



Cambridge Halls PBSA

Property Sustainability Services
Cambridge Halls PBSA Energy Statement
Stage 2

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1. EXECUTIVE SUMMARY

This Energy Statement has been prepared by Waterman Building Services to accompany an application for full planning permission for Cambridge Halls PBSA ("the Site"), hereafter referred to as 'the Proposed Development'.

The Proposed Development includes the demolition of the existing Cambridge Halls student accommodation, Manchester at Cavendish Street, and erection of building between 22 and 28 storeys in height excluding ground floor, comprising of a class E/F1/F2 Space at ground and first level, and the development of a purpose-built student accommodation with a multitude of communal spaces, both internal and external.

The Proposed Development is targeting net zero through construction and operation through high specification building fabric and energy efficient building services as part of a fully electric building. Unite Students have a long-standing Power Purchase Agreement (PPA) in place for renewable electricity, and therefore the student accommodation shall operate at Net-Zero from day one.

The site is not within a connectable distance to the closest local heat network and therefore this has not been considered within the design to supply heating and domestic hot water.

The carbon dioxide (CO₂) emissions performance presented in this report have been assessed in line with Approved Document L 2021 building regulations and the relevant planning policies within Manchester City Council. The Proposed Development has a cumulative CO₂ reduction of 6% for Phase 1 and 11% for Phase 2 when compared to baseline emissions in accordance with Manchester's energy hierarchy. The Proposed Development incorporates low thermal properties, high plant efficiencies and photovoltaic panels with green roofs. Overall, the development adheres to the relevant planning policies of Manchester and is a positive new addition to the city.



Figure 1: Architect CGI of development

2. INTRODUCTION

This Energy Statement has been prepared by Waterman Building Services to accompany an application for full planning permission for Unite Students, Cambridge PBSA, Manchester (“the Site”), hereafter referred to as ‘the Proposed Development’. The application will be submitted by the client, the Site is being brought forward for development by Applicant Unite Students.

The purpose of this report is to assess the energy strategy for the Proposed Development, which demonstrates the reduction in operational carbon emissions in line with the Manchester City Council relevant policies tackling climate change. This assessment considers energy efficiency measures which includes passive design, and low and zero carbon technologies such as connecting to the local district heat network and renewable energy generation which will be implemented to reduce energy use and CO₂ emissions.

The energy strategy follows the energy hierarchy as proposed by Manchester City Council. The site comprises of two buildings (Phase 1 and Phase 2) which is predominantly student accommodation with community and retail space situated across the ground and first floor.

2.1 Site Location and Description

The development is situated in the city centre of Manchester, with close proximity to the university as well as Manchester Oxford station, and Manchester Picadilly Station which provide direct services to London, Birmingham and other major UK cities. The development has 22-28 storeys split over two buildings with a total of 2302 bedrooms split into 1101 in Phase 1 and 1201 in phase 2 with 209 studios and 170 Post grad clusters across the phases. There are Class E/F1/F2 spaces on the ground and first floor, described as:

“Demolition of existing halls of residence and erection of two buildings of 30 and 24 storeys above ground, plus basement and rooftop plant levels, comprising purpose-built student accommodation with internal and external rooftop communal amenity space (Sui Generis). Ground floor commercial and community uses (Flexible Use Classes E, F1 or F2). Hard and soft landscaping and associated highway wor

The development has been assessed under the CIBSE Manchester TRY05 weather file which has a dominant winter profile and therefore heating demand will be highest for this development. The maximum annual temperature is 28°C and minimum annual temperature is -6.9°C and further detail can be seen in the weather metrics.

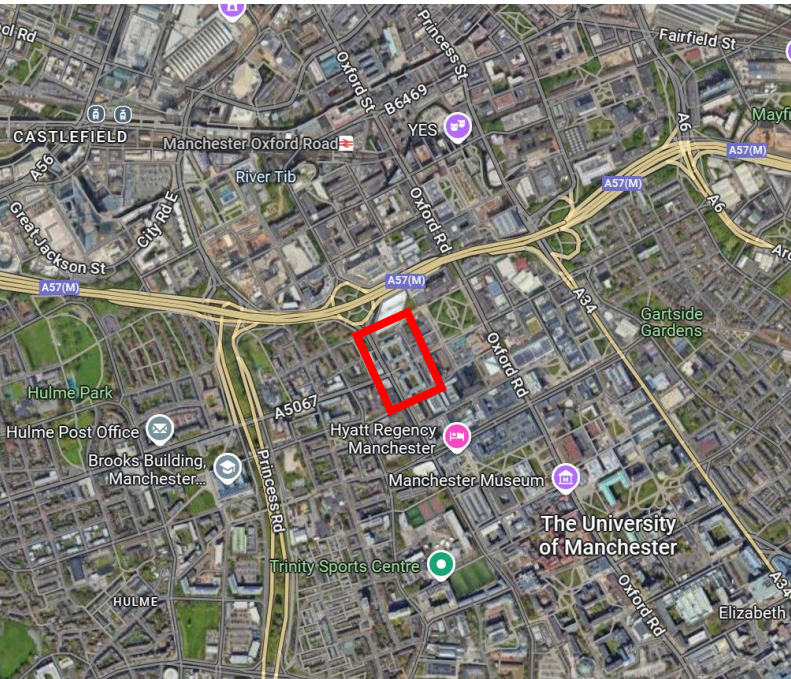


Figure 2: Site Location



Figure 3: Climate Metrics

3. KEY POLICIES AND LEGISLATIONS

This Energy Statement responds to the broader set of national, and regional policies outlined below.

3.1 Building Regulations

The Proposed Development will need to comply with Building Regulations AD Part L: Vol 2 England and Wales 2010 (2021 edition). These regulations (Conservation of fuel and power) are focused on limiting the carbon dioxide emissions and establish that the Building Emission Rate (BER) and Building Primary Energy Target (BPER) must not be greater than the Target Emissions Rate (TER) and Target Primary Energy Rate (TPER) set through the National Calculation Methodology (NCM).

3.2 National Planning Policy Framework (NPPF)

The Government has set out a planning policy framework guidance in the National Planning Policy Framework (NPPF) (Dec 2024), in which planning authorities can prepare and apply their development plans. Fundamental to this guidance is the requirement to meet sustainable development objectives.

The NPPF covers a wide range of planning issues from promoting sustainable transport to facilitating the sustainable use of minerals. Climate change is covered in section 14 'Meeting the challenge of climate change, flooding and coastal change'. In summary the framework advises:

"Plans should take a proactive approach to mitigating and adapting to climate change, taking into account the long-term implications for flood risk, coastal change, water supply, biodiversity and landscapes, and the risk of overheating from rising temperatures. Policies should support appropriate measures to ensure the future resilience of communities and infrastructure to climate change impacts, such as providing space for physical protection measures, or making provision for the possible future relocation of vulnerable development and infrastructure.

New development should be planned for in ways that:

- Avoid increased vulnerability to the range of impacts arising from climate change. When new development is brought forward in areas which are vulnerable, care should be taken to ensure that risks can be managed through suitable adaptation measures, including through the planning of green infrastructure; and
- Can help to reduce greenhouse gas emissions, such as through its location, orientation and design. Any local requirements for the sustainability of buildings should reflect the Government's policy for national technical standards.
- To help increase the use and supply of renewable and low carbon energy and heat, plans should:
- Provide a positive strategy for energy from these sources, that maximises the potential for suitable development, while ensuring that adverse impacts are addressed satisfactorily (including cumulative landscape and visual impacts).
- Consider identifying suitable areas for renewable and low carbon energy sources, and supporting infrastructure, where this would help secure their development.
- Identify opportunities for development to draw its energy supply from decentralised, renewable or low carbon energy supply systems and for co-locating potential heat customers and suppliers."

Local planning authorities should support community-led initiatives for renewable and low carbon energy, including developments outside areas identified in local plans or other strategic policies that are being taken forward through neighbourhood planning.

In determining planning applications, local planning authorities should expect new development to:

- Comply with any development plan policies on local requirements for decentralised energy supply unless it can be demonstrated by the applicant, having regard to the type of development involved and its design, that this is not feasible or viable.
- Considering landform, layout, orientation, massing and landscaping to minimise energy consumption.

When determining planning applications for renewable and low carbon development, local planning authorities should:

- Not require applicants to demonstrate the overall need for renewable or low carbon energy and recognise that even small-scale projects provide a valuable contribution to cutting greenhouse gas emissions.
- Approve the application if its impacts are (or can be made) acceptable. Once suitable areas for renewable and low carbon energy have been identified in plans, local planning authorities should expect subsequent applications for commercial scale projects outside these areas to demonstrate that the proposed location meets the criteria used in identifying suitable areas."

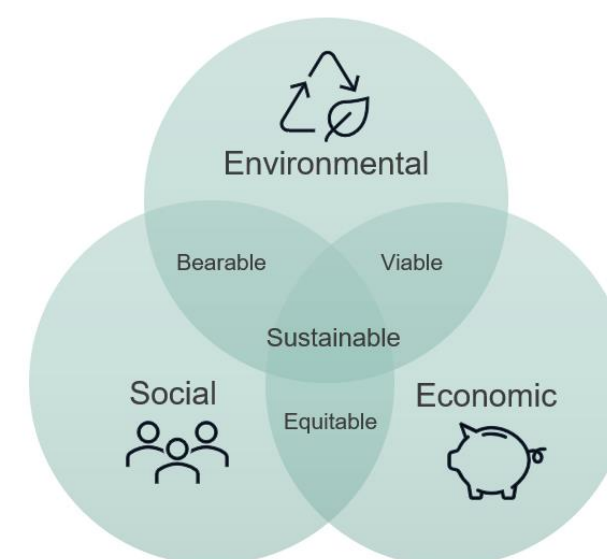


Figure 4: Pillars of Sustainability

Sustainable Development is achieved through the three pillars of sustainability integrated into the national planning framework:

Environmental: Addresses pollution control, habitat preservation, and responsible resource management.

Social: Promotes social equity, community well-being, and inclusive development.

Economic: Encourages responsible business practices, job creation, and long-term economic resilience.

Refer to: National Planning Policy Framework (2024) for further details.

3.3 MANCHESTER CORE STRATEGY – ADOPTED 2012-2027

The Manchester Core Strategy is the city's main planning document, guiding development until 2027. It sets out policies for sustainable growth, influencing decisions on housing, transport, employment, and the environment. Its purpose in planning applications is to ensure developments align with Manchester's long-term vision for economic and social growth while promoting sustainability and high-quality design. Proposals should support carbon reduction, well-connected communities, and the protection of green spaces and heritage assets. Developers must demonstrate how their plans meet these policies to secure approval.

3.3.1 Policy EN4

Policy EN4 of Manchester's Core Strategy focuses on reducing CO₂ emissions by enabling low and zero carbon development. Beyond the emphasis on the energy hierarchy, the policy encourages developments to integrate on-site renewable energy generation, such as solar panels or wind turbines, to supply a portion of their energy needs. It supports the development and connection to district heating networks, which distribute heat generated from a central source to multiple buildings, improving energy efficiency. The policy also promotes the use of low-carbon technologies, including combined heat and power systems and heat pumps. Additionally, it advocates for retrofitting existing buildings with energy-efficient measures to reduce their carbon footprint. These initiatives aim to facilitate the transition to a low-carbon city by integrating sustainable energy solutions into both new and existing developments.

The development adheres to the energy hierarchy by integrating highly efficient thermal elements (section 5), which reduces the heating demand of the building and therefore lowering the energy consumption. The use of renewable technologies has been incorporated into the design and an LZC feasibility study forms as part of this energy strategy. Air Source Heat Pumps have been included for the heating and domestic hot water, and photovoltaic panels have been included into the roof plan, utilising space where possible. The development is not able to connect to an existing district network due to practical and economical constraints, however sustainability is at the forefront of the design with low energy lighting and highly efficiency heat recovery systems integrated, meeting the policy requirements.

3.3.2 Policy EN5

Policy EN5 of Manchester's Core Strategy focuses on promoting renewable energy within the city. It encourages the integration of renewable energy technologies, such as solar panels and wind turbines, into new developments and existing structures. The policy also supports the establishment of district heating networks and other decentralised energy systems to enhance energy efficiency and reduce carbon emissions. Additionally, EN5 advocates for retrofitting existing buildings with energy-efficient measures to improve their environmental performance. These initiatives aim to transition Manchester towards a more sustainable, low-carbon future by incorporating renewable energy solutions into urban planning and development.

As referenced in the previous section, renewable technologies have been incorporated where feasible, and this has been especially utilised in place of district heating to show that the design has fully considered carbon reduction. The development achieves a 6% reduction over Approved Document L 2021 ensuring compliance with the current building regulations and improving upon them.

3.3.3 Policy EN6

Policy EN6 of Manchester's Core Strategy sets out a framework for reducing CO₂ emissions through the use of low or zero carbon energy supplies in new developments. It establishes a series of targets for CO₂ reduction relative to Building Regulations, encouraging developers to adopt measures that contribute to a more energy-efficient built environment. The policy supports the integration of renewable energy technologies, such as solar panels and heat pumps, alongside improvements to building design to minimise energy demand. Additionally, it promotes the development of decentralised energy networks, including district heating systems, to enhance energy efficiency and reduce reliance on fossil fuels. By implementing these measures through the incorporation of the energy hierarchy, Policy EN6 aims to facilitate Manchester's transition to a low-carbon future, ensuring that new developments contribute to the city's sustainability and emissions reduction goals.

Similar to that of the other policies referenced under the core strategy, this development adheres to the energy hierarchy to ensure passive design considerations to reduce energy consumption through lower demand. Furthermore, the development has adopted two types of renewable technologies to ensure carbon reduction and utilise the technologies available to support Manchester's goals to push towards a more sustainable city.

3.4 PLACES FOR EVERYONE JOINT DEVELOPMENT PLAN – ADOPTED 2024-2039

Places for Everyone is a joint development plan for nine Greater Manchester boroughs, replacing individual local plans, including the Manchester Core Strategy. It sets out a strategic framework for housing, employment, infrastructure, and the environment up to 2039, with a focus on sustainable growth and reducing carbon emissions.

It supersedes the Manchester Core Strategy by providing a broader, region-wide approach to development, ensuring consistency across Greater Manchester. While the Core Strategy focused specifically on Manchester, Places for Everyone introduces a unified vision for the wider city-region, shaping future planning decisions and policies at a higher level.

3.4.1 JS – S1 Sustainable Growth

This policy focuses on ensuring that Greater Manchester's growth is balanced, sustainable, and inclusive. It encourages developments that provide a mix of homes, jobs, and community amenities, while prioritising environmental protection and social wellbeing. Specific to energy efficiency, it is expected that the development will apply a Net Zero approach to the carbon emissions as laid out under the UK Green Building Council. Unregulated energy should be reported with regulated energy and new developments must follow the energy hierarchy, with any carbon emissions remaining after this has been demonstrated, offset through payment.

The development has been shown to adhere to the UK Green Buildings council with a yearly energy consumption of 55kWh/sqm/yr. The energy consumption is based off a baseline operational model produced with guidance from Unite Students, the Cumming group and historic data. A full CIBSE TM54 analysis will be undertaken at a later stage to ensure the development remains in line with the results produced in this report and that the operation of the building does not exceed the target.

3.4.2 JS – S2 Carbon and Energy

This policy sets a clear ambition for Greater Manchester to become a zero-carbon city-region by 2038. It requires new developments to contribute to reducing carbon emissions through energy efficiency measures, the integration of renewable energy sources, and the use of low-carbon technologies. The aim is to drastically reduce the city's overall carbon footprint by ensuring that all new developments meet high environmental standards. From adoption of this plan, new developments must be 'Net Zero' as defined by the UK Net Zero Carbon Buildings Standard, if

technically feasible. All non-residential developments must achieve BREEAM 'Excellent' for ENE01 and demonstrate how the site has reduced carbon emissions, along with overheating risks.

As mentioned regarding the previous development, there is a target to be Net Zero where feasible and this development shows achievement of this through a low heating demand and good management of energy consumption. The development also achieves BREEAM 'Excellent' as required and complies with Approved Document O to mitigate overheating through daytime natural ventilation and boosted ventilation at night when needed. Within the Appendix, the overheating report has been attached.

3.4.3 JS – S3 Heat and Energy Networks

This policy promotes the use of district heating systems and local energy networks to provide sustainable energy solutions across the region. It encourages new developments to connect to existing or planned heat networks, which can significantly reduce carbon emissions and improve energy efficiency. The policy supports the development of resilient, low-carbon energy infrastructure to help meet the region's long-term energy needs and ensure that growth is supported by sustainable energy systems. New residential schemes that exceed 1000m² must connect to existing or planned network if 500m within network unless able to provide effective alternative to reducing carbon emissions or if not financially/practically viable.

This development is over 500m away from existing network and would also require major infrastructure works in order to reach the Proposed Site. With this in mind, the development will provide viability to connect in the future to new District Heat Networks.

4. LZC Feasibility Review

As part of the energy strategy, a review of the potential low or zero carbon technologies has been conducted, due to the positive impact that implementation would have on the design. Renewable energy is defined as energy derived from energy flows that occur naturally and repeatedly in the environment. It may be contrasted with energy sources that can be depleted such as fossil fuels or uranium-238-based nuclear power. It therefore follows that the commonly used phrase “equipment to generate renewable energy” is an oxymoron since renewable energy cannot be “generated” – the true function of the technology is to harness a natural energy flow.

Renewable energy technologies, with a couple of exceptions, all utilise energy from the sun – either directly or indirectly, the exceptions being true geothermal, which uses heat from the earth’s core, and tidal / marine current electricity generation which uses the gravitational forces between the earth and the moon, (although some marine currents are also greatly affected by solar energy). Insofar as this report is only concerned with practical options for on-site renewable energy, these options are not considered further. The remaining range of “solar” technologies are however vast, and some would not even appear to be solar on superficial inspection. They can be summarised as follows:

- Solar thermal – direct heating of water for space heating or domestic hot water;
- Photovoltaic – direct generation of electricity from sunlight;
- Hydroelectricity – use of solar (water cycle) driven water flows to generate electricity;
- Wind turbines – use of solar driven air movement to generate electricity;
- Heat pumps – extraction of solar heat from the earth, atmosphere or water bodies.

The technologies, and their potential application to this site are discussed in more detail in the following sections. However, one further pertinent point must be made. The reason for adopting renewable energy technologies is to reduce greenhouse gas emissions – mainly carbon dioxide, and none of the technologies are wholly “zero carbon”. This is because when the whole life cycle is considered, some energy must be put into every system to manufacture and maintain the equipment (which has a finite life) or to operate the equipment, and generally at present this energy is derived from non-renewable sources. Examples include the energy needed to refine and process the silicon used to manufacture photovoltaic panels, the diesel fuel used to transport wood pellets to the development and to power the wood processing machinery, and where applicable to bio-fuels, the energy used to manufacture the fertilizers needed to maintain soil fertility.

Table 1: LZC Feasibility

Technology	Technically Feasible	Further Analysis	Comment
Connection to district heating network (DHN)	N	N	This scheme does not have the capability to connect to the local heat network.
Combined Heat & Power (CHP)	N	N	Heat demand profiles inadequate for installation of CHP unit. Run hours not expected to exceed 4,500hrs/annum required to achieve commercial viability (Carbon Trust). Additional implications on required plant space, nox emissions

			& noise. Not in line with DIO net-zero aspirations
Tri-generation (Tri-Gen)	N	N	No cooling proposed, site not large enough to support viability for cooling export.
Air Source Heat Pump (ASHP)	Y	Y	ASHP have been incorporated into the design for the FOH/communal areas for thermal comfort reasons. ASHP's have been incorporated for the DHW and to provide a wet heating system for the development.
Ground Source Heat Pump (GSHP)	Y	N	Building heating strategy suited to low temperature heating which would make GSHP viable. Whilst viable, and marginally more efficient than ASHPs, the increased cost and technical design considerations around ground conditions, alongside recent improvements in ASHP technologies, make ASHPs or DHN connection a more favourable option
Water Source Heat Pump	N	N	No suitable water source in close enough proximity to the building.
Wind Turbine	Y	N	As a general rule, a wind speed of less than 4.9 m/s is not considered to be sufficient to make wind a viable energy source (Natural Energy). The average wind speeds at the site is 4.9 m/s at 10m agl (NOABL), and therefore this could be viable. However, in addition to planning implications regarding visibility and noise, cost, space requirements and generally poor typical financial payback means this has been discontinued as an option.
Biomass Heating	Y	N	Potentially viable, however would have significant implications on plant space requirements (in addition to space for fuel storage). Higher maintenance costs and frequency, impact on local air quality and concerns regarding sourcing of sustainable fuel have rendered this option not deemed viable for further exploration.
Solar Photovoltaic Panels (PV)	Y	Y	Low roof pitch allows for full roof to be utilised for PV generation. Power generated could be utilised on site, stored or exported, allowing for maximum flexibility and demand response.
Solar Thermal hot water (ST)	Y	N	ST systems would be viable for the site, and could greatly contribute to the reduction in DHW energy consumption. However, the system would be in competition for roof space with the PV arrays, and the increased cost and maintenance requirements make PV a more attractive option for implementation. PV generation could also be used to heat DHW via electric immersion during periods of excess generation, whereas excess ST generation is generally

			wasted.
Hydroelectric generation	N	N	No suitable river sources in close enough proximity to the building
Fuel Cells	Y	N	Potentially viable, however due to enhanced space requirements, infancy of the technology, high costs and relative simplicity of the building, this has not been selected for more detailed analysis.

4.1 Overview of viable LZC technologies

4.1.1 Air Source Heat Pump (ASHP)

A heat pump is a device for transferring heat from a lower temperature heat source to a higher temperature heat sink. This is opposite to the natural flow of heat from a hot source to a cold sink but is made possible by the application of an external energy source to drive a thermodynamic vapour compression cycle.

The important characteristic of a heat pump is that the amount of heat that can be transferred is greater than the energy needed to drive the cycle. Typically, an air source heat pump will generate more than three times as much heat energy as the electrical energy it consumes.

There are two types of commonly available air-source heat pumps, depending on the heat distribution system in the building.

- Air-to-air - The most common is the air-to-air heat pump. It extracts heat/coolth from the outside ambient air and then transfers it to the building via an air conditioning system.
- Air-to-water - The other type is the air-to-water heat pump, which is used in buildings with wet central heating systems.

The current design proposal is for an Air to water heat pumps to provide DHW and heating to the bedrooms/studios and shared kitchens. Air to air heat pumps are to be provided for air conditioning to communal areas.

During the heating season, the heat pump takes heat from the outside air and transfers it to the water in the wet distribution system. The efficiency of a heat pump depends predominantly on the temperature difference between the internal environment and external air source and therefore can significantly vary throughout the year.

4.1.2 Solar Photovoltaic Panels (PV)

Photovoltaic technology – the direct generation of electricity in semi-conductor panels when these are exposed to sunlight, is not new. The first PV cells were demonstrated in the late 1950s although the physics had been known since the beginning of the 20th century.

There are three main types of modern silicon semiconductor panels; monocrystalline; polycrystalline; and thin film; plus a new technology that involves screen printing non-silicon nano-technology inks on to a flexible substrate. In many ways, these products are similar, with outputs ranging from 50 to 300 W/m².

Photovoltaic panels are conceptually straightforward. The panels produce “zero carbon” electricity that is used in place of grid electricity, and the carbon dioxide emissions saved are the emissions that would have occurred had the electricity been produced by a power station feeding the grid.

Photovoltaic panels have certain siting constraints. To produce the maximum output, they should face due south, although south-east to south-west is certainly acceptable, and even east or west will be acceptable if the angle of inclination is no more than 20°.

When not in direct sunlight but shaded by obstacles such as adjacent buildings or trees, the output of the affected panel is significantly reduced. As groups of panels are connected electrically in “series” a reduced output from one panel will reduce the output from all the panels in the group. This means that it is particularly important to avoid over-shading.

Photovoltaic panels have many advantages. They are clean, silent, reliable, low maintenance, and are easy to install. They also have a very long life – up to 40 years – which is at least double that typically quoted for other technologies. In addition, and unlike most solar thermal panels, and most other renewable energy technologies, photovoltaic panels are “zero carbon” in use. They simply produce electricity when exposed to sunlight.

The current proposal has a total of 438m2 of panels (258m2 for phase 1 and 180m2 for phase 2) which provides around 125kW of renewable energy.

5. ENERGY DEMAND AND APPROVED DOCUMENT L CALCUATIONS

5.1 Dynamic Simulation

For the energy assessment, AM11 approved software (IESVE 2023) was used to model the development following the energy hierarchy as referenced in policy BCS14. The energy consumption values illustrated within this report are generated using the National Calculation Methodology and are not a prediction of actual energy consumption. This methodology is used for the calculation of regulation energy, such as space heating and domestic hot water consumption. This development has been simulated under the Approved Document L 2021 under the Manchester TRY05 weather file as referred to in Section 2.1

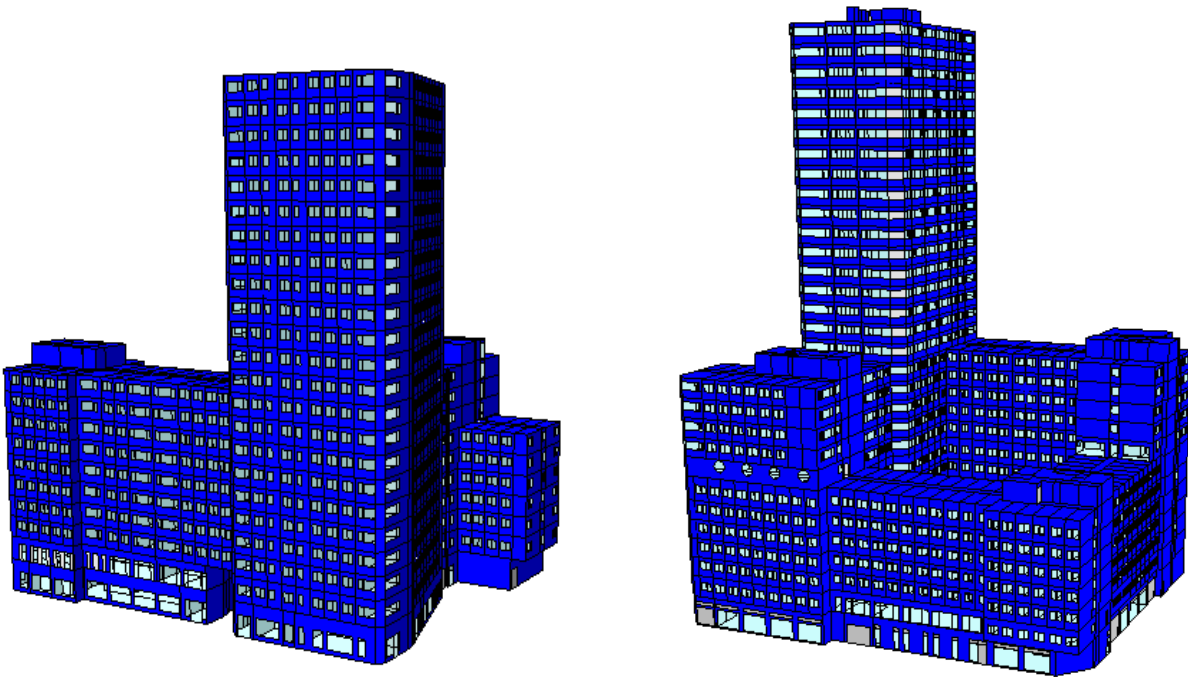


Figure 5: Phase 1 and 2 IES models

5.2 Results

The results following the energy hierarchy are shown in this section and the proposed energy strategy complies with both building regulations and relevant policies for Manchester. For the purposes of planning the commercial areas were included in the dynamic simulation for the energy modelling. It is expected that as design develops these areas will be separated for more specific energy analysis.

5.2.1 Minimising Energy Requirements (Be Lean)

The development incorporates a comprehensive range of passive measures to ensure maximum energy efficiency. Key among these is the implementation of low-energy lighting throughout the premises, significantly reducing both space gain and overall energy demand. Additionally, heat recovery units will be installed in all bedrooms, kitchens, and studios, further enhancing energy conservation by recycling heat that would otherwise be lost.

This development is designed to surpass standard building regulation requirements, boasting excellent U-values indicative of superior insulation. This includes the installation of triple glazing, which dramatically improves thermal performance and energy retention. The glazing design also includes optimal G-values, carefully selected to maximize the building's orientation benefits. During the summer, these G-values help minimize unwanted heat gain, keeping interiors cooler, while in the winter, they allow for advantageous solar gain, contributing to natural heating.

These measures illustrate a strong commitment to the energy hierarchy, emphasizing the reduction of energy demand and the utilization of renewable resources where possible. This strategic approach ensures that the development is not only energy-efficient but also sustainable and environmentally responsible, setting a benchmark for future projects in the region.

The U-values are summarised below:

Table 2: U-values

Thermal Elements	Approved Document L 2021 Limiting U-values (w/m²k)	Proposed Development Design U-values (w/m²k)	Percentage improved over Part L
External Walls	0.26	0.15	42%
Roof (flat)	0.18	0.12	33%
Ground/Exposed Floor	0.18	0.12	33%
Glazing	1.60	0.80	50%
Doors	1.60	1.60	-
Air Permeability (50pa (m³/h.m²))		3	

5.2.2 Incorporating Renewable Energy Sources (Be Clean)

The development cannot practically or economically connect to a district heat network and therefore no saving measurements were incorporated into the design. Provisions for future connections have been provided for both phases.

5.2.3 Incorporating Low-carbon Energy Sources (Be Green)

To show low carbon energy sources, photovoltaic panels and ASHP's for DHW and heating have been included into the design strategy, and this shows a reduction in carbon emissions of 6% and 11% on the target emissions rating, the BRUKL can be seen in the appendices. The following results are 2.85kgCO₂/sqm/annum for Phase 1 and 2.31kgCO₂/sqm/annum for Phase 2.

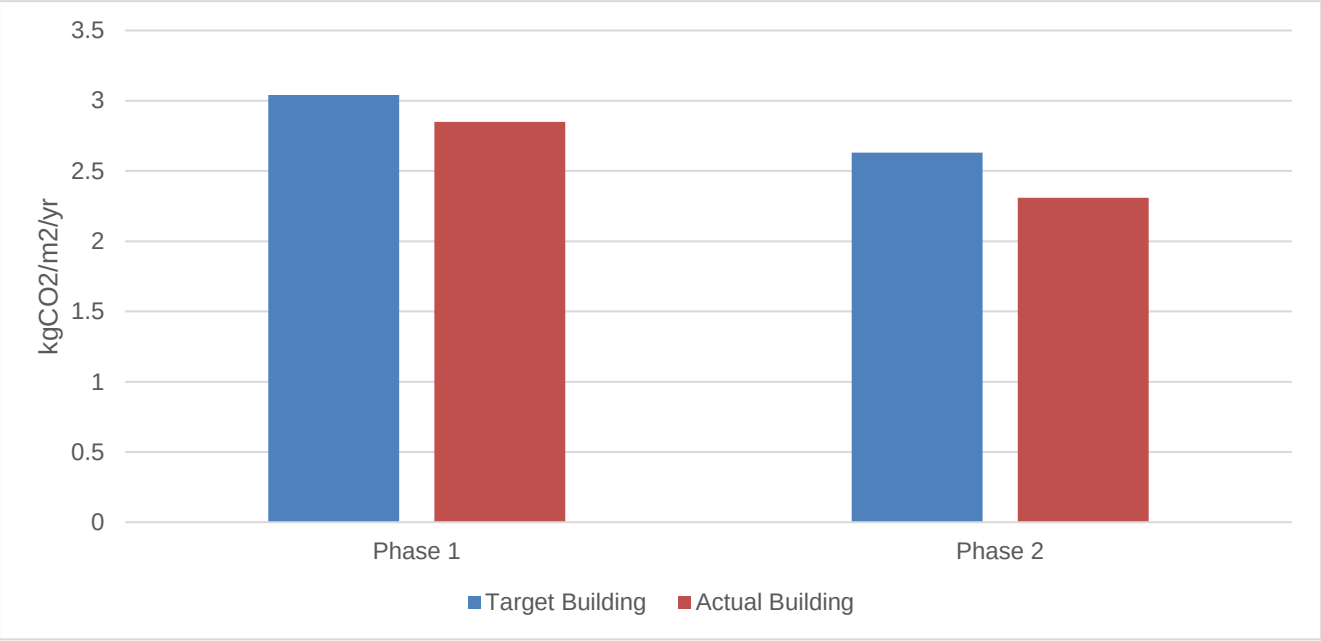


Figure 6: Carbon reduction over Part L 2021

6. Overheating Reporting

As per the cooling hierarchy, the development followed the guidance shown in figure 7.

The development minimises heating generation through the design of the building by incorporating low flow temperatures off for the hot water, and minimising pipe runs through corridors. There are a number of amenity spaces both external and internal to encourage occupants to spend time outside of their rooms which reduces internal gains.

As referenced in section 5.2.1, the development has a highly efficient thermal elements which reduces heat entering, and external shading has been incorporated to limit excessive solar gain. Green roofs have been implemented into this design with photovoltaic panels, this reduces the heat gain through the roof.

To mitigate overheating, natural ventilation is used during the daytime (as per ADO definition) and mechanical ventilation is to be used during the night-time. This is due to the pollution, noise and security risks associated with the development and this has been further explained in the overheating report. No active cooling has been incorporated into the design other than in front of house and communal areas and an overheating report has been provided in the appendices.

A full overheating report has been included as an Appendix.

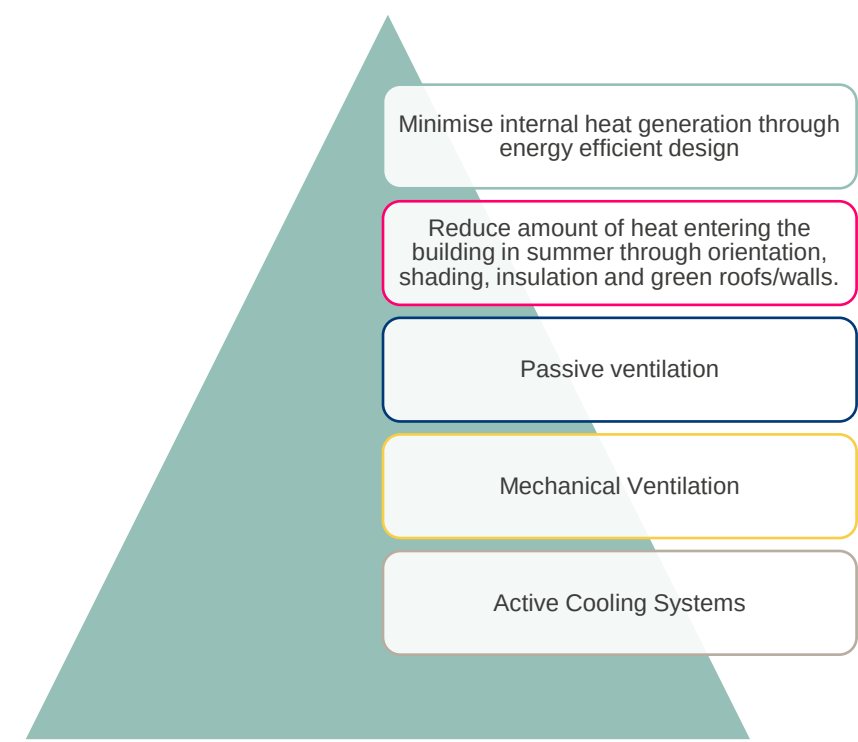


Figure 7: Cooling Hierarchy

The development was assessed to ensure compliance with Approved Document O which refers to the mitigation of overheating in residential developments including student accommodations. The Proposed Site complies with this requirement through the use of natural ventilation during the daytime and additional mechanical ventilation for nighttime boosting to 40l/s. Cooling is only provided for comfort in communal and amenity areas.

7. Conclusions

Following a review of the relevant of National and Local Planning Policies. This Energy Assessment proposed a strategy that positively response to the relevant energy and sustainability policies of Manchester City Council. An overheating assessment risk assessment has been undertaken to show compliance with Approved Document O which aligns with the assumption that windows must be closed at nighttime for noise pollution. The carbon dioxide (CO₂) emissions performance presented in this report has been assessed in line with Manchester City Council against Part L 2021. The Proposed Development has a cumulative CO₂ reduction of 6% when compared to baseline emissions, in accordance with the Energy Hierarchy. The building boasts highly efficient thermal elements, and a combination of energy efficient measures such as photovoltaic panels and low energy lighting.



Figure 8: Architects CGI

APPENDICES

A. MODEL SETTINGS

BSD15299 Cambridge Halls PBSA Model Settings Table (Part L Planning)	
U-Values (w/m²k)	
External Wall	0.15
Floor	0.12
Roof	0.12
External Glazing	0.8
Air Test (50pa (m3/h.m2))	3
Mechanical	
DHW	ASHP
COP	3.5
Storage (L)	6000
Heating/Cooling	ASHP Radiators
SCOP:	3.5
Serving	Bedrooms/Studios/Kitchens
Heating/Cooling	VRF
SCOP/SEER:	4.5/5.5
Ventilation	MVHR
Serving	Amenity and Communal Areas
Specific Fan Power (w/l/s)	0.80
Heat Recovery (%)	80
Electrical	
Lighting (lm/w)	134
Occupancy Sensing	Corridors/Stairs/Lobbies
Power Factor Correction	>0.95
Metering/Warning	Yes
PV Panels (sqm)	438

B. BRUKL Output – Proposed Design

BRUKL Output Document
Compliance with England Building Regulations Part L 2021



Project name
Cambridge Halls PBSA - Phase 1
As designed
Date: Mon Mar 31 17:09:38 2025

Administrative information
Building Details
Address: Address 1, Manchester, Postcode
Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.27
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.27
BRUKL compliance module version: v6.1.e.1
Certifier details
Name: Hannah Ireland
Telephone number: 02079287888
Address: Pickfords Wharf, Clink Street, London, SE1 9DG
Foundation area [m²]: 981.62

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m²:annum	3.04
Building CO ₂ emission rate (BER), kgCO ₂ /m²:annum	2.85
Target primary energy rate (TPER), kWh _{eq} /m²:annum	32.5
Building primary energy rate (BPER), kWh _{eq} /m²:annum	30.57
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

Energy Consumption by End Use [kWh/m²]		
	Actual	Notional
Heating	3.65	4.64
Cooling	0.3	0.24
Auxiliary	7.18	3.18
Lighting	6	7.52
Hot water	5.05	6.37
Equipment*	25.27	25.27
TOTAL**	22.17	21.94

* 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	1.61	0.12
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>1.61</i>	<i>0.12</i>

Energy & CO ₂ Emissions Summary		
	Actual	Notional
Heating + cooling demand [MJ/m ²]	35.77	46.47
Primary energy [kWh _{PE} /m ²]	30.57	32.5
Total emissions [kg/m ²]	2.85	3.04

BRUKL Output Document
Compliance with England Building Regulations Part L 2021



Project name
Cambridge Halls PBSA - Phase 2
As designed
Date: Mon Mar 31 16:46:04 2025

Administrative information
Building Details
Address: Address 1, Manchester, Postcode
Certification tool
Calculation engine: Apache
Calculation engine version: 7.0.27
Interface to calculation engine: IES Virtual Environment
Interface to calculation engine version: 7.0.27
BRUKL compliance module version: v6.1.e.1
Certifier details
Name: Hannah Ireland
Telephone number: Phone
Address: Street Address, City, Postcode
Foundation area [m²]: 794.42

The CO₂ emission and primary energy rates of the building must not exceed the targets

Target CO ₂ emission rate (TER), kgCO ₂ /m²:annum	2.63
Building CO ₂ emission rate (BER), kgCO ₂ /m²:annum	2.31
Target primary energy rate (TPER), kWh _{eq} /m²:annum	28.18
Building primary energy rate (BPER), kWh _{eq} /m²:annum	24.82
Do the building's emission and primary energy rates exceed the targets?	BER =< TER BPER =< TPER

Energy Consumption by End Use [kWh/m ²]		
	Actual	Notional
Heating	1.87	3.54
Cooling	0.27	0.19
Auxiliary	5.31	2.34
Lighting	5.4	7.17
Hot water	4.88	5.69
Equipment*	23.79	23.79
TOTAL**	17.73	18.94

* 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	0.99	0.01
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
<i>Displaced electricity</i>	<i>0.99</i>	<i>0.01</i>

Energy & CO ₂ Emissions Summary		
	Actual	Notional
Heating + cooling demand [MJ/m ²]	24.87	38.38
Primary energy [kWh _{pe} /m ²]	24.82	28.18
Total emissions [kg/m ²]	2.31	2.63

C. Overheating Report

Separate Submission

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We deliver progressive, sustainability-driven environmental and engineering consultancy services across every sector. We think differently, and we're harnessing our collective expertise to deliver greener, healthier and well-connected communities, networks and built environments.

Based in strategic locations throughout the UK and Ireland, our team of specialists is at the forefront of tackling the climate emergency and forging a path to a Net Zero built environment.

UK & Ireland Office Locations

