JMDC SERVICES LTD

DESIGN CONSULTANCY | BUILDING COMPLIANCE | BUILDING SIMULATION

ENERGY & SUSTAINABILITY STATEMENT

Proposed 15 bed HMO
(Sui Generis)
Rear of 110-112 East St
Bedminster
Bristol
BS3 4EY

For:

Paragon Developments

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ISSUE SHEET

Report Title:	Energy & Sustainability Statement		
Completed For:	Paragon Developments		
Date of First Issue:	18.02.2025		
Revision:	A	Date:	14.11.2025
Completed By:	Jemma McLaughlan	Signed:	

[1] Bristol Development Framework Core Strategy. Adopted June 2011

[2] Bristol Climate Change and Sustainability Practice Note. July 2020

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APPENDICES:

[1] Bristol Development Framework Core Strategy. Adopted June 2011

[2] Bristol Climate Change and Sustainability Practice Note. July 2020

1. EXECUTIVE SUMMARY

This Energy & Sustainability Statement has been prepared to support the Planning Application for the proposed new 15 Bedroom HMO at the rear of 110-112 East St, Bedminster, Bristol.

The report will address the requirements of policies BCS13-BCS16 of the Bristol City Council Core Strategy[1], which relate to Climate Change, Sustainable Energy, Sustainable Design and Construction and Flood Risk and Water Management.

The calculations and methodology used within this assessment and report structure, are in accordance with the Policy Guidance and the Bristol Climate Change and Sustainability Practice Note[2].

In order to establish predicted figures for the development, and to accurately assess the most feasible solution for the Energy & CO^2 Reduction Strategy, the building has been modelled using Design Builder SBEM, a government approved software for the national calculation methodology for buildings other than dwellings.

In accordance with the Energy Hierarchy, a baseline has been established, which is the Target Emission Rate (TER), calculated for the building based on the Part L2 2021 compliant specification, minus savings from notional PV.

After establishing this baseline, the saving in emissions from energy efficiency measures alone can then be calculated, before calculating the saving from the renewable or LZC technologies.

MVHR has been included, and in accordance with the Heat Hierarchy, the Heating & Hot Water will be provided via ASHP. PV is also proposed to supplement the ASHP and reduce electricity demand.

SITEWIDE ENERGY & CO2 SUMMARY

	ENERGY demand (kWh pa)	**CO2 Emissions** (kgCO2 p.a.)	**CO2 Reduction** (kgCO2 p.a.)	**CO2 Reduction** (%)
Target Emissions (2021) Part L (2021) Target	15262.1	2191		
BASELINE Part L (2021) Target (excluding notional PV)	15310.7	2143		
BE LEAN After Efficiency Measures	13658.6	1973	170.065	**7.94%**
BE CLEAN Localized Energy & CHP	13658.6	1973	0	**0.00%**
BE GREEN After Renewables	6127.2	937.787	1034.967	**52.46%**
TOTAL Reduction over BASELINE			1205.032	**56.24%**
TOTAL Reduction BER/TER			1254	**57.2%**

A full breakdown of the energy demand and associated CO2 can be seen in section 5 of this report and Appendix A.

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2. INTRODUCTION

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The calculations and methodology used within this assessment and report structure, are in accordance with the Policy Guidance and the Bristol Climate Change and Sustainability Practice Note[2].

In order to establish predicted figures for the development, and to accurately assess the most feasible solution for the Energy & CO^2 Reduction Strategy, the building has been modelled using Design Builder SBEM, a government approved software for the national calculation methodology for buildings other than dwellings.

In accordance with the Energy Hierarchy, a baseline has been established, which is the Target Emission Rate (TER), calculated for the building based on the Part L2 2021 compliant specification, minus savings from notional PV.

We have worked with the design team with regards to how the proposed development will address the issues of sustainability, resource efficiency and climate change to reduce its overall environmental impact and running costs for future occupants.

[1] Bristol Development Framework Core Strategy. Adopted June 2011

[2] Bristol Climate Change and Sustainability Practice Note. July 2020

3. THE POLICY REQUIREMENTS

Bristol City Council is committed, through the Core Cities Climate Change Declaration and the Climate Change Act 2008, to an 80% reduction in CO^2 emissions by 2050.

To achieve this goal, through the Core Strategy and Planning Policies, Bristol Council have set out a holistic approach to promote and assess the Sustainability of new developments, through good design, resource efficiency and Carbon reduction.

As this is a minor application, developments should follow the heat hierarchy and if a connection to an existing district heat network is not possible, the building should employ individual renewable heat or communal renewable heat technologies which are fossil fuel free.

Minor development should follow the same process for energy calculations as major development. The building should be modelled using SBEM, the government approved methodology for buildings other than dwellings.

In accordance with the Energy Hierarchy, a baseline should be established, which is the Target Emission Rate (TER), calculated for the building based on the Part L2021 compliant specification, minus savings from notional PV.

You should then reduce energy consumption by amending the design to include additional energy efficiency measures, that exceed the energy requirements of Building Regulations and result in a BER lower than the Baseline.

Heating systems used in the Be Lean calculation should be as per the notional building to show only the energy efficiency improvements relevant.

Developments should then utilise renewable energy technologies to reduce residual emissions by at least 20%.

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4. LZC TECHNOLOGY FEASIBILITY

Solar Hot Water (Thermal)

Solar water heating systems are one of the more familiar renewable technologies used at the moment. They use the energy from the sun to heat water, most commonly for hot water needs. Solar heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun. This fluid is used to heat water that is stored in either a separate hot water cylinder or in a twin-coil hot water cylinder (the second coil is used to provide additional heating from a boiler or other heat source).

Solar Hot Water Panels were not included, PV was preferred to supplement the ASHP and reduce electricity consumption.

Wind

Wind turbines convert the kinetic energy in wind into mechanical energy that is then converted to electricity. Turbines are available in a range of sizes and designs and can either be free-standing, mounted on a building or integrated into a building structure.

Wind generation would not be suitable for this property and location.

Photovoltaic (PV) Panels

Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases of silicon. Through a process called doping, a very small amount of impurities are added to the semiconductor, which creates two different layers called n-type and p-type layers.

Certain wavelengths of light are able to ionise the silicon atoms, which separates some of the positive charges (holes) from the negative charges (electrons). The holes move into the positive or p-layer and the electrons into the negative or n-layer. These opposite charges are attracted to each other, but most of them can only re-combine by the electrons passing through an external circuit, due to an internal potential energy barrier. This flow of electrons produces a DC current.

PV has been proposed to supplement the ASHP and reduce electricity consumption. A 5kWp PV array has been included in the current calculations.

Biomass Heating

Biomass is any plant-derived organic material that renews itself over a short period.

Biomass energy systems are based on either the direct or indirect combustion of fuels derived from those plant sources. The most common form of biomass is the direct combustion of wood in treated or untreated forms. The use of biomass is becoming increasingly common in some European countries (some countries such as Austria are heavily dependent on biomass).

The environmental benefits relate to the significantly lower amounts of energy used in biomass production and processing compared to the energy released when they are burnt. This can range from a

[1] Bristol Development Framework Core Strategy. Adopted June 2011

[2] Bristol Climate Change and Sustainability Practice Note. July 2020

four-fold return for biodiesel to an approximate 20-fold energy return for woody biomass. Biomass-fuels can be used to produce energy on a continuous basis (unlike renewables such as wind or solar energy) and it can be an economic alternative to fossil fuels as it is a potential source of both heat and electricity.

However, Biomass systems have particular design management and maintenance requirements associated with sourcing, transportation and storage and are therefore more commonly used in commercial developments rather than domestic installations. It can be less convenient to operate than mains-supplied fuels such as natural gas and are more management intensive and require expertise in facilities management. Sources of biomass can also fluctuate, so boilers should be specified to operate on a variety of fuels without risk of overheating or tripping out.

A biomass system is not suitable for this property type, scale and location.

Ground Source Heat pumps

A heat pump is a device that takes up heat at a certain temperature and releases it at a higher temperature. The essential components of a heat pump are heat exchangers (through which energy is extracted and emitted) and a means of pumping heat between the exchangers. The effectiveness of the heat pump is measured by the ratio of the heating capacity to the effective power input, usually known as the coefficient of performance (COP).

Ground-source heat pumps (GSHP) extract heat from the ground. They are classified as either water-to-air or water-to-water units depending on whether the heat distribution system in the building uses air or water. Ground source heat pumps either use long shallow trenches or deep vertical boreholes to take low grade heat from the ground and then compress it to create higher temperatures.

A GSHP system was deemed not feasible for this property type, scale and location.

Air Source Heat pumps

Air source heat pumps absorb heat from the outside air. This is usually used to heat radiators, underfloor heating systems, or warm air convectors. An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. The system performs down to air temperatures of -20°c which means that they are more than suitable for installations within the UK. Hot water and Heating can be provided 365 days a year. The hot water is produced without the aid of electrical immersions and at 55°c is more than hot enough for baths and showers. There are two main types of air source heat pump system:

An air-to-water system distributes heat via your wet central heating system. Heat pumps work much more efficiently at a lower temperature than a standard boiler system would. So they are more suitable for under-floor heating systems or larger radiators, which give out heat at lower temperatures over longer periods of time. An air-to-air system produces warm air which is circulated by fans. They are unlikely to provide you with hot water as well.

Air Source Heat Pump has been proposed to provide the heating and hot water in accordance with the Heat Hierarchy.

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[2] Bristol Climate Change and Sustainability Practice Note. July 2020

5. ENERGY STRATEGY

The building has been modelled using Design Builder Software, a MHCLG approved software program for carrying out the Simplified Building Energy Model (SBEM). SBEM is the UK Government's methodology for calculating the energy performance of buildings other than dwellings, and to generate the Energy Performance Certificate for the building once complete.

In accordance with the Energy Hierarchy, a baseline should be established, which is the Target Emission Rate (TER), calculated for the building based on the Part L2021 compliant specification, minus savings from notional PV. You should then reduce energy consumption by amending the design to include additional energy efficiency measures that exceed the energy requirements of Building Regulations and result in a BER lower than the Baseline.

STAGE 1 - BASELINE Demand & Emissions

BASELINE Calculation		
Total Target Primary Energy Rate (TPER)	**155.52**	**kWh/Yr/m²**
Target Emission Rate (TER)	**14.49**	**kgCO2/m²**
Notional PV inc. in TER	0	kgCO2/yr
Total Target Emissions (excl. notional PV	7121.835	kgCO2/yr
Target Emission Rate without PV	**14.49**	**kgCO2/m²**

BASELINE Calculation Specification		
	Part L2 Limiting Fabric Parameters	**BASELINE (Notional) Specification**
Exposed Floors (W/m2K):	0.18	0.15
External Walls (W/m2K):	0.26	0.18
Roof (W/m2K):	0.16/0.18	0.15
Windows, Doors & Roof W - U Value (W/m2K):	1.6	1.4
Air Permeability:	8	3
Ventilation:	-	MVHR efficiency 76%
Heating:	-	ASHP efficiency 264%
Hot Water:	-	ASHP efficiency 286%
Lighting:	95 lm/W	95 lm/W

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STAGE 2 - BE LEAN Demand & Emissions

You should then reduce energy consumption by amending the design to include additional energy efficiency measures that exceed the energy requirements of Building Regulations and result in a BER lower than the Baseline. Heating systems used in the Be Lean calculation should be as per the notional building to show only the energy efficiency improvements relevant.

BE LEAN Calculation Specification		
	BASELINE (Notional) Specification	**BE LEAN Specification**
Exposed Floors (W/m2K):	0.15	0.09
External Walls (W/m2K):	0.18	0.15
Roof (W/m2K):	0.15	0.13
Windows, Doors & Roof W - U Value (W/m2K):	1.4	0.9-1.2
Air Permeability:	3	3
Ventilation:	MVHR efficiency 76%	MVHR efficiency 85%
Heating:	ASHP efficiency 264%	ASHP efficiency 264%
Hot Water:	ASHP efficiency 286%	ASHP efficiency 286%
Lighting:	95 lm/W	100 lm/W

BE LEAN Calculation		
Building Primary Energy Rate (BPER)	**147.28**	**kWh/Yr/m²**
Reduction in BPER	8.24	kWh/Yr/m²
Reduction in BPER (%)	**5.30%**	
'BE LEAN' Building Emission Rate	**13.6**	**kgCO2/m²**
'BE LEAN' Total Building Emissions	6684.4	kgCO2/yr
Reduction in Building Emissions from Energy Efficiency	437.435	kgCO2/yr
Reduction in Building Emissions from Energy Efficiency (%)	**6.14%**	

STAGE 3 - BE CLEAN Demand & Emissions

The development is within the potential Heat Network Zone, within proximity to the Bedminster heat network. The building is not located directly on a current, phase 1 or 2 district heating network, however there may be opportunities in the future. The building will utilise renewable low temperature heating and will have a central plant room.

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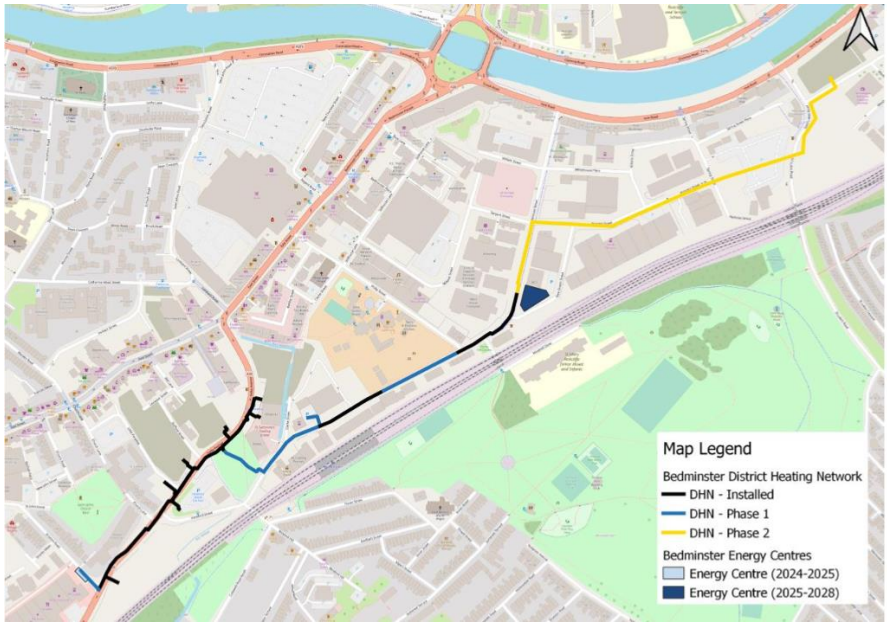

STAGE 4 - BE GREEN Demand & Emissions

Developments should then utilise renewable energy technologies to reduce residual emissions by at least 20% and this has been exceeded.

BE GREEN Calculation Specification		
	BE LEAN Specification	**BE GREEN Specification**
Exposed Floors (W/m2K):	0.09	0.09
External Walls (W/m2K):	0.15	0.15
Roof (W/m2K):	0.13	0.13
Windows, Doors & Roof W - U Value (W/m2K):	0.9-1.2	0.9-1.2
Air Permeability:	3	3
Ventilation:	MVHR efficiency 85%	MVHR efficiency 85%
Heating:	ASHP efficiency 264%	Grant ASHP efficiency 461%
Hot Water:	ASHP efficiency 286%	Grant ASHP efficiency 461%
Lighting:	100 lm/W	100 lm/W
PV:	-	5kWp
BE GREEN Calculation		
Building Primary Energy Rate (BPER)	**99.22**	**kWh/Yr/m²**
Reduction in BPER	48.06	kWh/Yr/m²
Reduction in BPER (%)	**32.63%**	
'BE GREEN' Building Emission Rate	**9.21**	**kgCO2/m²**
'BE GREEN' Total Building Emissions	4526.715	kgCO2/yr
Reduction in Building Emissions from ASHP & PV	2157.685	kgCO2/yr
Reduction in Building Emissions from HWHP & PV (%)	**32.28%**	

Proposed EPC rating – A5

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Energy Performance Certificate

Non-Domestic Building

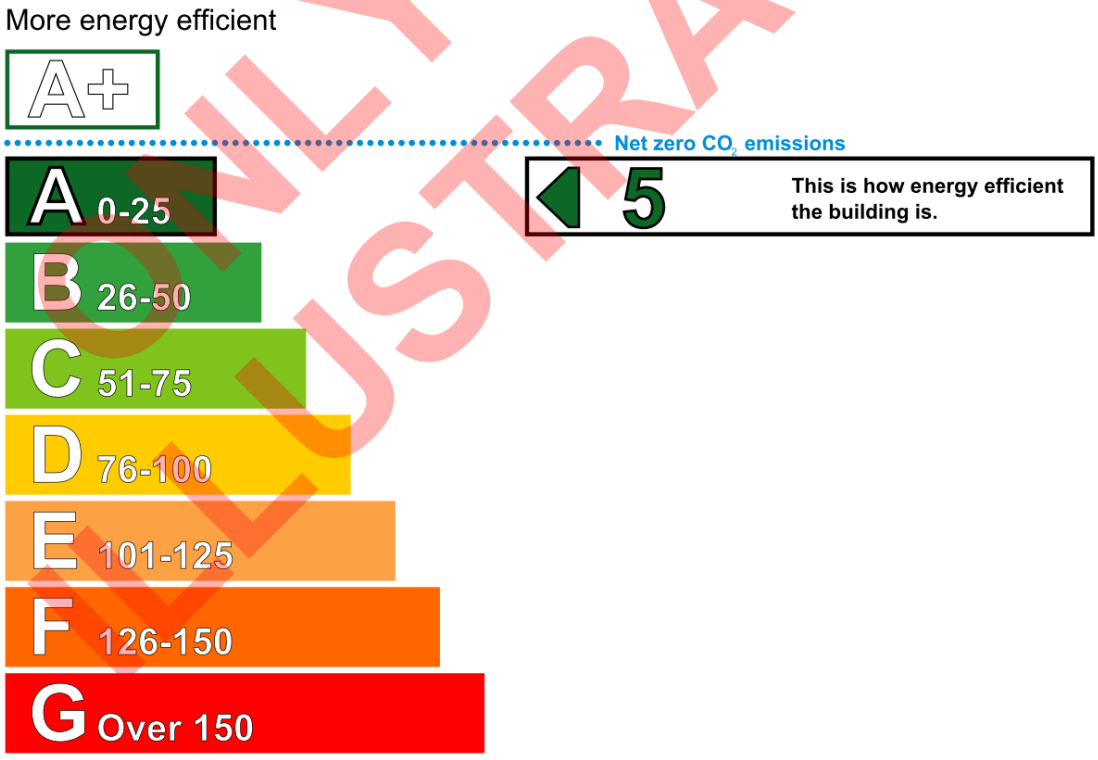
HM Government

110-112 East Street
Bristol
BS3 4EY

Certificate Reference Number:
1426-3902-7857-3283-8663

This certificate shows the energy rating of this building. It indicates the energy efficiency of the building fabric and the heating, ventilation, cooling and lighting systems. The rating is compared to two benchmarks for this type of building: one appropriate for new buildings and one appropriate for existing buildings. There is more advice on how to interpret this information in the guidance document *Energy Performance Certificates for the construction, sale and let of non-dwellings* available on the Government's website at www.gov.uk/government/collections/energy-performance-certificates.

Energy Performance Asset Rating



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6. SUSTAINABILITY STATEMENT

Designing for Energy Efficiency, Sustainability and Climate Change adaption

This report demonstrates that the policy requirements have been considered throughout the early design stages of this development. A fabric first design approach has been taken and this means improved insulation standards, better U Values and improved air tightness. Efficient low energy lighting is specified with an efficacy of 100Lm/W. MVHR will be installed to ensure that the building is adequately ventilated to control moisture and condensation within the building fabric, improving the building life span and providing a healthier internal environment for the building occupants.

Materials – Consideration will be given to using materials and construction that have a low environmental impact, such as those achieving an A+ or A rated under BRE's Green Guide. Where possible, materials will be chosen that are local and responsibly sourced (such as FSC timber), recycled or reclaimed. All insulation materials will have a GWP (Global Warming Potential) of 5 or less.

Waste - The contractor will produce a Site Waste Management Plan (SWMP) to set targets and monitor to reduce waste and divert from landfill. The building will incorporate dedicated internal and external general waste and recyclable storage in accordance with the LA minimum collection requirements.

Water – The building will be fitted out to aim for lower water usage to meet the residential target of 110L/Person/Day.

This will be achieved by the following targets:

Part G2 Water calculations		
Appliance Type:	Unit of measure:	Amount (litres) @ standard 3bar
WC (Dual flush)	Full flush volume	6
WC (Dual flush)	Part flush volume	3
Basin Taps (excluding kitchen)	Flow rate l/min	3
Kitchen taps	Flow rate l/min	6
Bath	Capacity to Overflow	N/A
Shower	Flow rate l/min	10
Washing Machine	Litres / kg dry load	8.17
Dishwasher	Litres / Place setting	1.25
TOTAL WATER USE		109.30

Health & Wellbeing – Rooms will have good levels of day lighting, and décor will enhance this minimising the need for artificial lighting. Materials with low VOC emissions will be used. The Mechanical Ventilation system will provide a much healthier internal environment for the occupants.
The house has private garden space and there are other greenspaces locally.

Transport – Cycle storage is incorporated. There are residential amenities within walking distance in addition to well defined public transport links.

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7. SCOPE & EXCLUSIONS

JMDC Services Ltd has been commissioned to carry out this Energy & Sustainability Statement, which is required as part of the Planning Application, to advise how the project could meet the Sustainability, Energy & Carbon Emission targets identified in the Planning Policies.

This report and the calculations provided are therefore for the purposes of Planning only and do NOT confirm compliance with the Building Regulations nor provide construction specifications. The calculations carried out at this stage are also NOT suitable for the formal generation and lodgement of EPCs at completion.

SAP and SBEM Calculations;

The Standard Assessment Procedure (SAP) is adopted by Government as the UK methodology for calculating the energy performance of buildings.

SBEM is a software tool developed by BRE in support of the National Calculation Methodology (NCM), the Energy Performance of Buildings Directive (EPBD) that provides an analysis of energy consumption for non-domestic buildings.

The calculations consider a range of factors that contribute to energy efficiency:

- Materials used for construction
- Thermal insulation of the building fabric
- Solar gains through openings
- Air leakage ventilation characteristics & ventilation equipment
- Fuel, type, efficiency's and controls of the heating, cooling and hot water systems
- Lighting
- Renewable Energy Technologies

Whilst not primarily for this purpose, until benchmark data becomes available that provides a suitable estimate of the regulated emissions of different development types, Local Authorities request that SAP and SBEM calculations are carried out as a way of providing this estimation and advising how the policy requirements can be met.

The calculations and report are based on the Planning application drawings and information available at the time, which at Planning Stage is limited and based on assumptions and estimations regarding the construction, mechanical and electrical specification, and has not been based on detailed design. This may mean that once the project progresses to the subsequent stages and detailed design is carried out, this specification is proved not feasible for the project for many different reasons.

The SAP and/or SBEM calculations are carried out in accordance with regulations at the time, therefore should the regulations change prior to the next stages being carried out, this could mean that these calculations are no longer suitable.

Should the Planning application be successful, detailed SAP and/or SBEM calculations will need to be carried once the design is developed, as required to confirm compliance with the Building Regulations or for EPC purposes.

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8. TERMS OF USE

This document is issued for the party which commissioned it, for this project ONLY and for the specific purposes detailed in section 8 of this report.

It should not be relied upon by any other party or used for any other purpose.

We accept no responsibility for the consequences of this document being relied upon by any other party, being used for any other purpose or containing any error or omission which is due to an error or omission in data supplied to us by other parties.

This document contains confidential information and proprietary intellectual property. It should not be shown to other parties without consent from us and from the party which commissioned it.

Please contact us is you require any further information regarding the content, scope of terms of this report.

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APPENDIX A: Energy Demand & CO2 Assessment Sheets

PROJECT	**110-112 East Street HMO**			
FLOOR AREA (m²)	**491.5**			
EPC Rating	**A5**			
DEMAND FGURES				
	TER	**BASELINE**	**BE LEAN**	**BE GREEN**
	Energy Demand (kWh/yr)	**Energy Demand (kWh/yr)**	**Energy Demand (kWh/yr)**	**Energy Demand (kWh/yr)**
Heating	10552.51	10552.51	3587.95	1916.85
Hot Water	30404.19	30404.19	28634.79	15261.08
Pumps and Fans	5308.20	5308.20	7146.41	7146.41
Cooling	0.00	0.00	0.00	0.00
Lighting	5131.26	5131.26	8537.36	8537.36
Energy Generated by PV	0.00	0.00	0.00	4295.71
TOTAL	**51396.2**	**51396.2**	**47906.5**	**28566.0**
BASELINE				
Target Emission Rate (TER)	**Notional PV included in TER (-)**	**TOTAL Target Emissions** (kgCO2 p.a.)	**TOTAL Target Emissions excluding notional PV**	**Target Emission Rate excluding notional PV**
14.49	0	7122	7122	**14.49**
BE LEAN				
	Building Emission Rate (BER) (BE LEAN) (kgCO2/m²)	**Total Building Emissions (BE LEAN) (kgCO2 p.a.)**	**BE LEAN' CO2 Reduction** (kgCO2 p.a.)	**BE LEAN' CO2 Reduction** (%)
	13.6	6684	437.435	**6.14%**
BE GREEN				
	Building Emission Rate (BER) (ACTUAL - BE GREEN) (kgCO2/m²)	Total Building Emissions (ACTUAL - BE GREEN) (kgCO2/m²)	**BE GREEN' CO2 Reduction** (kgCO2 p.a.)	**BE GREEN' CO2 Reduction** (%)
	9.21	4526.715	2157.685	**32.28%**

SITEWIDE ENERGY & CO2 SUMMARY

	ENERGY demand (kWh pa)	**CO2 Emissions** (kgCO2 p.a.)	**CO2 Reduction** (kgCO2 p.a.)	**CO2 Reduction** (%)
Target Emissions (2021) Part L (2021) Target	51396.2	7122		
BASELINE Part L (2021) Target (excluding notional PV)	51396.2	7122		
BE LEAN After Efficiency Measures	47906.5	6684	437.435	**6.14%**
BE CLEAN Localized Energy & CHP	47906.5	6684	0	**0.00%**
BE GREEN After Renewables	28566.0	4526.715	2157.685	**32.28%**
TOTAL Reduction over BASELINE			2595	**36.4%**
TOTAL Reduction BER/TER			2595	**36.4%**

APPENDIX B: BRUKL – BE LEAN

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Be Lean 2

As designed

Date: Fri Nov 14 14:15:52 2025

Administrative information

Building Details

Address: 110-112 East Street, Bristol, BS3 4EY

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Certifier details

Name: Jemma McLaughlan

Telephone number: [redacted]

Address: 129 Walton Lane, Lancashire, BB9 8BQ

Foundation area [m^2]: 163.84

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	14.49	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	13.6	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	155.52	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	147.28	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	First Flloor - Bed 10-12_W_5
Floors	0.18	0.09	0.24	First Flloor - Bed 10-12_F_4
Pitched roofs	0.16	0.15	0.25	Ground Floor - Kitchen_R_11
Flat roofs	0.18	0.13	0.13	First Flloor - FF Circ_R_12
Windows** and roof windows	1.6	0.94	1.2	First Flloor - Bed 8-9_G_11
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Project HVAC - ASHP - Be Lean

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	2.64	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- Project HW - Be Lean

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	2.86	0.001
Standard value	2*	N/A

* Standard shown is for all types except absorption and gas engine heat pumps.

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
First Flloor - Bed 10-12	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - FF Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - Kitchen 5	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - Bed 8-9	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - Store	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - Kitchen 4	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - Bed 7	-	-	-	-	1	-	-	-	-	0.85	N/A
First Flloor - FF Circ 2	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - Bed 13-15	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - SF Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - SF - Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen 3	-	-	-	-	1	-	-	-	-	0.85	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Ground Floor - Store	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Store 1	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 3	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 1-2	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Living Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - GF Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 4-6	-	-	-	-	1	-	-	-	-	0.85	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
First Flloor - Bed 10-12	100	-	-
First Flloor - FF Circ	100	-	-
First Flloor - Kitchen 5	100	-	-
First Flloor - Bed 8-9	100	-	-
First Flloor - Store	100	-	-
First Flloor - Kitchen 4	100	-	-
First Flloor - Bed 7	100	-	-
First Flloor - FF Circ 2	100	-	-
Second Floor - Bed 13-15	100	-	-
Second Floor - SF Kitchen	100	-	-
Second Floor - SF - Circ	100	-	-
Ground Floor - Kitchen	100	-	-
Ground Floor - Kitchen 3	100	-	-
Ground Floor - Store	100	-	-
Ground Floor - Store 1	100	-	-
Ground Floor - Bed 3	100	-	-
Ground Floor - Bed 1-2	100	-	-
Ground Floor - Kitchen	100	-	-
Ground Floor - Living Dining	100	100	1.5
Ground Floor - GF Circ	100	-	-
Ground Floor - Bed 4-6	100	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
First Flloor - Bed 10-12	NO (-84.2%)	NO
First Flloor - Bed 8-9	NO (-51.8%)	NO
First Flloor - Bed 7	NO (-71.7%)	NO
Second Floor - Bed 13-15	NO (-84.2%)	NO
Ground Floor - Bed 3	NO (-47.3%)	NO
Ground Floor - Bed 1-2	NO (-65%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Living Dining	NO (-82.6%)	NO
Ground Floor - Bed 4-6	NO (-93%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	491.5	491.5
External area [m^2]	1254.7	1254.7
Weather	CAR	CAR
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	234.21	522.09
Average U-value [W/m^2K]	0.19	0.42
Alpha value* [%]	28.81	35.56

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
99	**Hotels**
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
1	**Residential Institutions: Universities and Colleges**
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	6.81	21.47
Cooling	0	0
Auxiliary	14.54	10.8
Lighting	17.37	10.44
Hot water	58.26	61.86
Equipment*	40.78	40.78
TOTAL**	**96.99**	**104.57**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	0	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*0*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	209.58	351.98
Primary energy [kWh_{PE}/m^2]	147.28	155.52
Total emissions [kg/m^2]	13.6	14.49

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Natural Gas									
Actual	57.8	151.8	6.8	0	14.5	2.36	0	2.64	0
Notional	204	147.9	21.5	0	8.7	2.64	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type

APPENDIX C: BRUKL – PROPOSED

BRUKL Output Document

HM Government

Compliance with England Building Regulations Part L 2021

Project name

Proposed

As designed

Date: Fri Nov 14 13:58:06 2025

Administrative information

Building Details

Address: 110-112 East Street, Bristol, BS3 4EY

Certifier details

Name: Jemma McLaughlan

Telephone number: [redacted]

Address: 129 Walton Lane, Lancashire, BB9 8BQ

Certification tool

Calculation engine: SBEM

Calculation engine version: v6.1.e.0

Interface to calculation engine: DesignBuilder SBEM

Interface to calculation engine version: v7.2.0

BRUKL compliance module version: v6.1.e.1

Foundation area [m^2]: 163.84

The CO_2 emission and primary energy rates of the building must not exceed the targets

Target CO_2 emission rate (TER), $kgCO_2/m^2$annum	14.49	
Building CO_2 emission rate (BER), $kgCO_2/m^2$annum	9.21	
Target primary energy rate (TPER), kWh_{PE}/m^2annum	155.52	
Building primary energy rate (BPER), kWh_{PE}/m^2annum	99.22	
Do the building's emission and primary energy rates exceed the targets?	BER =< TER	BPER =< TPER

The performance of the building fabric and fixed building services should achieve reasonable overall standards of energy efficiency

Fabric element	$U_{a\text{-}Limit}$	$U_{a\text{-}Calc}$	$U_{i\text{-}Calc}$	First surface with maximum value
Walls*	0.26	0.15	0.15	First Flloor - Bed 10-12_W_5
Floors	0.18	0.09	0.24	First Flloor - Bed 10-12_F_4
Pitched roofs	0.16	0.15	0.25	Ground Floor - Kitchen_R_11
Flat roofs	0.18	0.13	0.13	First Flloor - FF Circ_R_12
Windows** and roof windows	1.6	0.94	1.2	First Flloor - Bed 8-9_G_11
Rooflights***	2.2	-	-	No external rooflights
Personnel doors^	1.6	-	-	No external personnel doors
Vehicle access & similar large doors	1.3	-	-	No external vehicle access doors
High usage entrance doors	3	-	-	No external high usage entrance doors

$U_{a\text{-}Limit}$ = Limiting area-weighted average U-values [$W/(m^2K)$] $U_{i\text{-}Calc}$ = Calculated maximum individual element U-values [$W/(m^2K)$]

$U_{a\text{-}Calc}$ = Calculated area-weighted average U-values [$W/(m^2K)$]

* Automatic U-value check by the tool does not apply to curtain walls whose limiting standard is similar to that for windows.

** Display windows and similar glazing are excluded from the U-value check. *** Values for rooflights refer to the horizontal position.

^ For fire doors, limiting U-value is 1.8 W/m^2K

NB: Neither roof ventilators (inc. smoke vents) nor swimming pool basins are modelled or checked against the limiting standards by the tool.

Air permeability	Limiting standard	This building

Building services

For details on the standard values listed below, system-specific guidance, and additional regulatory requirements, refer to the Approved Documents.

Whole building lighting automatic monitoring & targeting with alarms for out-of-range values	NO
Whole building electric power factor achieved by power factor correction	<0.9

1- Project HVAC - ASHP

	Heating efficiency	Cooling efficiency	Radiant efficiency	SFP [W/(l/s)]	HR efficiency
This system	4.61	-	-	-	-
Standard value	2.5*	N/A	N/A	N/A	N/A
Automatic monitoring & targeting with alarms for out-of-range values for this HVAC system					NO

* Standard shown is for all types >12 kW output, except absorption and gas engine heat pumps.

1- Project HW

	Water heating efficiency	Storage loss factor [kWh/litre per day]
This building	Hot water provided by HVAC system	0.001
Standard value	N/A	N/A

Zone-level mechanical ventilation, exhaust, and terminal units

ID	System type in the Approved Documents
A	Local supply or extract ventilation units
B	Zonal supply system where the fan is remote from the zone
C	Zonal extract system where the fan is remote from the zone
D	Zonal balanced supply and extract ventilation system
E	Local balanced supply and extract ventilation units
F	Other local ventilation units
G	Fan assisted terminal variable air volume units
H	Fan coil units
I	Kitchen extract with the fan remote from the zone and a grease filter

NB: Limiting SFP may be increased by the amounts specified in the Approved Documents if the installation includes particular components.

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
First FIloor - Bed 10-12	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - FF Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - Kitchen 5	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - Bed 8-9	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - Store	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - Kitchen 4	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - Bed 7	-	-	-	-	1	-	-	-	-	0.85	N/A
First FIloor - FF Circ 2	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - Bed 13-15	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - SF Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Second Floor - SF - Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen 3	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Store	-	-	-	-	1	-	-	-	-	0.85	N/A

Zone name	SFP [W/(l/s)]									HR efficiency	
ID of system type	A	B	C	D	E	F	G	H	I		
Standard value	0.3	1.1	0.5	2.3	2	0.5	0.5	0.4	1	Zone	Standard
Ground Floor - Store 1	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 3	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 1-2	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Kitchen	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Living Dining	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - GF Circ	-	-	-	-	1	-	-	-	-	0.85	N/A
Ground Floor - Bed 4-6	-	-	-	-	1	-	-	-	-	0.85	N/A

General lighting and display lighting	General luminaire	Display light source	
Zone name	Efficacy [lm/W]	Efficacy [lm/W]	Power density [W/m²]
Standard value	95	80	0.3
First Flloor - Bed 10-12	100	-	-
First Flloor - FF Circ	100	-	-
First Flloor - Kitchen 5	100	-	-
First Flloor - Bed 8-9	100	-	-
First Flloor - Store	100	-	-
First Flloor - Kitchen 4	100	-	-
First Flloor - Bed 7	100	-	-
First Flloor - FF Circ 2	100	-	-
Second Floor - Bed 13-15	100	-	-
Second Floor - SF Kitchen	100	-	-
Second Floor - SF - Circ	100	-	-
Ground Floor - Kitchen	100	-	-
Ground Floor - Kitchen 3	100	-	-
Ground Floor - Store	100	-	-
Ground Floor - Store 1	100	-	-
Ground Floor - Bed 3	100	-	-
Ground Floor - Bed 1-2	100	-	-
Ground Floor - Kitchen	100	-	-
Ground Floor - Living Dining	100	100	1.5
Ground Floor - GF Circ	100	-	-
Ground Floor - Bed 4-6	100	-	-

The spaces in the building should have appropriate passive control measures to limit solar gains in summer

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
First Flloor - Bed 10-12	NO (-84.2%)	NO
First Flloor - Bed 8-9	NO (-51.8%)	NO
First Flloor - Bed 7	NO (-71.7%)	NO
Second Floor - Bed 13-15	NO (-84.2%)	NO
Ground Floor - Bed 3	NO (-47.3%)	NO
Ground Floor - Bed 1-2	NO (-65%)	NO
Ground Floor - Living Dining	NO (-82.6%)	NO

Zone	Solar gain limit exceeded? (%)	Internal blinds used?
Ground Floor - Bed 4-6	NO (-93%)	NO

Regulation 25A: Consideration of high efficiency alternative energy systems

Were alternative energy systems considered and analysed as part of the design process?	YES
Is evidence of such assessment available as a separate submission?	NO
Are any such measures included in the proposed design?	NO

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters

	Actual	Notional
Floor area [m^2]	491.5	491.5
External area [m^2]	1254.7	1254.7
Weather	CAR	CAR
Infiltration [m^3/hm^2@ 50Pa]	3	3
Average conductance [W/K]	234.21	522.09
Average U-value [W/m^2K]	0.19	0.42
Alpha value* [%]	28.81	35.56

* Percentage of the building's average heat transfer coefficient which is due to thermal bridging

Building Use

% Area	Building Type
	Retail/Financial and Professional Services
	Restaurants and Cafes/Drinking Establishments/Takeaways
	Offices and Workshop Businesses
	General Industrial and Special Industrial Groups
	Storage or Distribution
99	**Hotels**
	Residential Institutions: Hospitals and Care Homes
	Residential Institutions: Residential Schools
1	**Residential Institutions: Universities and Colleges**
	Secure Residential Institutions
	Residential Spaces
	Non-residential Institutions: Community/Day Centre
	Non-residential Institutions: Libraries, Museums, and Galleries
	Non-residential Institutions: Education
	Non-residential Institutions: Primary Health Care Building
	Non-residential Institutions: Crown and County Courts
	General Assembly and Leisure, Night Clubs, and Theatres
	Others: Passenger Terminals
	Others: Emergency Services
	Others: Miscellaneous 24hr Activities
	Others: Car Parks 24 hrs
	Others: Stand Alone Utility Block

Energy Consumption by End Use [kWh/m^2]

	Actual	Notional
Heating	3.9	21.47
Cooling	0	0
Auxiliary	14.54	10.8
Lighting	17.37	10.44
Hot water	38.05	61.86
Equipment*	40.78	40.78
TOTAL**	**73.86**	**104.57**

* Energy used by equipment does not count towards the total for consumption or calculating emissions.
** Total is net of any electrical energy displaced by CHP generators, if applicable.

Energy Production by Technology [kWh/m^2]

	Actual	Notional
Photovoltaic systems	8.74	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	*8.74*	*0*

Energy & CO_2 Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m^2]	209.58	351.98
Primary energy [kWh_{PE}/m^2]	99.22	155.52
Total emissions [kg/m^2]	9.21	14.49

HVAC Systems Performance

System Type	Heat dem MJ/m2	Cool dem MJ/m2	Heat con kWh/m2	Cool con kWh/m2	Aux con kWh/m2	Heat SSEEF	Cool SSEER	Heat gen SEFF	Cool gen SEER
[ST] Central heating using water: radiators, [HS] ASHP, [HFT] Electricity, [CFT] Natural Gas									
Actual	57.8	151.8	3.9	0	14.5	4.11	0	4.61	0
Notional	204	147.9	21.5	0	8.7	2.64	0	----	----

Key to terms

Heat dem [MJ/m2] = Heating energy demand
Cool dem [MJ/m2] = Cooling energy demand
Heat con [kWh/m2] = Heating energy consumption
Cool con [kWh/m2] = Cooling energy consumption
Aux con [kWh/m2] = Auxiliary energy consumption
Heat SSEFF = Heating system seasonal efficiency (for notional building, value depends on activity glazing class)
Cool SSEER = Cooling system seasonal energy efficiency ratio
Heat gen SSEFF = Heating generator seasonal efficiency
Cool gen SSEER = Cooling generator seasonal energy efficiency ratio
ST = System type
HS = Heat source
HFT = Heating fuel type
CFT = Cooling fuel type