WEBB YATES ENGINEERS

Sustainability Statement

J5653 9 Northington Street

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Revision: 04
Status: S2

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1. 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 500m^2 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).

Table 4.3 Limiting U-values for existing elements in existing dwellings

Element	U-value[1] W/(m²·K)	
	(a) Threshold	(b) Improved
Roof[2][3][4]	0.35	0.16
Wall – cavity insulation[2][3]	0.70	0.55
Wall – internal or external insulation[2][3]	0.70	0.30
Floor[7][8]	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.

Table 4.2 Limiting U-values for new fabric elements in existing dwellings

Element type	Maximum U-value[1] W/(m²·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[11][12]	2.2
Doors with >60% of internal face glazed[13]	1.4 or Doorset Energy Rating[10] Band C minimum
Other doors[13][14]	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 (CO_2) 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 500m^2 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/m^{2}K]	Average U-Value [W/m^{2}K] 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 Floors	3.30	2.70
New Glazing at rear of LGF	1.40 or Window Energy Rating(10) Band B minimum	1.20

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 m^3/hr/m^2.

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 CO_2 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 (m^2)	Number of Units
Unit 1	97.67	1
Unit 2	78.66	1
Unit 3	89.56	1
Unit 4	111.43	1

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/m^2K)
External Wall	0.30
Roof	0.16
Exposed Floor	0.25

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

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/m^2K)
External Wall	0.30
Roof	0.16
Exposed Floor	0.25

Glazing	U-value (W/m^2K)	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 m^3/hm^2 @ 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 × {[average power consumption during operation × annual hours of operation] + [sleep mode consumption × (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**
					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 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%**

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.

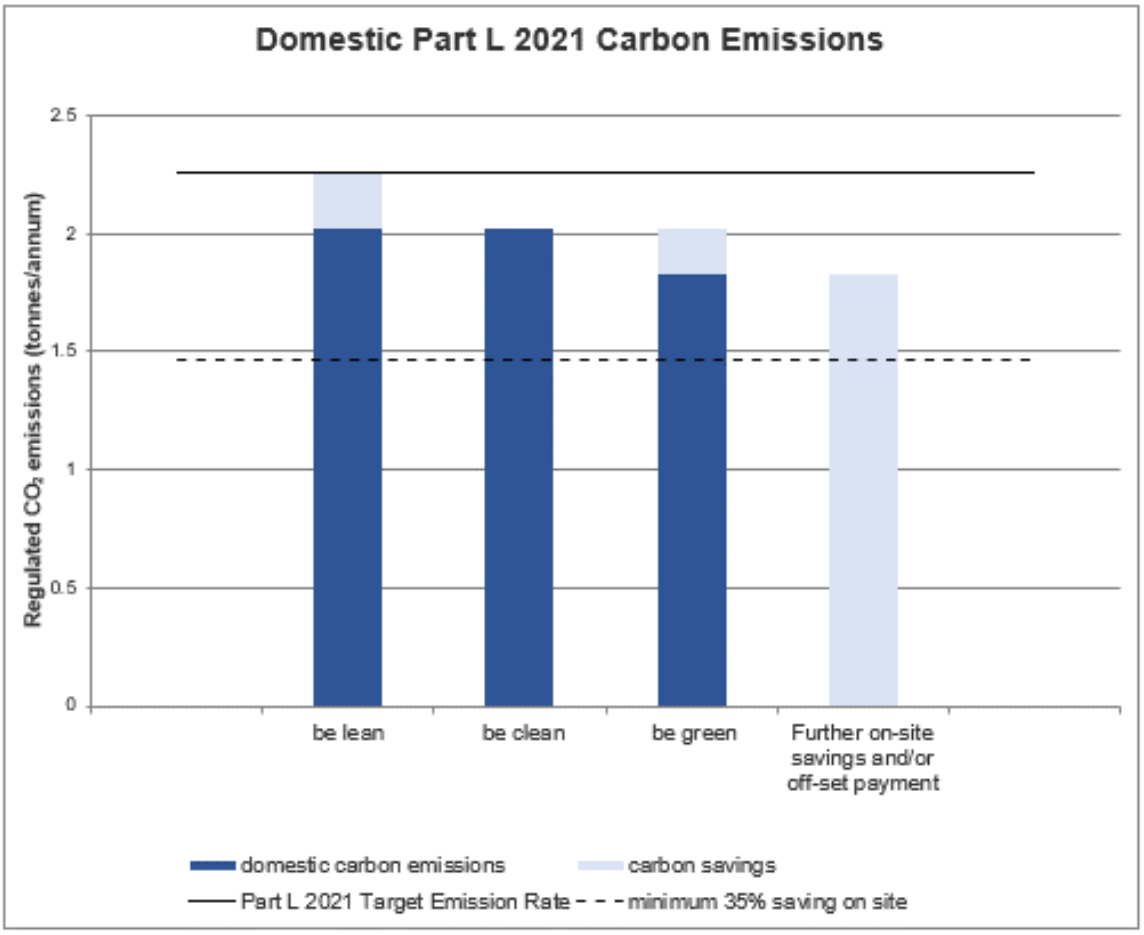
The baseline regulated emissions for the development have been calculated in accordance with Part L of the Building Regulations to be 2.3 tonnes CO_2/year.

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 CO_2 emissions of 10% over the Part L or 0.2 tonnes CO_2/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 CO_2/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 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%**



APPENDIX A – SAP CALCULATIONS

SAP WORKSHEET

Dwelling Reference: J5652
Dwelling Type: New Dwelling Design Stage
WC1N 2JF

1. Overall dwelling dimensions

	Area(m^2)		Av. Height(m)		Volume(m^3)	
Basement	52.29 (1a)	x	2.84	(2a) =	148.5	(3a)
Ground Floor	45.38 (1b)	x	3.26	(2b) =	147.94	(3b)
Total floor area TFA					97.67	(4)
Dwelling volume					296.44	(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 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, ($m^3/h/m^2$)	0	0	(17)
Air permeability value, AP4, ($m^3/h/m^2$)	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	
Monthly average wind speed from Table U2														
	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 Factor														
	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)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	1.12	1.1	1.08	0.97	0.95	0.84	0.84	0.81	0.88	0.95	0.99	1.03	11.55	(22b)

Calculate effective air change rate for the applicable case:

	0	(23a)
	0	(23b)
	0	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR)

0	0	0	0	0	0	0	0	0	0	0	0		(24a)

b) If balanced mechanical ventilation without heat recovery (MV)

0	0	0	0	0	0	0	0	0	0	0	0		(24b)

c) If whole house extract ventilation or positive input ventilation from outside

0	0	0	0	0	0	0	0	0	0	0	0		(24c)

d) If natural ventilation or whole house positive input ventilation from loft

1.12	1.1	1.08	0.97	0.95	0.85	0.85	0.83	0.89	0.95	0.99	1.03		(24d)

Effective air change rate

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)

Effective air change rate from PCDB:

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

ELEMENT	A X U (W/K)	A X k kJ/K	
Doors	3.36		(26)
Windows	20.36		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	13.07	5751.9	(28a)
Exposed floor	0	0	(28b)
Basement wall	5.62	3556.8	(29)
External wall	21.42	13564.1	(29a)
Roof	0	0	(30)
Total area of external elements ∑A, m²		159.3	(31)

Party Wall	0	23700.6	(32)
Party floor		215.6	(32a)
Party ceiling		1361.4	(32b)
Internal wall **		0	(33c)
Internal floor		0	(32d)
Internal ceiling floor		0	(32e)
Fabric heat loss, W/K = ∑ (A x U)		63.83	(33)
Heat capacity Cm = ∑(A x k)		48150.4	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K		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 = ∑(A × U) + ∑(L × Ψ) +∑χ		63.83	(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	101.12	(38)

Heat transfer coefficient, W/K

173.55	171.4	169.25	158.54	156.48	146.9	146.9	145.13	150.59	156.48	160.65	164.94	(39)

Heat loss parameter (HLP), W/m²K

1.78	1.75	1.73	1.62	1.6	1.5	1.5	1.49	1.54	1.6	1.64	1.69	(40)

Number of days in month (Table 1a)

31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N 2.72 (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	(42a)

Hot water usage in litres per day for baths, Vd,bath (from Appendix J)

80.47	79.28	77.6	74.49	72.17	69.59	68.2	69.87	71.69	74.45	77.62	80.2	(42b)

Hot water usage in litres per day for other uses, Vd,other (from Appendix J)

42.45	40.91	39.37	37.82	36.28	34.73	34.73	36.28	37.82	39.37	40.91	42.45	(42c)

Annual average hot water usage in litres per day Vd,average (from Appendix J) 113.21 (43)

Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)

122.93	120.19	116.96	112.31	108.45	104.33	102.94	106.15	109.51	113.81	118.53	122.66	1358.76	(44)

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

194.69	171.15	179.77	153.75	145.99	128.28	124.49	131.44	135.04	154.45	168.86	192.05	1879.95	(45)

Distribution loss (46) = 0.15 x (45)

29.2	25.67	26.96	23.06	21.9	19.24	18.67	19.72	20.26	23.17	25.33	28.81	(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 :

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) × (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 [(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 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 networks)

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 0 0 (61)

Total heat required for water heating calculated for each month (62) = 0.85 × (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 heating)

0 0 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 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 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 0 0 (63d)

Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)

244.73 216.35 229.81 202.19 196.04 0 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)

0 0 0 0 0 0 0 0 0 0 0 0 (64a)

Heat gains from water heating, kWh/month 0.25 x [0.85 × (45) + (61) + (64a)] + 0.8 x [(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

163.01 163.01 163.01 163.01 163.01 163.01 163.01 163.01 163.01 163.01 163.01 163.01 (66)

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

32.27 28.66 23.31 17.65 13.19 11.14 12.03 15.64 20.99 26.66 31.11 33.17 (67)

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

376.87	380.78	370.93	349.95	323.47	298.57	281.95	278.03	287.89	308.87	335.35	360.24	(68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	54.02	(69)

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5

-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	-108.68	(71)

Water heating gains (Table 5)

140.82	138.5	134.15	124.82	119.06	88.04	84.44	87.54	91.16	122.84	131.79	139.64	(72)

Total internal gains

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. Solar gains

Solar gains in watts, calculated for each month

93.14	166.39	251.25	355.78	442.66	459.83	434.78	366.22	286.53	189.96	112.89	78.88	(83)

Total gains – internal and solar (watts)

751.45	822.69	888	956.55	1006.73	965.94	921.55	855.79	794.93	756.68	719.51	720.29	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, 1,m (see Table 9a)

0.99	0.99	0.98	0.96	0.91	0.79	0.64	0.69	0.89	0.97	0.99	1	(86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.88	19.08	19.43	19.99	20.46	20.82	20.94	20.92	20.66	20.1	19.47	18.95	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

19.49	19.5	19.52	19.6	19.61	19.68	19.68	19.7	19.66	19.61	19.58	19.55	(88)

Roof Utilisation factor for gains for rest of dwelling, 2,m (see Table 9a)

0.99	0.99	0.98	0.95	0.87	0.69	0.48	0.54	0.82	0.96	0.99	0.99	(89)

Roof Mean internal temperature in the rest of dwelling T2

17.62	17.83	18.19	18.8	19.24	19.6	19.67	19.68	19.47	18.92	18.28	17.73	(90)

Living area fraction 0.2 (91)

Mean internal temperature (for the whole dwelling)

17.88	18.08	18.44	19.04	19.49	19.85	19.93	19.93	19.71	19.16	18.52	17.98	(92)

Adjusted mean internal temperature:

17.88	18.08	18.44	19.04	19.49	19.85	19.93	19.93	19.71	19.16	18.52	17.98	(93)

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	(94)

Useful gains, mGm , W

743.11	809.32	863.18	899.56	869.61	679.92	471.02	485.48	654.73	718.58	707.06	713.58	(95)

Monthly average external temperature from Table U1

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

2356.71	2259.76	2021.64	1607.94	1218.85	770.92	489.07	512.31	844.71	1338.76	1834.43	2272.91	(97)

Space heating requirement for each month

1200.52	974.7	861.89	510.04	259.84	0	0	0	0	461.41	811.7	1160.14	(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

1200.52	974.7	861.89	510.04	259.84	0	0	0	0	461.41	811.7	1160.14	(98c)

Space heating requirement in kWh/m²/year 63.89 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)

Space cooling requirement for month, whole dwelling, continuous (kWh) (104)

0	0	0	0	0	0	0	0	0	0	0	0	(104)

Cooled fraction 0 (105)

Intermittency factor

0	0	0	0	0	0	0	0	0	0	0	0	(106)

Space cooling requirement for month 0 0 (107)

0	0	0	0	0	0	0	0	0	0	0	0	(107)

Space cooling requirement in kWh/m²/year 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency, 0 0 (109)

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

Fraction of space heat from secondary/supplementary system,								0				0	(201)
Fraction of space heat from main system(s),												1	(202)
Fraction of main heating from main system 2,												0	(203)
Fraction of total space heat from main system 1,												1	(204)
Fraction of total space heat from main system 2,												0	(205)
Efficiency of main space heating system 1 (in %),												264	(206)
Efficiency of main space heating system 2 (in %),												0	(207)
Efficiency of secondary/supplementary heating system, %,												0	(208)
Cooling System Seasonal Energy Efficiency Ratio,								0				0	(209)
Space heating requirement (calculated above),													
0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fuel (main heating system 1), kWh/month								0				0	
454.74	369.2	326.47	193.2	98.42	0	0	0	0	174.78	307.46	439.45		(211)
Space heating fuel (main heating system 2), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(213)
Space heating fuel (secondary), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(215)
Output from water heater),								0				264	(216)
Efficiency of water heater													
264	264	264	264	264	264	264	264	264	264	264	264		(217)
Fuel for water heating													
92.7	81.95	87.05	76.59	74.26	0	0	0	0	77.46	82.31	91.7	664.01	(219)
Space Cooling													
0	0	0	0	0	0	0	0	0	0	0	0		(221)
Annual totals								kWh/year		kWh/year			
Space heating fuel used, main system 1												2363.72	(211)
Space heating fuel used, main system 2												0	(213)
Space heating fuel used, secondary												0	(215)
Water heating fuel used												664.01	(219)
Electricity for instantaneous electric shower(s)												0	(64a)
Space cooling fuel used												0	(221)
Electricity for pumps, fans and electric keep-hot													
Mechanical vent fans - balanced, extract or positive input from outside								0		0		0	(230a)
warm air heating system fans												0	(230b)
Heating circulation pump or water pump within warm air heating unit												0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)												0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)												0	(230e)
Maintaining electric keep-hot facility for gas combi boiler												0	(230f)
Pump for solar water heating												0	(230g)
Pump for storage WWHRS												0	(230h)
Total electricity for the above												0	(231)
Electricity for lighting												227.95	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>	Fuel	kWh/year	
energy saved		0	(236a)
energy used		0	(237a)
Total delivered energy for all uses		3880.35	

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

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
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)				
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>	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 micro-CHP

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 KWh/year	Emission factor kg	Emissions 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)
EI rating		95	(274)

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

	Energy KWh/year	Emission factor kg	Emissionsr 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 LEAN	Plot Reference	J5652
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	5.03 $kgCO_2/m^2$	OK
1b Target primary energy rate and dwelling primary energy		
Target primary energy	*67.06 kWh_{PE}/m^2*	
Dwelling primary energy	53.04 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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.15	2 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: 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 17:44:58

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 GREEN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.15	2 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

SAP WORKSHEET

Dwelling Reference: J5652
Dwelling Type: New Dwelling Design Stage
WC1N 2JF

1. Overall dwelling dimensions

	Area(m^2)		Av. Height(m)		Volume(m^3)	
Basement	40.23 (1a)	x	2.84	(2a) =	114.25	(3a)
Ground Floor	38.43 (1b)	x	3.26	(2b) =	125.28	(3b)
Total floor area TFA					78.66	(4)
Dwelling volume					239.53	(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	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		
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, ($m^3/h/m^2$)	0	0	(17)
Air permeability value, AP4, ($m^3/h/m^2$)	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)

Infiltration rate modified for monthly wind speed

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Monthly average wind speed from Table U2														
	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 Factor														
	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)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	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)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house extract ventilation or positive input ventilation from outside														
	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation or whole house positive input ventilation 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)
Effective air change 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)
Effective air change rate from PCDB:														
	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		(26)
Windows	22.99		(27)
Roof window	0		(27a)
Basement floor	0	0	(28)
Ground floor	10.06	4425.3	(28a)
Exposed floor	0	0	(28b)
Basement wall	16.25	10290.4	(29)
External wall	11.6	7349.2	(29a)
Roof	0	0	(30)
Total area of external elements ∑A, m²		148.36	(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 = ∑ (A x U)		60.9	(33)
Heat capacity Cm = ∑(A x k)		35343.2	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K		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 = ∑(A × U) + ∑(L × Ψ) +∑χ		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	(39)

Heat loss parameter (HLP), W/m²K

1.89	1.87	1.85	1.74	1.72	1.62	1.62	1.6	1.66	1.72	1.76	1.8	(40)

Number of days in month (Table 1a)

31	28	31	30	31	30	31	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)

0	0	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)

114.63	112.07	109.06	104.73	101.12	97.28	95.98	98.98	102.12	106.13	110.52	114.37	1267 (44)

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

181.54	159.59	167.63	143.37	136.13	119.62	116.08	122.56	125.92	144.02	157.46	179.08	1753 (45)

Distribution loss (46) = 0.15 x (45)

27.23	23.94	25.14	21.51	20.42	17.94	17.41	18.38	18.89	21.6	23.62	26.86	(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 :

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) × (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 [(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 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 networks)

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 0 0 (61)

Total heat required for water heating calculated for each month (62) = 0.85 × (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 heating)

0 0 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 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 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 0 0 (63d)

Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)

231.59 204.79 217.67 191.8 186.18 0 0 0 0 194.06 205.89 229.13 1661.11 (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 x [0.85 × (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]

100.4 89.23 95.77 86.42 85.3 60.51 60.03 62.18 62.61 87.92 91.1 99.58 (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

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

323.31	326.66	318.21	300.21	277.49	256.14	241.87	238.52	246.97	264.97	287.69	309.04	(68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	52.06	(69)

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5

-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	-97.48	(71)

Water heating gains (Table 5)

134.94	132.78	128.73	120.02	114.65	84.04	80.68	83.57	86.95	118.18	126.53	133.85	(72)

Total internal gains

585.59	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 gains

Solar gains in watts, calculated for each month

132.27	231.77	336.78	454.37	545.75	558.8	531.61	460.31	376.74	261.21	159.55	112.51	(83)

Total gains – internal and solar (watts)

717.86	815.58	903.69	989.91	1049.54	1008.93	964.86	896.06	828.72	767.08	700.15	683.47	(84)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, ⍰1,m (see Table 9a)

0.99	0.98	0.97	0.93	0.85	0.7	0.55	0.6	0.82	0.95	0.98	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.87	19.11	19.51	20.1	20.55	20.87	20.96	20.95	20.73	20.16	19.48	18.92	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

19.41	19.42	19.44	19.51	19.53	19.6	19.6	19.61	19.57	19.53	19.5	19.47	(88)

Roof Utilisation factor for gains for rest of dwelling, ⍰2,m (see Table 9a)

0.99	0.98	0.96	0.91	0.79	0.59	0.39	0.44	0.73	0.92	0.98	0.99	(89)

Roof Mean internal temperature in the rest of dwelling T2

17.56	17.81	18.21	18.83	19.25	19.54	19.59	19.6	19.43	18.91	18.23	17.65	(90)

Living area fraction 0.2 (91)

Mean internal temperature (for the whole dwelling)

17.82	18.07	18.47	19.08	19.5	19.8	19.86	19.86	19.69	19.16	18.48	17.9	(92)

Adjusted mean internal temperature:

17.82	18.07	18.47	19.08	19.5	19.8	19.86	19.86	19.69	19.16	18.48	17.9	(93)

8. Space heating requirement

Utilisation factor for gains,

0.98	0.97	0.95	0.9	0.79	0.61	0.42	0.47	0.74	0.91	0.97	0.98	(94)

Useful gains, mGm , W

704.49	791.71	857.54	886.89	827.89	611.54	406.34	422.68	611.48	700.77	679.18	672.73	(95)

Monthly average external temperature from Table U1

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

2010.57	1935.79	1738.85	1392.2	1054.34	663.43	415.7	436.81	729.02	1156.4	1575.05	1943.77	(97)

Space heating requirement for each month

971.72	768.82	655.7	363.82	168.48	0	0	0	0	338.99	645.03	945.65	(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

971.72	768.82	655.7	363.82	168.48	0	0	0	0	338.99	645.03	945.65	(98c)

Space heating requirement in kWh/m²/year 61.76 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)

Space cooling requirement for month, whole dwelling, continuous (kWh) (104)

0	0	0	0	0	0	0	0	0	0	0	0	(104)

Cooled fraction 0 (105)

Intermittency factor

0	0	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	(107)

Space cooling requirement in kWh/m²/year 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency, 0 0 (109)

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

Fraction of space heat from secondary/supplementary system,								0				0	(201)
Fraction of space heat from main system(s),												1	(202)
Fraction of main heating from main system 2,												0	(203)
Fraction of total space heat from main system 1,												1	(204)
Fraction of total space heat from main system 2,												0	(205)
Efficiency of main space heating system 1 (in %),												264	(206)
Efficiency of main space heating system 2 (in %),												0	(207)
Efficiency of secondary/supplementary heating system, %,												0	(208)
Cooling System Seasonal Energy Efficiency Ratio,								0				0	(209)
Space heating requirement (calculated above),													
0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fuel (main heating system 1), kWh/month								0				0	
368.08	291.22	248.37	137.81	63.82	0	0	0	0	128.41	244.33	358.2		(211)
Space heating fuel (main heating system 2), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(213)
Space heating fuel (secondary), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(215)
Output from water heater),								0				264	(216)
Efficiency of water heater													
264	264	264	264	264	264	264	264	264	264	264	264		(217)
Fuel for water heating													
87.72	77.57	82.45	72.65	70.52	0	0	0	0	73.51	77.99	86.79	629.21	(219)
Space Cooling													
0	0	0	0	0	0	0	0	0	0	0	0		(221)
Annual totals								kWh/year		kWh/year			
Space heating fuel used, main system 1												1840.23	(211)
Space heating fuel used, main system 2												0	(213)
Space heating fuel used, secondary												0	(215)
Water heating fuel used												629.21	(219)
Electricity for instantaneous electric shower(s)												0	(64a)
Space cooling fuel used												0	(221)
Electricity for pumps, fans and electric keep-hot													
Mechanical vent fans - balanced, extract or positive input from outside								0		0		0	(230a)
warm air heating system fans												0	(230b)
Heating circulation pump or water pump within warm air heating unit												0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)												0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)												0	(230e)
Maintaining electric keep-hot facility for gas combi boiler												0	(230f)
Pump for solar water heating												0	(230g)
Pump for storage WWHRS												0	(230h)
Total electricity for the above												0	(231)
Electricity for lighting												187.46	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>	Fuel	kWh/year		
energy saved			0	(236a)
energy used			0	(237a)
Total delivered energy for all uses			3246.49	

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

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
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>	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 micro-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 KWh/year	Emission factor kg	Emissions 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)			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)
EI rating		95	(274)

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

	Energy KWh/year	Emission factor kg	Emissionsr 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 LEAN	Plot Reference	J5652
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 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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.38	1 (2.7)	FAIL
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^2K]**
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^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: 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 GREEN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.38	1 (2.7)	FAIL
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^2K]**
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^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

SAP WORKSHEET

Dwelling Reference: J5652
Dwelling Type: New Dwelling Design Stage
WC1N 2JF

1. Overall dwelling dimensions

	Area(m^2)		Av. Height(m)		Volume(m^3)	
Ground Floor	89.56 (1a)	x	3.68	(2a) =	329.58	(3a)
Total floor area TFA					89.56	(4)
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 changes 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	0	0	(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	0.92	0.92	(16)
Air permeability value, AP50, ($m^3/h/m^2$)	0	0	(17)
Air permeability value, AP4, ($m^3/h/m^2$)	0	0	(17a)
Air permeability value)	0.92	0.92	(18)
Number of sides on which dwelling is sheltered	2	2	(19)
Shelter factor		0.85	(20)
Infiltration rate incorporating shelter factor		0.78	(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 speed from Table U2

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 Factor

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)

Adjusted infiltration rate (allowing for shelter and wind speed)

1	0.98	0.96	0.86	0.84	0.74	0.74	0.72	0.78	0.84	0.88	0.92	10.28	(22b)

Calculate effective air change rate for the applicable case:

0	(23a)
0	(23b)
0	(23c)

a) If balanced mechanical ventilation with heat recovery (MVHR)

0	0	0	0	0	0	0	0	0	0	0	0		(24a)

b) If balanced mechanical ventilation without heat recovery (MV)

0	0	0	0	0	0	0	0	0	0	0	0		(24b)

c) If whole house extract ventilation or positive input ventilation from outside

0	0	0	0	0	0	0	0	0	0	0	0		(24c)

d) If natural ventilation or whole house positive input ventilation from loft

1	0.98	0.96	0.87	0.85	0.78	0.78	0.76	0.81	0.85	0.89	0.92		(24d)

Effective air change rate

1	0.98	0.96	0.87	0.85	0.78	0.78	0.76	0.81	0.85	0.89	0.92		(25)

Effective air change rate from PCDB:

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	A X U (W/K)	A X k kJ/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 = ∑ (A x U)	58.66	(33)
Heat capacity Cm = ∑(A x k)	43121.6	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K	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 = ∑(A × U) + ∑(L × Ψ) +∑χ	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	(38)

Heat transfer coefficient, W/K

167.27	165.16	163.1	153.4	151.59	143.15	143.15	141.58	146.4	151.59	155.26	159.09	(39)

Heat loss parameter (HLP), W/m²K

1.87	1.84	1.82	1.71	1.69	1.6	1.6	1.58	1.63	1.69	1.73	1.78	(40)

Number of days in month (Table 1a)

31	28	31	30	31	30	31	31	30	31	30	31	(41)

4. Water heating energy requirement

Assumed occupancy, N 2.62 (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	(42a)

Hot water usage in litres per day for baths, Vd,bath (from Appendix J)

78.59	77.42	75.78	72.74	70.48	67.96	66.6	68.23	70.01	72.7	75.79	78.32	(42b)

Hot water usage in litres per day for other uses, Vd,other (from Appendix J)

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	1326.89 (44)

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

190.12	167.13	175.55	150.15	142.57	125.27	121.57	128.35	131.87	150.82	164.9	187.54	1835.85 (45)

Distribution loss (46) = 0.15 x (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 :		
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) × (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 [(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	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 networks)

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	0	0	(61)

Total heat required for water heating calculated for each month (62) = 0.85 × (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	2333.56	(62)

CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)

0	0	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	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	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	0	0	(63d)

Output from water heater for each month, kWh/month (64) = (62) + (63a) + (63b) + (63c) + (63d)

240.17	212.34	225.6	198.58	192.61	0	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)

0	0	0	0	0	0	0	0	0	0	0	0	(64a)

Heat gains from water heating, kWh/month 0.25 x [0.85 × (45) + (61) + (64a)] + 0.8 x [(46) + (57) + (59)]

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)

Metabolic gains (Table 5), watts

157.18	157.18	157.18	157.18	157.18	157.18	157.18	157.18	157.18	157.18	157.18	157.18	(66)

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

29.19	25.93	21.08	15.96	11.93	10.07	10.88	14.15	18.99	24.11	28.14	30	(67)

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

355.62	359.31	350.01	330.21	305.22	281.74	266.05	262.36	271.66	291.45	316.44	339.93	(68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	53.34	(69)

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5

-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	-104.79	(71)

Water heating gains (Table 5)

138.78	136.51	132.27	123.15	117.53	86.65	83.13	86.16	89.7	121.22	129.97	137.63	(72)

Total internal gains

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. Solar gains

Solar gains in watts, calculated for each month

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 gains – internal and solar (watts)

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. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, 1,m (see Table 9a)

0.99	0.99	0.97	0.93	0.83	0.66	0.51	0.57	0.81	0.95	0.99	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.86	19.12	19.54	20.16	20.61	20.9	20.97	20.96	20.75	20.17	19.48	18.92	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

19.42	19.44	19.46	19.53	19.55	19.61	19.61	19.63	19.59	19.55	19.52	19.49	(88)

Roof Utilisation factor for gains for rest of dwelling, 2,m (see Table 9a)

0.99	0.98	0.96	0.9	0.76	0.54	0.36	0.42	0.72	0.93	0.98	0.99	(89)

Roof Mean internal temperature in the rest of dwelling T2

17.56	17.83	18.25	18.9	19.31	19.57	19.61	19.62	19.46	18.93	18.24	17.66	(90)

Living area fraction 0.3 (91)

Mean internal temperature (for the whole dwelling)

17.96	18.22	18.64	19.28	19.71	19.98	20.02	20.02	19.85	19.31	18.62	18.05	(92)

Adjusted mean internal temperature:

17.96	18.22	18.64	19.28	19.71	19.98	20.02	20.02	19.85	19.31	18.62	18.05	(93)

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	(94)

Useful gains, mGm , W

769.68	877.51	973.75	1037.83	981.47	720.46	480.83	498.22	708.84	787.08	745.8	732.82	(95)

Monthly average external temperature from Table U1

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

2284.69	2199.72	1980.13	1592.15	1213.51	769.52	490.01	513.19	842.21	1319.98	1788.46	2202.83	(97)

Space heating requirement for each month

1127.17	888.53	748.74	399.11	172.63	0	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

1127.17	888.53	748.74	399.11	172.63	0	0	0	0	396.48	750.71	1093.69	(98c)

Space heating requirement in kWh/m²/year 62.27 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)

Space cooling requirement for month, whole dwelling, continuous (kWh) (104)

0	0	0	0	0	0	0	0	0	0	0	0	(104)

Cooled fraction 0 (105)

Intermittency factor

0	0	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	(107)

Space cooling requirement in kWh/m²/year 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency, 0 0 (109)

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

Fraction of space heat from secondary/supplementary system,								0				0	(201)
Fraction of space heat from main system(s),												1	(202)
Fraction of main heating from main system 2,												0	(203)
Fraction of total space heat from main system 1,												1	(204)
Fraction of total space heat from main system 2,												0	(205)
Efficiency of main space heating system 1 (in %),												264	(206)
Efficiency of main space heating system 2 (in %),												0	(207)
Efficiency of secondary/supplementary heating system, %,												0	(208)
Cooling System Seasonal Energy Efficiency Ratio,								0				0	(209)
Space heating requirement (calculated above),													
0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fuel (main heating system 1), kWh/month								0				0	
426.96	336.56	283.62	151.18	65.39	0	0	0	0	150.18	284.36	414.28		(211)
Space heating fuel (main heating system 2), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(213)
Space heating fuel (secondary), kWh/month								0				0	
0	0	0	0	0	0	0	0	0	0	0	0		(215)
Output from water heater),								0				264	(216)
Efficiency of water heater													
264	264	264	264	264	264	264	264	264	264	264	264		(217)
Fuel for water heating													
90.97	80.43	85.45	75.22	72.96	0	0	0	0	76.09	80.81	90	651.92	(219)
Space Cooling													
0	0	0	0	0	0	0	0	0	0	0	0		(221)
Annual totals								kWh/year		kWh/year			
Space heating fuel used, main system 1												2112.52	(211)
Space heating fuel used, main system 2												0	(213)
Space heating fuel used, secondary												0	(215)
Water heating fuel used												651.92	(219)
Electricity for instantaneous electric shower(s)												0	(64a)
Space cooling fuel used												0	(221)
Electricity for pumps, fans and electric keep-hot													
Mechanical vent fans - balanced, extract or positive input from outside								0		0		0	(230a)
warm air heating system fans												0	(230b)
Heating circulation pump or water pump within warm air heating unit												0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)												0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)												0	(230e)
Maintaining electric keep-hot facility for gas combi boiler												0	(230f)
Pump for solar water heating												0	(230g)
Pump for storage WWHRS												0	(230h)
Total electricity for the above												0	(231)
Electricity for lighting												206.2	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>	Fuel	kWh/year		
energy saved			0	(236a)
energy used			0	(237a)
Total delivered energy for all uses			3583.12	

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

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
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>	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 micro-CHP

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 KWh/year	Emission factor kg	Emissions kg CO2/year	
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)
EI rating		95	(274)

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

	Energy KWh/year	Emission factor kg	Emissionsr 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 LEAN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.7	1 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: 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 GREEN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.7	1 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: Date:
b. Client Declaration	
N/A	

SAP WORKSHEET

Dwelling Reference: J5652
Dwelling Type: New Dwelling Design Stage
WC1N 2JF

1. Overall dwelling dimensions

	Area(m^2)		Av. Height(m)		Volume(m^3)	
Ground Floor	106.37(1a)	x	2.72	(2a) =	289.33	(3a)
First Floor	5.06 (1b)	x	3.68	(2b) =	18.62	(3b)
Total floor area TFA					111.43	(4)
Dwelling volume					307.95	(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 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, ($m^3/h/m^2$)	0	0	(17)
Air permeability value, AP4, ($m^3/h/m^2$)	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

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total	
Monthly average wind speed from Table U2														
	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 Factor														
	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)
Adjusted infiltration rate (allowing for shelter and wind speed)														
	1.21	1.19	1.17	1.05	1.02	0.91	0.91	0.88	0.95	1.02	1.07	1.12	12.5	(22b)
Calculate effective air change rate for the applicable case:														
													0	(23a)
													0	(23b)
													0	(23c)
a) If balanced mechanical ventilation with heat recovery (MVHR)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24a)
b) If balanced mechanical ventilation without heat recovery (MV)														
	0	0	0	0	0	0	0	0	0	0	0	0		(24b)
c) If whole house extract ventilation or positive input ventilation from outside														
	0	0	0	0	0	0	0	0	0	0	0	0		(24c)
d) If natural ventilation or whole house positive input ventilation from loft														
	1.21	1.19	1.17	1.05	1.02	0.91	0.91	0.89	0.95	1.02	1.07	1.12		(24d)
Effective air change rate														
	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)
Effective air change rate from PCDB:														
	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 = ∑ (A x U)		87.73	(33)
Heat capacity Cm = ∑(A x k)		34531.43	(34)
Thermal mass parameter (TMP = Cm ÷ TFA) in kJ/m²K		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 = ∑(A × U) + ∑(L × Ψ) +∑χ		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	104.07	108.91	113.75	(38)

Heat transfer coefficient, W/K

211.17	208.75	206.33	194.22	191.8	180.16	180.16	178	184.66	191.8	196.64	201.48	(39)

Heat loss parameter (HLP), W/m²K

1.9	1.87	1.85	1.74	1.72	1.62	1.62	1.6	1.66	1.72	1.76	1.81	(40)

Number of days in month (Table 1a)

31	28	31	30	31	30	31	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	(42a)

Hot water usage in litres per day for baths, Vd,bath (from Appendix J)

82.54	81.31	79.58	76.4	74.02	71.38	69.95	71.66	73.53	76.36	79.6	82.26	(42b)

Hot water usage in litres per day for other uses, Vd,other (from Appendix J)

43.54	41.96	40.38	38.79	37.21	35.63	35.63	37.21	38.79	40.38	41.96	43.54	(42c)

Annual average hot water usage in litres per day Vd,average (from Appendix J) 116.11 (43)

Hot water usage in litres per day for each month Vd,m = (42a) + (42b) + (42c)

126.08	123.27	119.96	115.19	111.23	107	105.57	108.87	112.32	116.73	121.56	125.8	1393.59	(44)

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

199.68	175.53	184.37	157.69	149.73	131.57	127.68	134.81	138.5	158.4	173.19	196.97	1928.13	(45)

Distribution loss (46) = 0.15 x (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	(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 :

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) × (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 [(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 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 networks)

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 0 0 (61)

Total heat required for water heating calculated for each month (62) = 0.85 × (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 (62)

CWWHRS DHW input calculated using Appendix G (negative quantity) (enter 0 if no WWHRS contribution to water heating)

0 0 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 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 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 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 (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 x [0.85 × (45) + (61) + (64a)] + 0.8 x [(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

169.39 169.39 169.39 169.39 169.39 169.39 169.39 169.39 169.39 169.39 169.39 169.39 (66)

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

35.56 31.58 25.69 19.45 14.54 12.27 13.26 17.24 23.13 29.37 34.28 36.55 (67)

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

408.35	412.59	401.91	379.18	350.48	323.51	305.49	301.26	311.93	334.67	363.36	390.33	(68)

Cooking gains (calculated in Appendix L, equation L18 or L18a), also see Table 5

54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	54.76	(69)

Pumps and fans gains (Table 5a)

0	0	0	0	0	0	0	0	0	0	0	0	(70)

Losses e.g. evaporation (negative values) (Table 5

-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	-112.93	(71)

Water heating gains (Table 5)

143.05	140.67	136.21	126.64	120.73	89.56	85.86	89.05	92.76	124.61	133.79	141.84	(72)

Total internal gains

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. Solar gains

Solar gains in watts, calculated for each month

221.65	390	571.56	779.71	944.37	970.31	921.73	792.87	642.16	440.8	267.63	188.36	(83)

Total gains – internal and solar (watts)

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)

7. Mean internal temperature (heating season)

Temperature during heating periods in the living area from Table 9, Th1 (°C) 21 (85)

Utilisation factor for gains for living area, 1,m (see Table 9a)

0.99	0.99	0.97	0.93	0.84	0.68	0.53	0.58	0.82	0.95	0.99	0.99	(86)

Mean internal temperature in living area T1 (follow steps 3 and 4 in Table 9c)

18.79	19.05	19.48	20.1	20.57	20.88	20.97	20.95	20.73	20.13	19.41	18.83	(87)

Temperature during heating periods in rest of dwelling from Table 9, Th2 (°C)

19.4	19.42	19.43	19.51	19.53	19.6	19.6	19.62	19.57	19.53	19.49	19.46	(88)

Roof Utilisation factor for gains for rest of dwelling, 2,m (see Table 9a)

0.99	0.98	0.96	0.9	0.78	0.56	0.37	0.43	0.73	0.93	0.98	0.99	(89)

Roof Mean internal temperature in the rest of dwelling T2

17.47	17.75	18.18	18.83	19.26	19.55	19.59	19.6	19.44	18.88	18.16	17.56	(90)

Living area fraction 0.25 (91)

Mean internal temperature (for the whole dwelling)

17.8	18.07	18.5	19.15	19.59	19.88	19.94	19.94	19.76	19.19	18.47	17.88	(92)

Adjusted mean internal temperature:

17.8	18.07	18.5	19.15	19.59	19.88	19.94	19.94	19.76	19.19	18.47	17.88	(93)

8. Space heating requirement

Utilisation factor for gains,

0.99	0.98	0.95	0.9	0.78	0.59	0.41	0.47	0.74	0.92	0.98	0.99	(94)

Useful gains, mGm , W

907.07	1059.52	1187.93	1268.17	1201.25	885.39	588.77	610.68	874.55	961.05	889.17	858.52	(95)

Monthly average external temperature from Table U1

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

2850.88	2749.99	2476.79	1990.6	1512.81	951.98	600.98	629.99	1044.97	1647.4	2236.16	2756.07	(97)

Space heating requirement for each month

1446.2	1136	958.91	520.15	231.8	0	0	0	0	510.64	969.83	1411.78	(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

1446.2	1136	958.91	520.15	231.8	0	0	0	0	510.64	969.83	1411.78	(98c)

Space heating requirement in kWh/m²/year 64.48 (99)

8c. Space Cooling requirement

Heat loss rate,

0	0	0	0	0	0	0	0	0	0	0	0	(100)

Utilisation factor for loss

0	0	0	0	0	0	0	0	0	0	0	0	(101)

Useful loss, mLm (watts)

0	0	0	0	0	0	0	0	0	0	0	0	(102)

Gains

0	0	0	0	0	0	0	0	0	0	0	0	(103)

Space cooling requirement for month, whole dwelling, continuous (kWh) (104)

0	0	0	0	0	0	0	0	0	0	0	0	(104)

Cooled fraction 0 (105)

Intermittency factor

0	0	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	(107)

Space cooling requirement in kWh/m²/year 0 (108)

8f. Space heating requirement

Fabric Energy Efficiency, 0 0 (109)

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

Fraction of space heat from secondary/supplementary system,							0					0	(201)
Fraction of space heat from main system(s),												1	(202)
Fraction of main heating from main system 2,												0	(203)
Fraction of total space heat from main system 1,												1	(204)
Fraction of total space heat from main system 2,												0	(205)
Efficiency of main space heating system 1 (in %),												264	(206)
Efficiency of main space heating system 2 (in %),												0	(207)
Efficiency of secondary/supplementary heating system, %,												0	(208)
Cooling System Seasonal Energy Efficiency Ratio,							0					0	(209)
Space heating requirement (calculated above),													
0	0	0	0	0	0	0	0	0	0	0	0		(210)
Space heating fuel (main heating system 1), kWh/month							0					0	
547.8	430.3	363.23	197.03	87.8	0	0	0	0	193.43	367.36	534.76		(211)
Space heating fuel (main heating system 2), kWh/month							0					0	
0	0	0	0	0	0	0	0	0	0	0	0		(213)
Space heating fuel (secondary), kWh/month							0					0	
0	0	0	0	0	0	0	0	0	0	0	0		(215)
Output from water heater),							0					264	(216)
Efficiency of water heater													
264	264	264	264	264	264	264	264	264	264	264	264		(217)
Fuel for water heating													
94.59	83.61	88.8	78.08	75.67	0	0	0	0	78.96	83.95	93.57	677.22	(219)
Space Cooling													
0	0	0	0	0	0	0	0	0	0	0	0		(221)
Annual totals								kWh/year		kWh/year			
Space heating fuel used, main system 1												2721.71	(211)
Space heating fuel used, main system 2												0	(213)
Space heating fuel used, secondary												0	(215)
Water heating fuel used												677.22	(219)
Electricity for instantaneous electric shower(s)												0	(64a)
Space cooling fuel used												0	(221)
Electricity for pumps, fans and electric keep-hot													
Mechanical vent fans - balanced, extract or positive input from outside							0		0			0	(230a)
warm air heating system fans												0	(230b)
Heating circulation pump or water pump within warm air heating unit												0	(230c)
Oil boiler auxiliary (oil pump, flue fan, etc; excludes circulation pump)												0	(230d)
Gas boiler auxiliary (flue fan, etc; excludes circulation pump)												0	(230e)
Maintaining electric keep-hot facility for gas combi boiler												0	(230f)
Pump for solar water heating												0	(230g)
Pump for storage WWHRS												0	(230h)
Total electricity for the above												0	(231)
Electricity for lighting												251.2	(232)

Energy saving/generation technologies (Appendices M, N) - Energy used in dwelling

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233a)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234a)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235a)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235c)

Energy saving/generation technologies (Appendices M, N) - Energy exported

Electricity generated by PVs (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(233b)

Electricity generated by wind turbines (Appendix M) (negative quantity)

0	0	0	0	0	0	0	0	0	0	0	0	0	(234b)

Electricity generated by hydro-electric generators

0	0	0	0	0	0	0	0	0	0	0	0	0	(235b)

Electricity used or net electricity generated by micro-CHP

0	0	0	0	0	0	0	0	0	0	0	0	0	(235d)

Appendix Q items: annual energy

Appendix Q, <item 1 description>	Fuel	kWh/year		
energy saved			0	(236a)
energy used			0	(237a)
Total delivered energy for all uses			4288.1	

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

Fuel required	kWh/year	Fuel price	Fuel cost £/year	
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)				
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>	Fuel	kWh/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)

11a. SAP rating – Individual heating systems including micro-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 KWh/year	Emission factor kg	Emissions 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)
EI rating		95	(274)

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

	Energy KWh/year	Emission factor kg	Emissionsr 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 LEAN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.7	1 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: 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 GREEN	Plot Reference	J5652
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/m^2K]***	**Dwelling average U-Value [W/m^2K]**	**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, and roof windows	*1.6*	2.7	1 (2.7)	FAIL
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^2K]**
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 [m^2]**	**Orientation**	**Frame factor**	**U-Value [W/m^2K]**
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/m^2K) 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 m^3/hm^2, Design value	OK
Air permeability test certificate reference	Not Provided	

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		
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 efficiency	*N/A*	
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: Name:	Assessor ID: 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.

RESIDENTIAL CO_2 ANALYSIS (PART L1)

				Baseline		'Be Lean'	'Be Clean'	'Be Green'	Fabric Energy Efficiency (FEE)		Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Unit identifier (e.g. plot number, dwelling type etc.)	Model total floor area	Number of units	Total area represented by model	TER	Energy saving/generation technologies (-)	DER	DER	DER	Target Fabric Energy Efficiency	Dwelling Fabric Energy Efficiency	Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2) (Row 4)		(m^2)	($kgCO_2$ / m^2) (Row 273)	($kgCO_2$ p.a.) (Row 269)	($kgCO_2$ / m^2) (Row 273 or 384)	($kgCO_2$ / m^2) (Row 273 or 384)	($kgCO_2$ / m^2) (Row 273 or 384)	(kWh/m²)	(kWh/m²)	($kgCO_2$ 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.)	($kgCO_2$ p.a.)
Unit 1	*97.67*	*1*	*97.67*	**5.98**	**0.00**	**5.03**	**5.03**	**4.55**	34.10	54.10	**584**	**0**	**491**	**491**	**93**	**491**	**491**	**0**	**444**	**47**
Unit 2	*78.66*	*1*	*78.66*	**6.20**	**0.00**	**5.46**	**5.46**	**4.94**	34.10	57.40	**488**	**0**	**429**	**429**	**58**	**429**	**429**	**0**	**389**	**41**
Unit 3	*89.56*	*1*	*89.56*	**6.03**	**0.00**	**5.69**	**5.69**	**5.14**	38.30	63.70	**540**	**0**	**510**	**510**	**30**	**510**	**510**	**0**	**460**	**49**
Unit 4	*111.43*	*1*	*111.43*	**5.82**	**0.00**	**5.32**	**5.32**	**4.80**	35.90	63.10	**649**	**0**	**593**	**593**	**56**	**593**	**593**	**0**	**535**	**58**
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*

NON-RESIDENTIAL CO_2 ANALYSIS (PART L2)

				Baseline		'Be Lean'	'Be Clean'	'Be Green'			Baseline		'Be Lean'			'Be Clean'			'Be Green'	
Building Use	Model Area	Number of units	Total area represented by model	BRUKL TER	BRUKL Displaced electricity (-)	BRUKL BER	BRUKL BER	BRUKL BER			Part L 2021 CO_2 emissions	Energy saving/generation technologies	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Lean' savings	Part L 2021 CO_2 emissions	Part L 2021 CO_2 emissions with Notional PV savings included	'Be Clean' savings	Part L 2021 CO_2 emissions	'Be Green' savings
	(m^2)		(m^2)	($kgCO_2$ / m^2)	(kWh / m^2)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)	($kgCO_2$ / m^2)			($kgCO_2$ 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.)	($kgCO_2$ 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*
SITE-WIDE ENERGY CONSUMPTION AND CO_2 ANALYSIS																				
Total Sum			377	-	-	-	-	-			*2,260*	*0*	*2,023*	*2,023*	*237*	*2,023*	*2,023*	*0*	*1,828*	*195*

Part L 2021 Performance

Residential

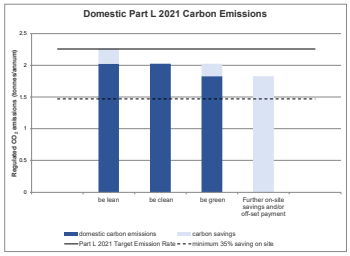
Table 1: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for residential building

	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 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	-
	(Tonnes CO_2)	
Cumulative savings for off-set payment	**55**	-
Cash in-lieu contribution (£)	**5,210**	

*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



Non-residential

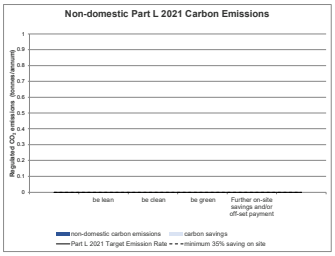
Table 3: Carbon Dioxide Emissions after each stage of the Energy Hierarchy for non-residential building

	Carbon Dioxide Emissions for non-residential buildings (Tonnes CO_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	

Table 4: Regulated Carbon Dioxide savings from each stage of the Energy Hierarchy for non-residential buildin

	Regulated non-residential 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	-
	(Tonnes CO_2)	
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



SITE-WIDE

	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 (MJ/year)
Actual		
Notional		

EUI & space heating demand (predicted energy use)

Residential

Building type	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable energy)	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)

Non-residential

Building type	EUI (kWh/m²/year) (excluding renewable energy)	Space heating demand (kWh/m²/year) (excluding renewable energy)	EUI value from Table 4 of the guidance (kWh/m²/year) (excluding renewable energy)	Space heating demand from Table 4 of the guidance(kWh/m²/year) (excluding renewable energy)	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)