

PROJECT | CHRISTIE HOSPITAL NORTHERN PATHOLOGY

ENERGY STATEMENT

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Version History

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P01	June 25	RIBA Stage 3	Issued for Planning.
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1 EXECUTIVE SUMMARY

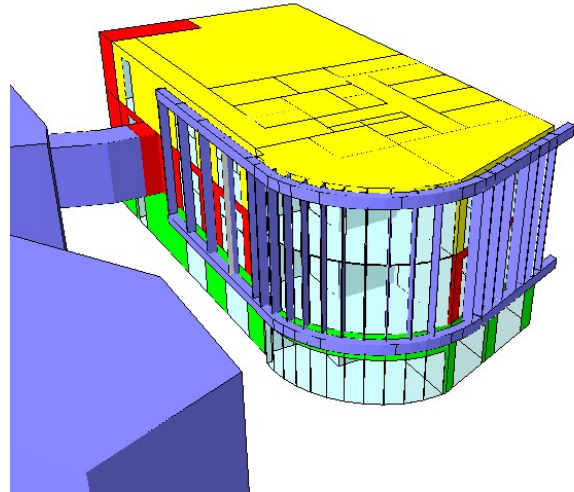
This assessment report has been developed on behalf of Northern Pathology Developments Ltd, in support of the proposed Christie Northern Pathology development.

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.

- The Proposed Development has a cumulative CO2 reduction of 7.5% 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:

- Full-electric building heated by Air Source Heat pumps.
- Domestic Hot Water from air source as well.
- Efficient air handling serving all laboratories and ancillary spaces – low SFP and high efficiency heat recovery.
- Cooling delivered by efficient, low SFP, Fan Coil Units where required.
- High efficacy LED lighting and energy-saving controls.
- Photovoltaic array occupying approximately 120m² of roofspace.



2 INTRODUCTION

This Energy Statement has been prepared by DSSR Ltd. They have been appointed by Northern Pathology Developments Ltd (the Client) to undertake energy assessments for a proposed new Pathology Development at Christie Hospital in south Manchester. This statement shall accompany an application for planning permission.

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 include passive design, and low and zero carbon technologies such as connecting to the local district heat network. All assessment has been done considering the Project's anticipated usage, architecture, and HVAC servicing strategy.

The energy strategy follows the energy hierarchy as proposed by Manchester City Council.

The proposed works will involve the construction of a new 3-storey building housing laboratories, offices, and ancillary spaces. A link bridge shall connect from the first floor into the existing Christie Hospital Estate.

2.1 SITE LOCATION AND DESCRIPTION

The development is situated in the Withington suburb of Manchester, bordering the main hospital site.



Figure 1: Site location plan (circled)

The development has been assessed under the local CIBSE TRY05 weather file:

- Location: Manchester.
- Terrain exposure type: Suburbs

3 KEY POLICIES AND LEGISLATION

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.

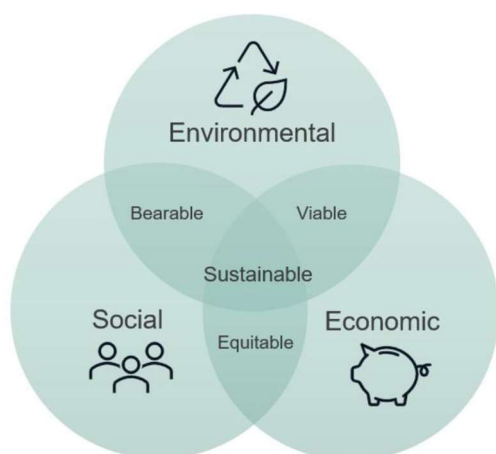
In determining planning applications, local planning authorities should expect new development to:

- 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.”

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.

Figure 4 (NPPF): Pillars of sustainability

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.

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.

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 JP – S1 SUSTAINABLE GROWTH

This strategic policy focuses on creating a "Thriving and Sustainable City". It aims to improve Manchester's economic performance, spread the benefits of growth, and create inclusive, sustainable communities. This involves developing a knowledge-based economy, fostering an entrepreneurial community, and ensuring a skilled and inclusive workforce. The policy also emphasizes making Manchester a desirable place to live, visit, and work, with world-class infrastructure and connectivity.

The policy's key objectives point to addressing climate change through sustainable design and adaptation. It also points toward the emergent UK Green Building Council's net zero advice, and the (yet to be published) Future Homes Standard.

3.4.2 JP – 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.

3.4.3 JP – 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.

3.5 GMCA NET ZERO DESIGN GUIDANCE

Greater Manchester Combined Authority (GMCA) provides a set of Net Zero guidance documents to support its commitment to becoming carbon neutral by 2038. These resources include design guidance for Net Zero

buildings, low carbon heat strategies, and submission guidance for planning applications. The aim is to ensure new developments are designed and constructed to minimize carbon emissions and contribute to the region's overall net zero goals.

Here's a breakdown of the key elements:

1. **Net Zero Commitment:** The GMCA has committed to becoming carbon neutral by 2038 and has set a target to build 30,000 Net Zero social rented homes by 2038.
2. **"Places for Everyone" Plan:** This plan, which includes the GMCA's Net Zero policies, aims for new developments to be Net Zero Carbon by taking into account total emissions from 2025 and all emissions from 2028.
3. **Guidance Documents:**

- **Design Guidance for Net Zero:**

This guide provides a framework for designing energy-efficient and low-carbon buildings, including strategies for reducing operational and embodied carbon.

- **Low Carbon Heat:**

This document focuses on heating options for achieving net zero, considering factors like energy efficiency, cost, and reliability.

- **Submission Guidance:**

This guide simplifies planning application requirements, detailing how to complete the Energy and Carbon Proforma and Energy and Carbon Statements.

4. **Key Principles:** The guidance emphasizes prioritizing the reduction of on-site emissions, minimizing the need for offsets, and maintaining transparency in calculations and reporting.
5. **Proforma:** An Energy and Low Carbon Proforma is provided to help applicants demonstrate compliance with the policy requirements.
6. **Future Updates:** The guidance documents are designed to be updated periodically to reflect advancements and address the needs of developers and local authorities.

This Project:

The project area, according to BRUKL is 1362 m². However, this includes a substantial amount of plant area that may be coordinated outside of the thermal envelope. It is therefore on the cusp of the minor/ major sized development category.

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 nuclear power.

Renewable energy technologies typically utilise energy from the sun - either directly or indirectly, the exceptions being 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. 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 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.

4.1 REVIEW OF LZC TECHNOLOGIES

The technologies, and their potential application to this site are discussed in more detail in the following section.

Table 1: Low and zero carbon sources feasibility discussion

Solar Photovoltaics	
<i>Overview</i>	Photovoltaic (PV) modules convert sunlight directly to DC electricity. The solar cells consist of a thin piece of semiconductor material, in most cases silicon. When sunlight shines on the cell it creates an electric field causing electricity to flow, the greater the light intensity, the greater the flow of electricity. Individually, PV cells only provide a small amount of electricity, and they are grouped together into a module for convenience and higher output.
<i>Status</i>	Recommended
<i>Reasons</i>	Solar Photovoltaics are generally a feasible technology due to their flexibility in urban environments. Extensive and accessible roof space lends itself to ease of installation. There is also synergy between the facility's anticipated increase in cooling energy use on hot days, and potential to offset it with PV. This can limit the facility's peak electrical demand in summer.
Solar thermal	
<i>Overview</i>	Solar Water Heating systems use radiant energy from the sun to heat water for Domestic Hot Water systems or heating systems pre-heat. Solar hot water systems are most effective when used on buildings with year-round demand. There is a risk of these systems overheating when demand is low. Appropriate management

	strategies, heat dumps, and/or covers to Block the sun must be included to mitigate the risk of the system breaking. Associated additional capital expenditure and maintenance risk must be considered in the feasibility.
<i>Status</i>	Not recommended
<i>Reasons</i>	The facility will have limited hot water heat demand. Hot water shall be generated efficiently using heat pumps. The PV system will further offset the electricity used for hot water generation.
Biomass	
<i>Overview</i>	Biomass boilers burn wood fuel or other bio-fuel sources to generate heat. These boilers can operate at high efficiencies, albeit not as high as condensing gas boilers. Maintenance can be a challenge. Ash waste must be managed, and they typically require a large fuel store to maintain continuous operation during the winter months.
<i>Status</i>	Not recommended
<i>Reasons</i>	The area required for biomass plant and its associated storage is high. Furthermore, fuel deliveries can prove difficult, and security of fuel supply is an important consideration. These systems are usually backed up with a fossil fuel input source. Additionally, high maintenance implications and air quality implications mean that biomass boilers are not considered a suitable technology for the scheme.
Ground Source Heat Pump	
<i>Overview</i>	Space heating and cooling can be provided by circulating water through the ground or via subterranean water. Ground water cooling and heating makes use of the relatively stable ground/water temperatures throughout the year, typically ranging between 10 – 14°C. Depending on whether it is in heating or cooling mode, the heat pump extracts or rejects heat to the ground via a ground contacting heat exchanger. Ground source heat pumps require no flues and have no acoustic issues.
<i>Status</i>	Not Recommended
<i>Reasons</i>	The system would require extensive below ground works to bury and install the system on site, which is unfeasible given existing site boundary.
Air Source Heat Pumps	
<i>Overview:</i>	An air source heat pump extracts heat from the outside air in the same way that a fridge extracts heat from its inside. It can extract heat from the air even when the outside temperature is as low as minus 15°C. The cycle can be reversed to also provide cooling. The heat pump extracts or dumps heat to the air via a heat exchanger.
<i>Status</i>	Recommended
<i>Reasons</i>	Due to grid decarbonisation, it is expected that ASHP technology will offer significant carbon emission reductions over a gas boiler baseline scenario. Implementing heat-pump technology brings the additional benefit of a shift towards combustion-free development, with the associated benefit to local air quality.

Water source heat pumps	
<i>Overview:</i>	Water source heat pumps use bodies of water, such as rivers, lakes, or oceans to provide heating or cooling energy to a building.
<i>Status</i>	Not recommended
<i>Reasons</i>	As there are no such bodies of water are close enough to the site, this technology is not considered suitable.
Wind turbines	
<i>Overview:</i>	Wind turbines harness energy from wind to move turbine blades and drive a generator, producing electricity. For efficient operation and to yield high energy output, wind turbines require a consistent flow of air.
<i>Status</i>	Not recommended
<i>Reasons</i>	Where development is located within a low-lying, sheltered environment, wind flow profiles can be erratic and consequently not conducive to high annual yields. The development is also low-rise, where wind speeds are slower. Mounting wind turbines on the roof of the building could also result in unacceptable vibration and resonance being felt within occupied spaces. The turbines are also likely to generate noise which may be a nuisance to any neighbouring properties.

4.2 SELECTED LZC TECHNOLOGIES

The following complimentary LZC technologies have been selected:

- Air Source Heat Pumps
- Photovoltaics

4.2.1 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.

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.

Proposed ASHP

The current design proposal is for air to water heat pumps to provide DHW and heating via the integrated heating and cooling system.

4.2.2 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. Outputs ranged from 50 to 300 Watts per square metre of installed panel.

Typically comprising of an external array, DC cabling, and an inverter to convert DC to AC electricity, photovoltaic panels are relatively 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 from other grid sources – a large portion of which are fossil fuels.

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.

Proposed PV

The current design proposal takes advantage of rooftop space set aside for PV.

- Rooftop drawings showing notional PV layout – see below.
- Confirmed space availability for PV: 120m²
- Assumption: 80% fill factor, therefore array area: 96 m²
- Typical 22% efficiency
- Panels facing due south, with 10° tilt
- Yield: 17,400 kWh/ann.

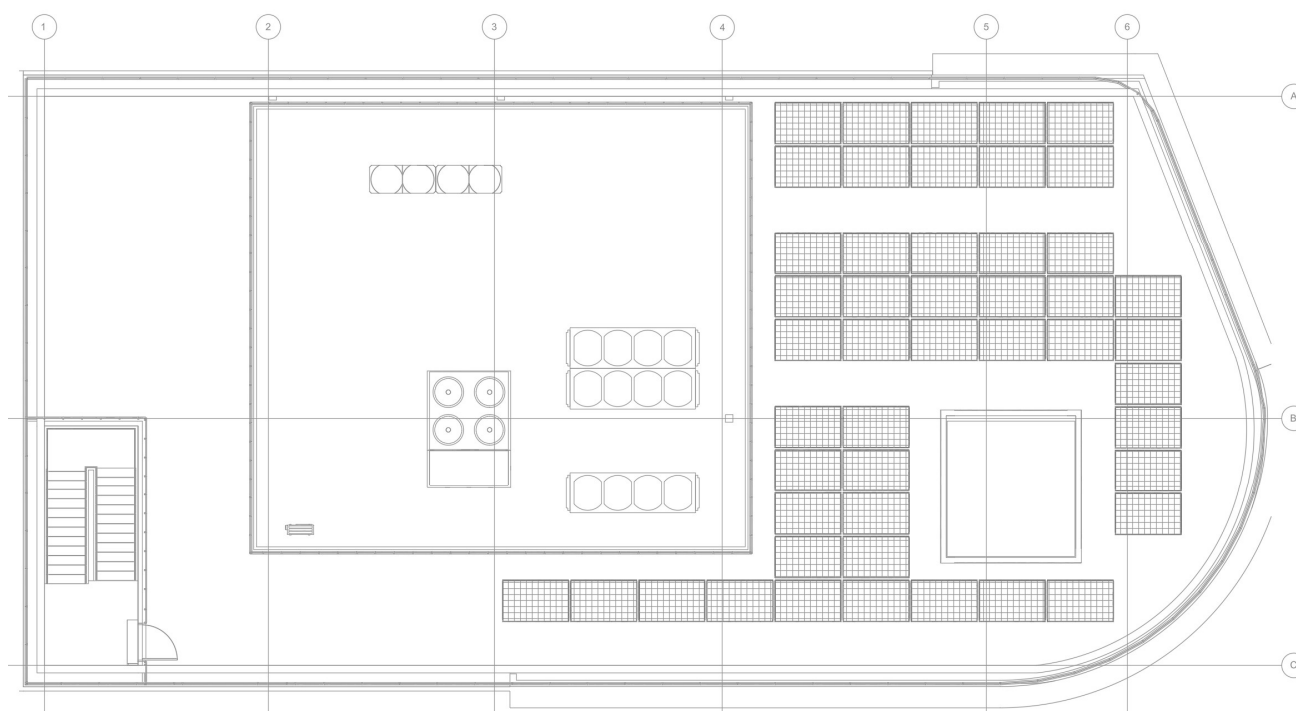


Figure 2: Roof plan with PV allocation (hatched)

5 ENERGY ASSESSMENT

5.1 DYNAMIC SIMULATION

For the energy assessment, AM11 approved software was used to model the development following an energy hierarchy. The energy consumption values illustrated within this report have been generated using the National Calculation Methodology. This methodology is used for the calculation of regulation energy, such as space heating and domestic hot water consumption.

- Near field shading, overhangs, and nearby buildings have been modelled where relevant.
- Shading devices have been modelled.
- HVAC was modelled with basic Apache systems.
- Software used: IES Virtual Environment 2024
- The analysis was undertaken by a professionally qualified person (C Eng MCIBSE) experienced in energy and comfort modelling.

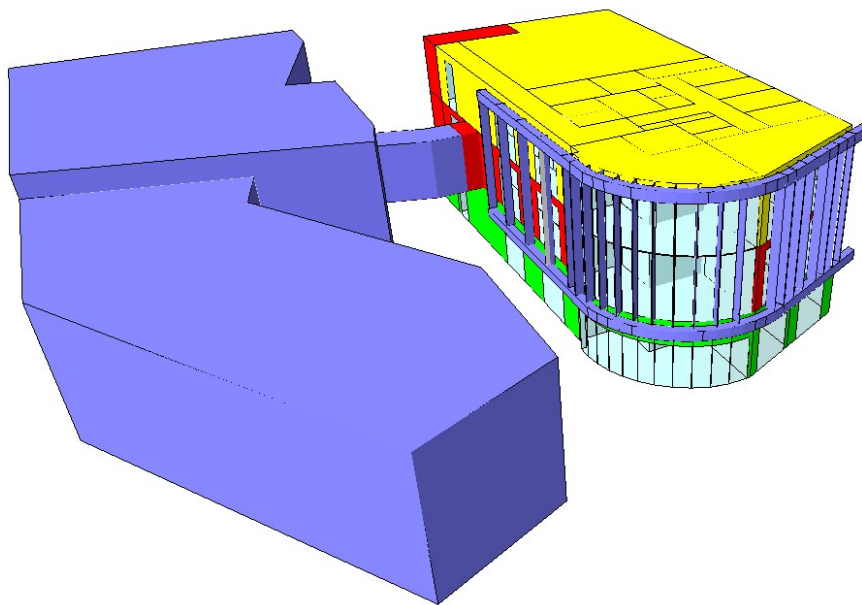


Figure 3: View from Southeast of analysis model

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 ventilation serves all main spaces further enhancing energy conservation by recycling heat that would otherwise be lost.

This development is designed to surpass standard building regulation requirements, with U-values exceeding the requirements. This includes the installation of solar control glazing, which dramatically improves cooling and comfort performance. The glazing design includes optimal G-values and exterior shading elements.

These measures adhere 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.

Table 2: element u-values

Element	Approved Document L 2021 Limiting U-values (W/m ² k)	This project U-values (W/m ² k)	GMCA net zero advice	Percentage improved over Part L
External Wall	0.26	0.20	0.18	23%
Ground/Exposed Floor	0.18	0.18	0.15	0%
Roof	0.18	0.18	0.13	0%
Glazing	1.6	1.6	1.6	0%
Doors	1.6	1.6	1.5	-
Air permeability		5.0	3	

Summary of “Be Lean” improvements:

- Fabric improvement.
- Low-SFP, high heat recovery efficiency air handling.
- Efficient cooling.
- Solar shading and solar glazing specification.
- High efficacy lighting with extensive energy saving controls.

For a more comprehensive summary of model inputs, see Appendix “Model inputs”.

GMCA Net Zero Design Guidance

Table 3: GMCA Net Zero Design Guidance Metrics

Element	GMCA net zero advice	This project	Compliant?	Notes
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Space heating demand (kWh/m²/yr)	≤ 15	26.4	No	Demand increased due to laboratory ventilation requirements.
Space cooling demand (kWh/m²/yr)	≤ 15	13.2	Yes	
Form factor	≤ 2	1.5	Yes	
Energy Use Intensity (EUI)	BREEAM Excellent	--	No	T.B.C.
PV footprint area	Required	~ 120 m2 of roof set aside	Yes	
Fossil fuel free	Required	Complies	Yes	
Comfort/ TM52	Required	Close environmental control and containment requirements	No	The comfort requirements are defined in the (more stringent) HTM03-1A.
Upfront embodied carbon	Summary of efforts	--	No	T.B.C.

5.2.2 INCORPORATING LOW CARBON HEAT (BE CLEAN)

The facility shall be served by heat pumps and will be “heat network ready”. A low carbon heat appraisal has not been completed (GMCA Net Zero Guidance for Major developments).

- The development cannot, at present, practically or economically connect to a district heat network and therefore no saving measurements were incorporated into the design.
- The development site is in the proximity of the Christie Hospital’s (now aging) heat network infrastructure.
- It is also located on the edge of the suburban Manchester areas identified as being within a potential heat network zone (GMCA Heat Network Zoning Map).
- Provisions for future connections shall be provided in the plant room.

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.

- The adopted measures result in a carbon saving of 7.5% over Part L 2021.

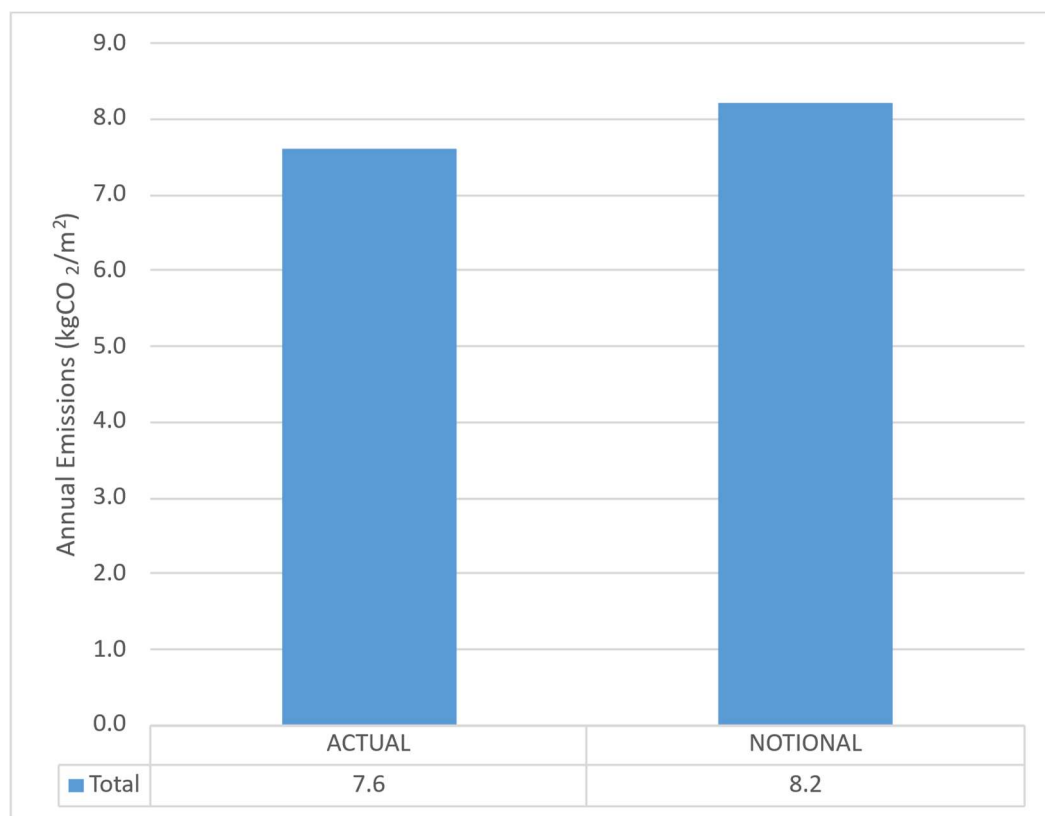


Figure 4: Carbon reduction over Part L 2021

6 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. The Proposed Development has a cumulative CO2 reduction of 7.5% 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.

- The required performance metrics have been added to the Net Zero Energy and Carbon Proforma.

APPENDIX A – MODEL INPUTS

Item		Description
<i>Building envelope</i>		
U-values		See Table 2: element u-values
Air permeability		
<i>Mechanical</i>		
ASHP	SCOP	3.15
Chiller	SEER	4.38
AHUs, Fans and MVHR	SFP and Heat recovery	1.7 W/l/s & 89%
Coils	LTHW, CHW, electric resistance	LTHW and CHW
Radiators/ radiant panels	LTHW or electric	LTHW
Split systems	SCOP/ SEER	One small comms room
Terminal SFP	W/l/s	0.2
DHW ASHP	SCOP	SCOP 2.7
<i>Electrical</i>		
Lighting	Luminaire efficacy	110 Lumens per circuit-watt
Controls	Occupancy sensing	• Circulation • Offices • Stores • Toilet and changing
	Daylight dimming	• Spaces with an exterior window
Power Factor Correction	Limited lagging to:	• 0.9 – 0.95
Automatic Monitoring and Targeting	Via BMS	YES
Photovoltaics	PV array	See section: 4.2.2 Solar Photovoltaic Panels (PV)

APPENDIX B – BRUKL OUTPUT

Excerpt from BRUKL certificate.

Technical Data Sheet (Actual vs. Notional Building)

Building Global Parameters			Building Use	
	Actual	Notional	% Area	Building Type
Floor area [m ²]	1362.1	1362.1		Retail/Financial and Professional Services
External area [m ²]	2038.3	2038.3		Restaurants and Cafes/Drinking Establishments/Takeaways
Weather	MAN	MAN		Offices and Workshop Businesses
Infiltration [m ³ /hm ² @ 50Pa]	5	3		General Industrial and Special Industrial Groups
Average conductance [W/K]	725.65	778.72		Storage or Distribution
Average U-value [W/m ² K]	0.36	0.38		Hotels
Alpha value* [%]	25.06	10	100	Residential Institutions: Hospitals and Care Homes
* Percentage of the building's average heat transfer coefficient which is due to thermal bridging				
Residential Institutions: Residential Schools				
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/m²]

	Actual	Notional
Heating	9.01	6.04
Cooling	3.7	3.9
Auxiliary	26.83	26.22
Lighting	22.08	22.2
Hot water	5.03	1.85
Equipment*	132.71	132.71
TOTAL**	66.65	60.21

* 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/m²]

	Actual	Notional
Photovoltaic systems	12.8	0
Wind turbines	0	0
CHP generators	0	0
Solar thermal systems	0	0
Displaced electricity	12.8	0

Energy & CO₂ Emissions Summary

	Actual	Notional
Heating + cooling demand [MJ/m ²]	142.68	125.45
Primary energy [kWh _{PE} /m ²]	81.33	89.1
Total emissions [kg/m ²]	7.6	8.22

