ITIAL CO2 ANA		L1)					'Re Clean' 'Re Green'			
		umber of units Total area	Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Effic	Dwelling Fabric	Baseline			'Be Lean'			'Be Clean'			
	area	umber of units Total area represented b model		Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO, emissions	Energy saving/generation technologies	Part L 2021 CO ₃ emissions	Part L 2021 CO ₃ emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO ₂ emissions	Part L 2021 CO ₃ emissions with Notional PV savings included	"Be Clean" savings	Part L 2021 CO ₃ emissions	'Be Green' savings
Helt 1	(m²) (Row 4)	(m²)	(kgCO ₂ / m ²) (Row 273)	(kgCO ₂ p.a.) (Row 269)	(kgCO ₂ / m ²) (Row 273 or 384)	(kgCO ₂ / m ³) (Row 273 or 384)	(kgCO ₂ / m ²) (Row 273 or 384)	(kWh/m²)	(kWhim²)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO, p.a.)
Usini T Usini 2 Usini 2 Usini 4 Usini	20 27 28 27 28 28 28 28 28 28 28 28 28 28 28 28 28	1 22 67 1 28 68 1 186 1 111.43	548 548 543 542 542	6.05 8.95 6.95 6.95	5.03 5.49 5.00 5.32	\$60 \$60 \$60 \$12	455 458 454 440 440	34.10 34.30 33.30 35.50	60.3 60.3 60.3	640 440 440 440 440	0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	492 493 693 693	692 693 693 693	93 93 93 95 66	491 421 421 503	950 950 950 950 950	0 0	669 609 609 609	61 61 62 65
Sum		4 377	6.0	0.0	5.4	5.4	4.8	35.6	59.7	2,260	0	2,023	2,023	237	2,023	2,023	0	1,828	195
			Baseline		"Be Lean"	'Be Clean'	'Be Green'	NON-RESID	DENTIAL CO ₂ A	NALYSIS (PAR Baseline	T L2)		'Be Lean'			'Be Clean'		'Be	Green'
Building Use	Model Area No	umber of units Total area	BRUKL	BRUKL	BRUKL BER	BRUKL BER	BRUKL BER			Part L 2021 CO ₂	Energy saving/generation	Part L 2021 CO ₂	Part L 2021 CO ₂	'Be Lean' savings	Part L 2021 CO ₂	Part L 2021 CO ₂	'Be Clean' savings	Part L 2021 CO ₂	'Be Green' savings
		represented to model	y TER	Displaced electricity (-)	BER	BER	BER			emissions	saving/generation technologies	emissions	emissions with Notional PV		emissions	emissions with Notional PV		emissions	
	(m²)	(m²)	(kgCO ₂ / m ²)	(kWh / m²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)	(kgCO ₂ / m ²)			(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	savinns included (kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)	(kgCO ₂ p.a.)
Sum		0 0	0.0	0.0	0.0	0.0	0.0			0	0	0	0	0	0	0	0	0	0
Sum STE-WIDE ENE Total Sum	ergy consumption /		0.0	0.0	0.0	0.0	0.9			0	0	2,023	2,023	237	2,023	2,023	0	0	0 195

	Carbon Dioxide Emissions for residential buildings (Tonnes CO ₂ per annum)					
	Regulated	Unregulated				
Baseline: Part L 2021 of the Building Regulations Compliant Developmen	2.3	1.4				
After energy demand reduction (be lean)	2.0	1.4				
After heat network connection (be clean)	2.0	1.4				
After renewable energy (be green)	1.8	1.4				

Table 2: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for residential building

	Regulated residential	Regulated residential carbon dioxide savings					
	(Tonnes CO ₂ per annum)	(%)					
Be lean: savings from energy demand reduction	0.2	10%					
Be clean: savings from heat network	0.0	0%					
Be green: savings from renewable energy	0.2	9%					
Cumulative on site savings	0.4	19%					
Annual savings from off-set payment	1.8	-					
	(Tonne	s CO ₃)					
Cumulative savings for off-set payment	55						
Cash in-lieu contribution (E)	5,210						

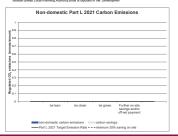
*carbon price is based on QLA recommended price of £95 per torne of carbon dioxide unless Local Planning Authority price is inputted in the 'Developmen'



Non-residential			
Table 3: Carbon Dioxide Em		the Energy Hierarchy for non-	residential building
	buil (Tonnes CC	dings 2 per annum)	
	Regulated	Unregulated	
Baseline: Part L 2021 of the Building Regulations Compliant Developmen	0.0		
After energy demand reduction (be lean)	0.0		
After heat network connection (be clean)	0.0		
After renewable energy (be green)	0.0		

	Regulated non-residentia	al carbon dioxide savings
	(Tonnes CO ₂ per annum)	(%)
Be lean: savings from energy demand reduction	0.0	0%
Be clean: savings from heat network	0.0	0%
Be green: savings from renewable energy	0.0	0%
Total Cumulative Savings	0.0	0%
Annual savings from off-set payment	0.0	-
	(Tonne	s CO ₃)
Cumulative savings for off-set payment	0	
Cash in-lieu contribution (£)	0	

*carbon price is based on GLA recommended price of £95 per tonne of carbon dioxide unless Local Planning Authority price is inputted in the "Developmen"



	Total regulated emissions (Tonnes CO ₂ / year)	CO ₂ savings (Tonnes CO ₂ / year)	Percentage savings (%)
Part L 2021 baseline	2.3		
Be lean	2.0	0.2	10%
Be clean	2.0	0.0	0%
Be green	1.8	0.2	9%
Total Savings	-	0.4	19%
	-	CO ₂ savings off-set (Tonnes CO ₂)	-
Off-set	-	54.8	

	Target Fabric Energy Efficiency (kWh/m²)	Dwelling Fabric Energy Efficiency (kWh/m²)	Improvement (%)	
Development total	35.63	59.72	-68%	

	Area weighted non-residential cooling demand (MJ/m²)	Total non-residential cooling demand (M.l/rear)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Residential						
Building type	EUI (KWh/m²/year) (excluding renowable energy)	Space heating demand (kWh/m²/year)	4 of the guidance (kWh/m²/year)	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable	(e.g. 'be seen' methodology or	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)

Non-residential

				Space heating		
Building type	EUI (KWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	4 of the guidance (kWh/m²/year)	Space heating demand from Table 4 of the guidance(kWhim ²)year) (excluding renewable appears)	Methodology used (e.g. 'be seen' methodology or an alternative predictive energy modelling methodology)	Explanatory notes (if expected performance differs from the Table 4 values in the guidance)
				A000000		