NXQ

Lever Street, Manchester

Energy Statement

Revision P01, 01.03.2024

Howells

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Document information

Report title:	Energy Statement
Project name:	The NXQ Building, Lever Street
Project number:	60035
Digital file name:	60035 Lever Street Energy Statement 2024.03.01 RevP01
Digital file location:	V:\60035 Lever Street Manchester\12. A10 Reports\Stage 2 Concept Design

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Revisions

No	Date	Approved
P01	01.03.2024	NH

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Site address: Land bound by Lever Street, Great Ancoats Street, Little Lever Street and Houldsworth Street, Manchester.

Grid reference: X: 384725 Y: 398587

Client: Soller Nine

Project Name: The NXQ Building

This Energy Statement is submitted to accompany a planning application submitted by Soller Nine ('The Applicant') who is seeking detailed planning permission ('the application') for the construction of an office led development on the site of Lever Street.

The description of the Proposed Development is:

Full planning application for part-retention, conversion and extension of existing buildings; selective demolition; the erection of a ground floor + 17 storey building comprising new office space (Use Class E) with ground floor reception area and ancillary uses; supporting infrastructure and ancillary facilities, roof top plant, and landscaping.

This Energy Statement is part of a suite of documents, agreed at the pre-application advice stage, to support this major application.

Executive summary

Sustainability is a fundamental aspect of the NXQ Building's office development. High standards of energy performance have been applied to the building design that will reduce its operational energy and associated carbon emissions. This includes using electric Air Source Heat Pumps (ASHP) to deliver low carbon (fossil fuel free) heating and photovoltaic panels for electricity generation.

The project is implementing the BREEAM assessment methodology as part of its sustainability response, with Excellent certification targeted.

The following Energy Statement supports the detailed planning application for the NXQ Building and contains the compliance modelling results regarding the betterment over Part L 2021, BREEAM Excellent requirements and local planning policies.
The analysis shows that compliance with local Manchester Council planning and the Ene01 BREEAM Excellent prerequisite has been achieved through a combination of high fabric performance and system efficiencies outlined in this report.

Measure	Result
HVAC System	HVRF
Renewables	ASHP & ~100m² PV
BER kgCO_2/m²	2.73
TER kgCO_2/m²	3.12
% BER/TER Betterment over Part L 2021	13.9%
BPER kWh/m²	29.58
TPER kWh/m²	34.13
% BPER/TPER Betterment over Part L 2021	15.4%
BREEAM Ene01 Credits achieved	6
Part L 2021 Compliance Achieved	✓
15% pass over Part L 2010 (Policy EN 6)	✓
Prerequisite for BREEAM Excellent Achieved (min. 4 credits)	✓

In terms of the development's energy strategy, a hierarchy process of reducing energy demand through enhanced fabric thermal performance has been applied, followed by using highly efficient equipment and low carbon technologies. A key element of the proposals includes the use of air source heat pumps as the heat generating technology for space heating. This low carbon technology will allow the building to achieve net zero carbon in operation as the national grid decarbonises, while also delivering a fossil fuel-free development as an all-electric building.

The energy and building services strategies outlined in this report demonstrate compliance with Section 6 (Energy) of the Scottish Technical Standards and the requirements of local Manchester Council Planning for the development.

The opportunities for connection to an existing district heating network have also been investigated. The outcomes of this analysis concluded that this is not a viable option as there is no heat network within the vicinity of the site, nor are there existing heat generators of a sufficient capacity to heat the building. The proposed building will however have a centralised heating network fed by an ASHP system.

A Low and Zero Carbon Generating Technology (LZCGT) feasibility study has been completed in the development of the building's energy strategy. The assessment was carried out in accordance with Policy EN 4. Air Source Heat Pumps (ASHP) have been selected to provide low carbon space heating and photovoltaic panels for fossil fuel-free electricity generation. The proposal achieves the following targets:

- 15.4% improvement on the delivered energy rate requirements of Part L 2021
- 13.9% improvement on CO_2 emission requirements of Part L 2021
- > 15% improvement on Part L 2010
- 6 BREEAM Ene01 credits

1 Introduction

Manchester City Council has an ambition to become net zero carbon by 2038, meaning that all new buildings must be net zero carbon. The Manchester Local Plan is being developed to align with the emerging Council's Climate Change Action Plan and the expectation is that new planning proposals assist in meeting the Council's ambition. This energy statement will focus on the thermal modelling to meet the requirements of national and local planning regulations.

With the UK Government declaring a climate change emergency, it is important that the built environment responds to reducing greenhouse gas emissions while addressing the broader sustainability issues affecting the environment, economy, and society. This is why low-carbon design and sustainability feature high on the agenda for the NXQ Building development.

This report therefore aims to quantify the carbon and energy performance of the proposals while also responding to the energy and carbon emission reduction policies of Part L2 of the Building Regulations and Manchester's Local Development Framework.

To achieve a low-carbon building, an energy hierarchy process that focuses on passive measures first to reduce energy demand has been applied. This is followed by implementing highly efficient active systems and plant choices that incorporate heat recovery and smart controls to ensure energy-consuming systems are operating effectively and efficiently. Finally, the opportunities for renewable technologies, such as photovoltaic panels and solar thermal systems, are explored to provide renewable energy to the building. This hierarchy process is illustrated in Figure 1.1 below.

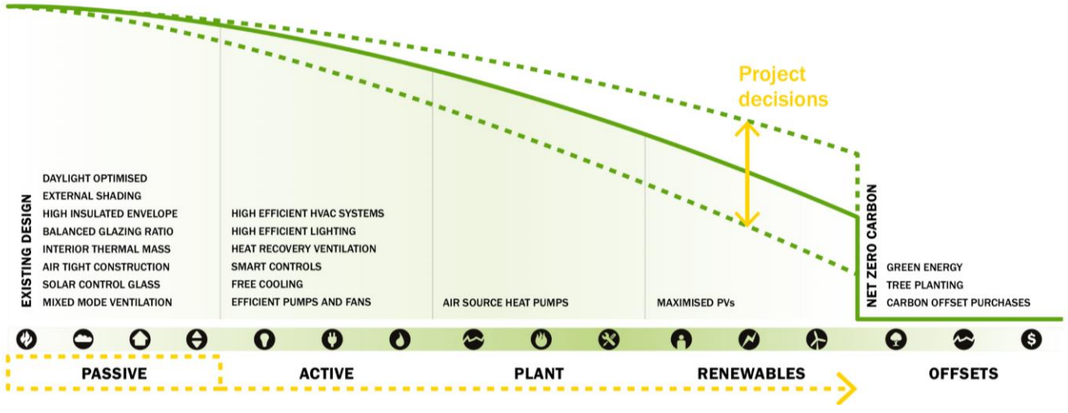


Figure 1.1 Pathway to Zero Carbon

1.1 Proposed Development

The site is located in Manchester, bound by Lever Street to the northwest, Great Ancoats Street to the northeast, Houldsworth Street to the southeast, and Little Lever Street to the southeast.

The proposal includes the refurbishment, façade retention and part demolition of the existing buildings, and the construction of a new 18-storey office building.

2 Planning Policy

Several planning policies are relevant to the proposed development. This section of the report summarises the carbon and sustainability policies that apply to the development addressed in this report. These are the National Planning Policy Framework, Part L of the Building Regulations, the Manchester Local Development Framework, and the relevant supplementary planning guidance.

2.1 National Planning Policy Framework (December 2023)

The National Planning Policy Framework (NPPF) is a key part of the Government's reforms to make the planning system less complex and more accessible, protect the environment, and promote sustainable development. It sets out the Government's planning policies for England and how these are expected to be applied. The NPPF replaces the previous suite of national Planning Policy Statements, Planning Policy Guidance Notes, and some Circulars, except PPS10 (Waste).

Regarding energy policies, the NPPF states the following in paragraph 160:

To help increase the use and supply of renewable and low-carbon energy and heat, plans should:

a. provide a positive strategy for energy from these sources that maximises the potential for suitable development and their future re-powering and life extension while ensuring that adverse impacts are addressed appropriately (including cumulative landscape and visual impacts).
b. consider identifying suitable areas for renewable and low-carbon energy sources, and supporting infrastructure, where this would help secure their development; and
c. 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.

2.2 Building Regulations Part L (June 2022)

Approved Document Part L of the Building Regulations relates to the conservation of fuel and power in buildings and is divided into the following sections:

- Volume 1 relates to dwellings.
- Volume 2 relates to buildings other than dwellings.

Part L1(a) of Schedule 1 of the Building Regulations states that reasonable provision shall be made for the conservation of fuel and power in buildings by:

d. Limiting heat gains and losses:
   i. Through thermal elements and other parts of the building
   ii. From pipes, ducts and vessels used for space heating, space cooling and hot water services
e. Providing fixed building services which:
   i. Are energy efficient to a reasonable standard,
   ii. Have effective controls and
   iii. Are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.

Developments are expected to achieve the above by limiting unwanted heat losses by meeting the limiting values for HVAC and fabric efficiencies. New development must also meet the Target Emissions Rate (TER) set by a notional building of the same type and geometry but with standardised fabric and HVAC systems. Therefore, the development's Building Emissions Rate (BER) must be lower than the TER. Similarly, the Target Primary Energy Rate (TPER) has to be met or bettered by the Building Primary Energy Rate (BPER).

2.3 Local Development Framework - Core Strategy (July 2012)

The Adopted Local Plan sets out the Council's vision and strategy for the area until 2027. The Core Strategy is the principal strategic document within the Local Plan. An adopted Supplementary Planning Document (SPD) that expands on the Local Plan's requirements is the Guide to Development in Manchester.

Manchester has set an ambitious target to become zero carbon by 2038, with new developments to achieve zero carbon by 2038. A short-term target is not included in the current policy. However, it is expected that new developments will support the Council's vision by incorporating low and zero-carbon renewable technologies instead of direct-emission heating systems.

The policies applicable to the proposal regarding energy and carbon emissions include the following

- Policy EN 4 (Reducing CO_2 emissions by enabling low and zero carbon development).
- Policy EN 6 (Target Framework for CO_2 reductions from low or zero carbon energy supplies).
- Policy EN 7 (Energy infrastructure opportunities)

2.3.1 Policy EN 4: Reducing CO_2 emissions by enabling low and zero carbon development

Policy EN 4 within the Core Strategy document states:

- All development must follow the principle of the Energy Hierarchy, being designed:
  - To reduce the need for energy through design features that provide passive heating, natural lighting, and cooling
  - To reduce the need for energy through energy-efficient features such as improved insulation and glazing
  - To meet residual energy requirements through the use of low or zero carbon energy generating technologies
- Wherever possible new development and retrofit projects, including energy generation plant, must be located, and designed in a manner that allows advantage to be taken of opportunities for low and zero carbon energy supplies.
- Where possible, new development and retrofit projects will be used as a mechanism to help improve energy efficiency and provide low and zero carbon energy supplies to existing buildings.
- Where appropriate, new development and retrofit projects will be required to connect to and/or make contributions to low or zero carbon energy schemes and/or to incorporate provision to enable future connection to any existing/potential decentralised energy schemes.
- The use of building materials with low embodied carbon in new development and refurbishment schemes.

2.3.2 Policy EN 6: Target framework for CO_2 reductions from low or zero carbon energy supplies

Policy EN 6 within the Core Strategy document states that all non-domestic development over 1,000m² will need to achieve the targets in Table 2.1 compared to the Part L 2010 required TER.

Table 2.1 Policy EN 6 non-domestic CO_2 emissions reductions targets

Target	% Minimum Requirement
Target 1: Network development area	CHP/district heating anchor or connection or where not feasible a 15% increase on Part L 2010
Target 2: Electricity intense buildings	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Approved document Part L has been updated twice after the publication of the Core Strategy, with the following approximate reductions:

- Part L 2013 brought a 9% reduction in carbon emissions compared to Part L 2010 across all building types
- Part L 2021 introduced further carbon emissions reductions, 31% for domestic and 27% for non-domestic.

2.3.3 Policy EN 7: Energy infrastructure opportunities

Policy EN 7 of the Core Strategy states that there will be a general presumption in favour of low and zero carbon decentralised energy schemes, subject to the following considerations:

- Any new generating plant capable of producing heat and cooling as well as electricity should be located in a way that facilitates future connection to a local distributed energy system.
- That any energy centre, including generating plant, standby/boiler plant, and substations, shall be located, and designed to a high quality so as to integrate with and contribute to the townscape.
- Biofuels should be obtained from sustainable sources and processes and in a way that minimises transport impacts, following a sequential approach in order to minimise CO_2 emissions - firstly prioritising local and regional sources, followed by national, European, and international.
- Consideration should be given to biofuel delivery by rail and waterways where possible. Where large-scale fuel or feedstock delivery is required by road the energy centre must be located in or adjacent to light industrial, industrial or leisure uses with any impact on local residential amenity minimised.
- The cumulative impact of energy schemes will be taken into account when considering applications, to include modelled impacts on air quality and landscape character, with reference to Policy EN 16.
- In determining proposals for development, consideration will be given to the need to safeguard strategic energy sites and network routes, both proposed or existing, where there have been identified as having strategic significance for the delivery of low or zero carbon energy infrastructure or, would be required in order to achieve the successful regeneration of an area in line with targets for reducing carbon emissions.

3 Building Regulations Compliance

3.1 Project Aims

The development aims to achieve compliance with Part L 2021, BREEAM Excellent and adherence to Manchester's Adopted Local Plan.

Following Manchester's Local Development Plan (under Policy EN 6 of the Core Strategy), the development will achieve a betterment equivalent to 15% over Part L 2010. Low and zero carbon generating technologies will be identified through a feasibility study described in the following section.

Following with Manchester's Local Development Plan (under Policy EN 7 of the Core Strategy), we also assess the feasibility of connecting to District Heat Networks (DHN) in this report.

3.2 Energy Strategy

Following Manchester's Local Development Plan, the proposed development aims to minimise CO_2 emissions to the atmosphere arising from the operations of and within the building. The following energy hierarchy (by Policy EN 6 of the Core Strategy) has been applied to the design strategy of the development to minimise CO_2 emissions:

1. Minimising energy consumption through passive design measures
2. Supplying energy efficiently through active systems
3. Maximising energy generation from on-site Low and Zero Carbon Generation Technologies (LZCT) energy sources

The three principles outlined above have been applied sequentially and systematically in developing the proposal. These are illustrated in the following sections.

3.2.1 Passive Design Measures

The energy-efficient building design of the proposed development will minimise the need for energy in operation while maximising the comfort of users during the lifetime of the building. Integrating passive design principles will enable the building to be less reliant on HVAC systems and minimise dependence on artificial lighting, taking advantage of natural energy flows to maintain visual and thermal comfort.

Several measures have been implemented to limit heat losses across the building envelope. These include highly efficient built form and high levels of insulation and airtightness. Solar control glass has been implemented to help minimise solar heat gains and reduce the energy required for cooling. Daylight into the building has been maximised through the specification of glazing with a high visible light transmittance. The performances go significantly beyond building regulations compliance and have applied the latest innovative insulation and glazing products to reduce the building heat demand.

3.2.2 Energy Efficient Systems

Services that exceed compliance with Part L 2021 have been specified. Services will include energy-efficient lighting systems, controls, and efficient HVAC and DHW plant and equipment.

Details of the systems applied are provided in Table 3.1, which includes the performance of ASHP chillers, heat recovery ventilation, lighting, and controls. The latest innovative technologies have been applied within the energy model to reduce energy consumption and CO_2 emissions to ensure the building uses energy as efficiently and cleanly as possible.

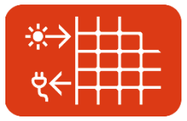
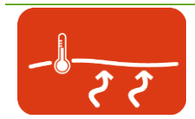
3.2.3 Low Carbon Technologies

We have examined the opportunities to install LZCGT and present the results from this feasibility study in Table 3.2 below. Water source heat pumps and hydroelectricity have been excluded from the assessment as no large body of water is close to the site. We have also excluded fuel cells from the assessment due to the infancy of this technology, which would result in a significant technical, commercial, and economic risk to the project. The outcomes conclude that air source heat pumps and photovoltaic panels are the most appropriate for the proposed development.

Table 3.1 Energy Strategy Applied in the Dynamic Simulation Modelling

Element or System	Modelled Parameter/Performance
Fabric Thermal Performance	
External Wall U-Value	• 0.13 W/m²K for solid walls and solid curtain wall panels • 1.30 W/m²K for insulated glazed curtain wall panels adjacent to core/WC areas
Floor U-Value	• 0.10 W/m²K
Roof U-Value	• 0.10 W/m²K
Glazing U-value (incl. frame)	• 1.30 W/m²K
Building Air Permeability	• 3 m³/h-m² @ 50Pa
Glazing Performance	
Glazing g-value	• 0.35
Glazing Light Transmittance	• 70%
HVAC	
Hybrid VRF system	• UK NCM type = Variable refrigerant flow • SCoP = 3.50 • Heat recovery = 80% • EER = 3.30, SEER = 6.01 • UK NCM air supply mechanism = Centralised balanced A/C or mech vent system • SFP = 1.6W/l/s • Demand controlled ventilation with CO2 sensors and fan speed control to all office and business lounge areas
Electric Panel Heaters	• UK NCM type = Other local room heater - unfanned • SCoP = 1.00 • Heat recovery = 76% for WCs • UK NCM air supply mechanism = Centralised balanced A/C or mech vent system • Pump type = Variable speed differential sensor across the pump • SFP = 1.6W/l/s
Domestic Hot Water	
Domestic Hot Water	• General: Electric instantaneous • Shower block fed by ASHP. System properties: – SCoP = 3.2 – 1400l storage with 50mm insulation thickness – 60m hot water pipework loop length – 10 W/m average pipework losses
Lighting	
Luminaire efficacy	• Average = 120lm/circuit W • Display lighting = 90 lm/circuit W
Lighting controls	• PIR and applied to circulation, toilets, showers, and internal office spaces • Daylight dimming applied to offices • Manual switching to plant rooms and reception
LZC	
Photovoltaic (PV) panels	• 100 m² panel area, 22.6% panel efficiency, south orientation
ASHP	• Part of HVRF with efficiencies as per HVAC properties
Miscellaneous	
BMS	• Automatic monitoring and targeting of energy consumption with alarms for 'out-of-range' values applied to HVAC plant and lighting
Power factor correction	• Power factor correction bonus has not been applied

Table 3.2 Low and Zero Carbon Renewable Technology Feasibility Study

Technology	Technology Description	Feasibility Study	Recommendation
 Photovoltaic Panels	Building mounted solar photovoltaic panels to generate renewable electricity	• PV panels provide clean, green energy. • ~100m2 of active PV meets all Part L, local planning and BREEAM Excellent requirements • PV panels' operating and maintenance costs are considered to be lower than other renewable energy systems. • Roof access will be required as photovoltaics require maintenance and cleaning. • Simple and cost-effective technology to reduce CO2 emissions. • Technology recommended due to the above	
Solar Thermal Heating	Building mounted solar collectors to generate domestic hot water for use in each building	• The outputs from solar thermal systems installed in the north of England tend to be low. The capital cost of the system results in a poor pay pack. • Development has a relatively low domestic hot water demand that limits the opportunity for this system. • Technology is not recommended due to the above.	
Wind Turbines	Free standing mast mounted micro wind turbine to generate renewable electricity	• Roof-mounted wind turbines will require significant structural support and present maintenance issues. • Wind turbines are also contentious planning issues. • Due to the unstable wind patterns in urban areas, the energy generation and resulting CO2 emission reductions are minimal. • Technology is not recommended due to the above.	
Biomass	Use of wood biomass or biofuel to generate hot water for space heating and DHW.	• The design aims to avoid energy generation through combustion • The project aims to be all-electric, therefore combustion technology does not align with this target • There is also minimal space within the site's constraints to install the biomass plant, boiler flue and associated fuel stores. • Biofuels are not readily available and would cause commercial and economic risk to the project • Technology is not recommended due to the above.	
CHP	Combined generation of heat and power from a single fuel source	• The design aims to avoid energy generation through combustion • To be economically viable, CHP requires at least 4,500 hours of high and constant heat demand • Dumping excess heat is not an efficient system operation in terms of cost, energy, and CO2 emission savings. • CHP is contentious to class as renewable generation • Technology is not recommended due to the above.	
 Ground Source Heat Pumps	Use of the thermodynamic refrigeration cycle to generate or remove heat from a ground heat sink.	• Ground area is restricted to the building footprint, resulting in a limited heat sink. • As a result, deep geothermal boreholes are the only option, resulting in high risk, cost, and implication on the programme. • Technology is not recommended due to the above.	
Air Source Heat Pump	Use of the thermodynamic refrigeration cycle to generate hot water using air as a heat sink	• ASHP chiller technology can provide heating and cooling simultaneously with high efficiencies achieved. • Technology can be combined with cooling systems • Technology can provide domestic hot water • Performance of technology subject to external ambient air temperatures • Acoustic attenuation is often required due to noise from ASHPs • Technology recommended due to the above	
Geothermal	Use of the thermodynamic refrigeration cycle to generate hot water using deep geothermal boreholes	• Ground area is restricted to the building footprint, resulting in a limited heat sink. • As a result, deep geothermal boreholes are the only option, resulting in high risk, cost, and implication on the programme. • Technology is not recommended due to the above.	

3.3 Energy Analysis

This report section presents the results from the Part L 2021 compliance calculations for the proposed NXQ Building office development. We have undertaken calculations to identify the energy performances and technologies required to achieve an improvement over Part L 2021 and the Ene01 BREEAM Excellent prerequisite.

3.3.1 Energy Modelling

The proposed development will be subject to complying with Part L 2021 (Conservation of Fuel & Power). Part L of the building regulations requires all new non-domestic buildings to achieve minimum performance parameters with respect to CO_2 emissions from heating, cooling, ventilation, and lighting energy consumption. With each revision of Part L, the Government has implemented more stringent CO_2 emission targets, which are approaching similar requirements for LETI standards.

We have completed a compliance model for the proposed development to identify the fabric and energy performances required to comply with Part L (as outlined in Table 3.1). This process involves calculating the Building Emission Rate (BER), and Target Emission Rate (TER), where compliance is achieved provided the BER is less than or equal to the TER (The BER and TER values are the $kgCO_2/m^2$ emissions for the actual building and a building regulation compliant building respectively).

A three-dimensional representation of the thermal model is shown in Figure 3.3.

3.3.2 Compliance

The compliance results are presented in Table 3.3. The BER/TER and BPER/TPER results illustrate that compliance with Part L 2021 is achieved (i.e. the BER < TER and BPER < TPER). As Part L 2021 introduced average reductions of 31% for domestic and 27% for non-domestic over Part L 2013, it is demonstrated that achieving compliance with Part L 2021 satisfies the requirement of Policy EN 6 regarding the 15% increase over Part L 2010 standards.

Table 3.3 Part L 2021 energy modelling results

Measure	Result
HVAC System	HVRF
Renewables	ASHP & ~100m^2 PV
BER $kgCO_2/m^2$	2.73
TER $kgCO_2/m^2$	3.12
% BER/TER Betterment over Part L 2021	13.9%
BPER kWh/m^2	29.58
TPER kWh/m^2	34.13
% BPER/TPER Betterment over Part L 2021	15.4%
BREEAM Ene01 Credits achieved	6
Part L 2021 Compliance Achieved	✓
15% pass over Part L 2010 (Policy EN 6)	✓
Prerequisite for BREEAM Excellent Achieved (min. 4 credits)	✓

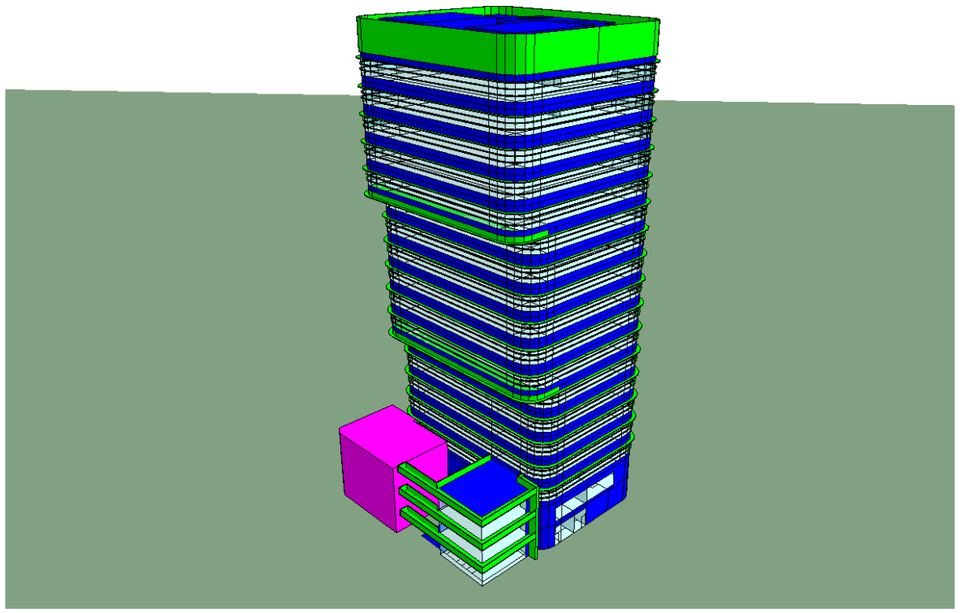


Figure 3.1 The thermal model in IES VE

3.4 District Heating Appraisal

This section of the report presents the results from the district heating feasibility analysis for the proposed NXQ Building office development following Core Strategy EN 7.

3.4.1 Heat Map and Existing / Proposed Networks

Heat mapping is an important tool to help identify locations where heat distribution is most likely beneficial and economical. Heat maps can utilise information on both demand (domestic, industrial, and commercial) and supply for renewable heat.

The Department for Business, Energy and Industrial Strategy has developed the Heat Networks Planning Database (HNPD), which provides a picture of district and communal heat networks across the UK. The map shows that no operational District Heat Networks (DHN) are located within a reasonable vicinity of Lever Street, nor are any planned/ future networks proposed. The heat map identifies four sizable heat generators in the extended vicinity as listed below, including their distance and heat capacity, where known.

- 44-46 Princess Street (operational, ASHP): 0.92km
- 70 Great Bridgewater Street (under construction, ASHP): 1.38km
- Manchester Civic Quarter Heat Network (operational, 27MW CHP): 1.41km
- Old Granada Studios - Mollies Hotel & Offices (under construction, CHP): 1.63km

Due to their distance from the site, we do not currently recommend connection to these heat networks.

3.4.2 Site Heat Demand

We have completed detailed work identifying key energy demands for the proposed development. The results from energy modelling confirm that the most significant energy load is equipment (mainly office), followed by cooling, as shown in Figure 3.3. The analysis also confirms that the total heat consumption (space heating and DHW combined) accounts for 16% of the building energy demand. Due to the relatively low heat demand, the building would not significantly benefit from a district heating connection.

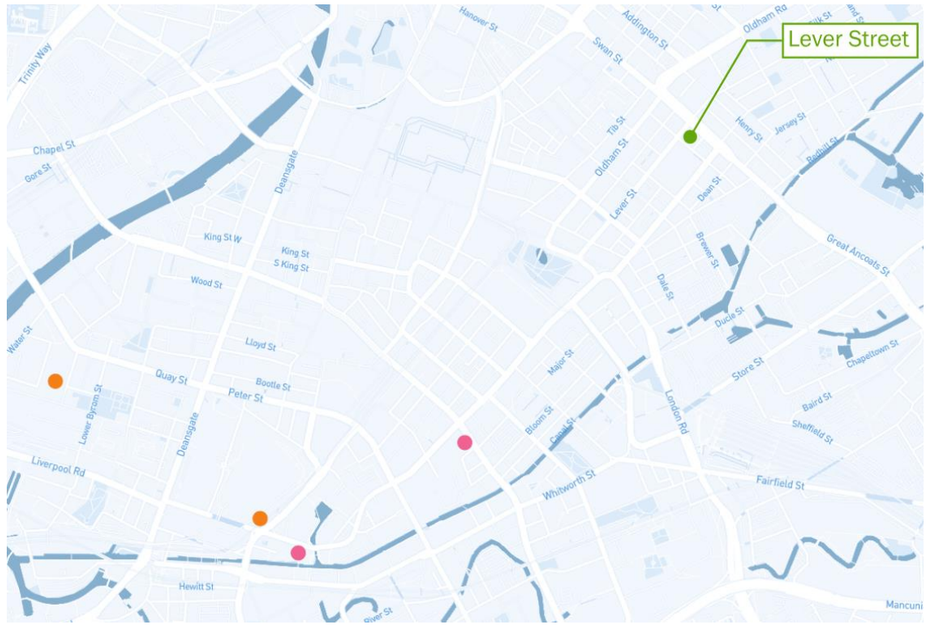


Figure 3.2 Heat Networks Planning Database

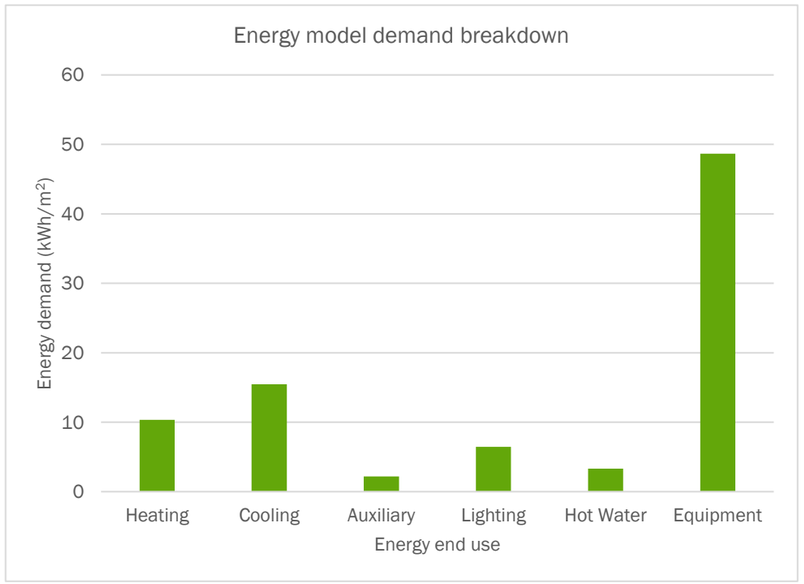


Figure 3.3 Energy demand breakdown

4 Conclusion

We have prepared this report to address the aims and objectives of the new Part L 2021, BREEAM and local planning policies.

The NXQ Building development aims to achieve compliance with Part L 2021, BREEAM Excellent and adherence to the Manchester Local Development Plan (current July 2012 when writing this report).

We have completed energy modelling to investigate the energy performance parameters required to achieve all energy aspirations.

The proposed energy strategy for the development consists of:

- U-values beyond those required for compliance
- Reasonable glazing ratios and solar control glazing
- Air permeability of 3 m3/h.m² @ 50Pa
- High-efficiency HVRF to the office spaces
- Ventilation with heat recovery to the majority of the core spaces
- SFPs of 1.6W/l/s for supply & extract systems
- High lighting efficacy and controls
- DHW via ASHP for the shower block
- A PV array with circa 100 m² total panel area.

The project also targets BREEAM certification under BREEAM UK New Construction 2018 to address the wider sustainability issues. The BREEAM Pre-assessment is included in Appendix B.

The project achieves 6 credits under Ene01, exceeding the minimum requirement for Excellent.

Appendices

Appendix A BRUKL document

Appendix B BREEAM Pre-assessment

Appendix A BRUKL document

Appendix B BREEAM Pre-assessment