

ENERGY STATEMENT
NEW MEDLOCK HOUSE
21-010
DECEMBER 2021
REV -

INTRODUCTION

The following energy statement has been provided to form part of the Planning submission to outline the proposed alterations to be carried out at New Medlock House as part of the building refurbishment works.

The report provides a brief outline of the process that has been carried out to determine the most suitable technology to allow the required improvements to be achieved and also provides an outline of how the technology will be implemented within the constraints of the project.

The proposed alterations are designed to make a significant improvement in the energy performance of the building and aid Unite Students and Manchester City Council in their targets to reduce emissions and limit the effects of climate change.

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1 PROJECT OVERVIEW

The existing Unite New Medlock House development provides accommodation for over 650 students over 8 storeys. The development also provides amenity space and sits around a central courtyard.

The development is due to be re-furbished to improve the internal decoration and facilities in 2022 which provides an opportunity to make improvements to the energy performance of the building as part of Unite Students commitment towards a more energy efficient estate.

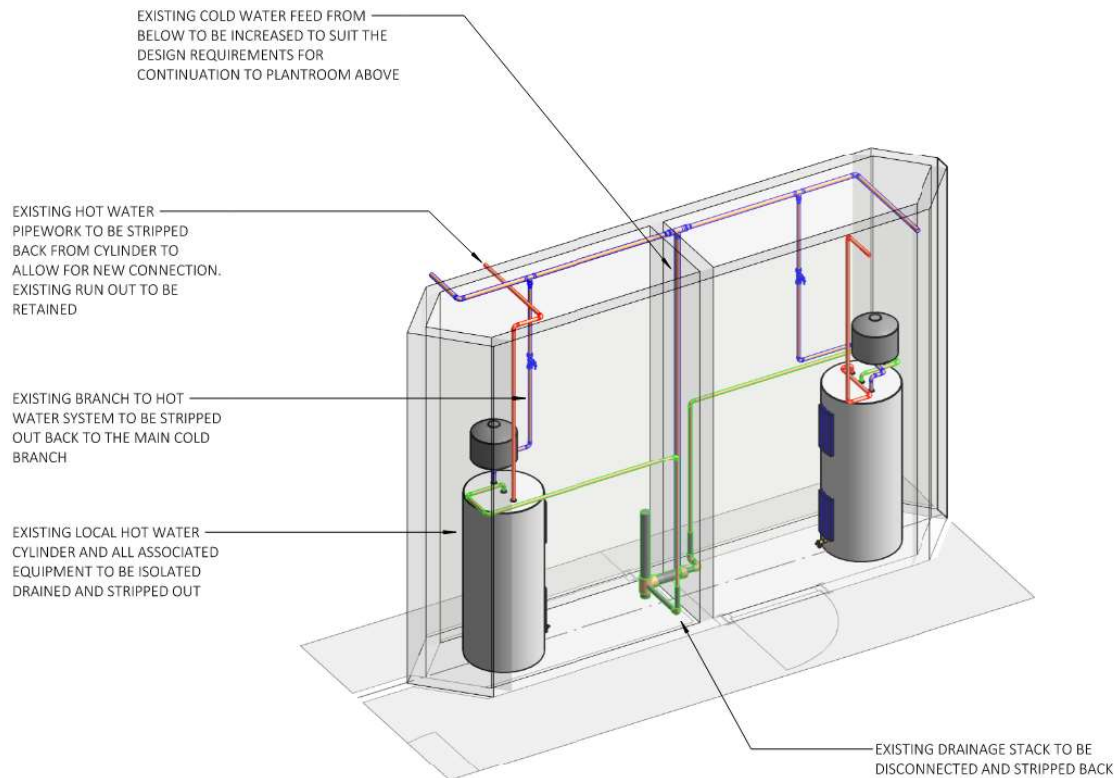
This Energy Statement looks at how improvements can be made and how the proposed technology is to be integrated into the existing building.

2 EXISTING INSTALLATION

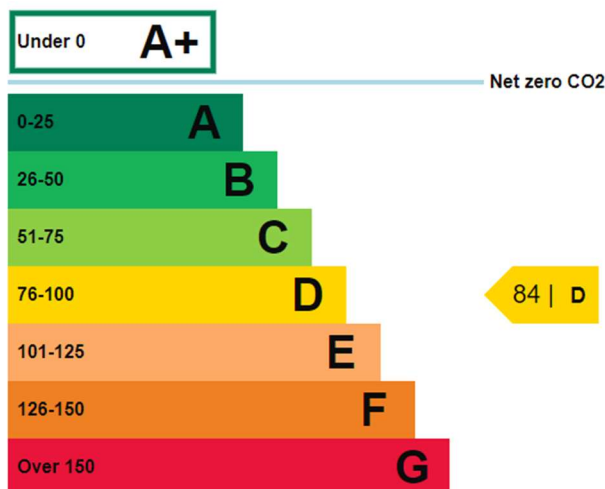
The existing development is 'all electric' with no gas connection provided to the development.

Space heating is provided through the use of electric panel heaters with local controls whilst hot water is generated through the use of local hot water storage cylinders. Each cluster is provided with a dedicated hot water cylinder with electric immersions utilised to generate the heat.

Showers are provided with cold water with heat provided via electric power shower units.



The existing EPC provided for the development show a 'D' rating being achieved.



Due to the age of the existing heat generating equipment for both hot water and space heating there is a significant opportunity to improve the energy usage.

The existing EPC provided for the building provides a number of recommendations for improvements which could be introduced to improve the performance of the building.

It should be noted that there are only 2 recommendations which are noted to have a high potential impact on the energy performance of the building. These are listed as:

- Consider installing an air source heat pump
- Consider installing a ground source heat pump

3 ENERGY TARGETS

Unite Students have set out a sustainability commitment to reach net-zero carbon across its operations and construction by 2030. The commitment aims to make their operations as sustainable as possible focusing on five overarching sustainability commitments:

- Aim to become net zero carbon by 2030
- Create resilient, resource efficient assets and operations
- Enhance the health and wellbeing of their employees and students
- Provide opportunities for all
- Lead the student housing sector

As part of this commitment the refurbishment at New Medlock House will look to reduce the energy demand through the use of Low Carbon Technology.

The Manchester Core Strategy provides guidance to the requirements for new and retrofit developments. Policy EN4 outlines the requirements for Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development.

Policy EN 4

Reducing CO₂ Emissions by Enabling Low and Zero Carbon Development

The Council will seek to reduce fuel poverty and decouple growth in the economy, growth in CO₂ emissions, and rising fossil fuel prices, through the following actions:

- 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.

The proposed refurbishment is able to develop on the requirement to utilise low and zero carbon technology. The largest energy demand within the building is for the production of domestic hot water therefore this is the area that is being targeted to make the largest savings in energy.

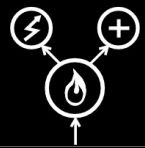
4 ENERGY STRATEGY OPTIONS

As noted above the use of low carbon technology has been considered for the production of hot water for domestic use throughout the building. A large proportion of energy is utilised for this purpose due to the nature of the building therefore this provides the best opportunity for improvements to be made to the building services systems.

The existing hot water generation is provided through the use of localised hot water cylinders which utilise electric immersions for the generation of heat.

Individual cylinders are provided within each of the clusters and studios resulting in large volumes of stored water and a limited efficiency.

A number of technologies have been considered at the early stage of design as a replacement to the existing system.



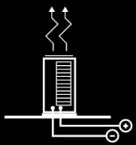
4.1 CHP Units

The use of a CHP installation could be utilised to produce domestic hot water as well as providing additional electrical energy which could either be utilised within the building or exported to the grid. This technology has been utilised widely over recent years in new build student accommodation buildings to improve overall building energy efficiency.

These installations typically operate utilising natural gas to generate electricity. The heat which is a by-product of the process is then utilised to generate hot water for the domestic water system.

The implementation of this technology within the existing building would be very challenging. The building is not currently supplied with gas and there are no dedicated spaces that could be utilised to locate the required plant and systems.

The introduction of flues would also need to be considered as they would need to discharge in a suitable location. Utilising a rooftop plantroom may aid with this however would require the routing of gas mains through the building which is not practical with the layout and void spaces available.

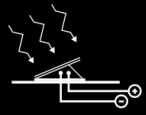


4.2 Air Source Heat Pumps

The use of Air Source Heat Pump (ASHP) technology provides an opportunity to improve the efficiency of the domestic water system through utilising the heat available within external air as part of the refrigerant cycle. This process enables the system to be up to 3.5 times as efficient as a direct electrical installation as currently installed dependent on the external air temperature.

To implement this option the water generation would need to be centralised. This would be achieved through the introduction of a roof mounted plantroom where the ASHP, thermal stores and associated equipment could be located. By centralising the plant it allows the volume of stored water to be reduced and maximises the efficiency of the system.

ASHP systems operate utilising electrical energy therefore there is no requirement for gas and associated flues. This technology is designed for the direct purpose of heating water and is therefore very efficient and compatible with the requirement of the scheme.



4.3 Solar Thermal

The use of solar thermal panels allows hot water to be generated utilising energy from the sun. Heat is transferred from solar energy into the water which is then stored. This technology is limited in its effectiveness by the external conditions and therefore varies significantly in its efficiency. An adequate back-up system is required to meet the building needs when the conditions are not suitable.

For this reason this technology is often utilised as a pre-heat to ensure that there is always an alternative supply of hot water. The existing roof at New Medlock House accommodates a significant number of PV panels therefore there is little opportunity to install a large array of additional solar thermal panels.

Student accommodation is generally at its highest demand throughout the winter period when this system is at its least efficient due to short daylight periods and overcast skies therefore is not ideally suited to this type of building.



4.4 Ground Source Heat Pump

The existing EPC suggests that GSHP technology would provide a high potential improvement to the energy performance of the building. This technology works in a similar manner to that of an ASHP system where heat stored within the ground is utilised within the refrigerant cycle.

This system requires large areas of available space to allow either coiled or bore hole systems to be installed within the ground. Due to the available external area being limited to the courtyard and the disruption required to install such a system this option is not considered viable for this building.

4.5 Recommendations

The technologies outlined above provide the best opportunity for utilising Low Carbon technologies for the production of hot water. Other technologies such as wind turbines and biomass have not been considered as they either do not provide a direct output that can be utilised for hot water production or are not feasible for the site.

The use of ASHP technology provides the most achievable method for reducing the domestic hot water energy requirements of the building. This technology provides the opportunity to generate the required daily hot water demand whilst making significant improvements on the energy efficiency of the system.

The use of a centralised ASHP system allows the volume of storage to be reduced whilst significantly reducing the overall energy used for hot water production.

The layout and riser positions within the building allow the centralised system to be introduced without significant impact on the internal layouts of the apartments and therefore can be accommodated within the constraints of the refurbishment works.

5 ENERGY ASSESSMENT

Based on the use of ASHP technology to produce the domestic hot water throughout the building the energy assessment can be re-calculated to understand if this and further improvements allow the building Energy Performance to improve to achieve the required 'B' rating.

To do this the building has been modelled in IES VE Compliance software.

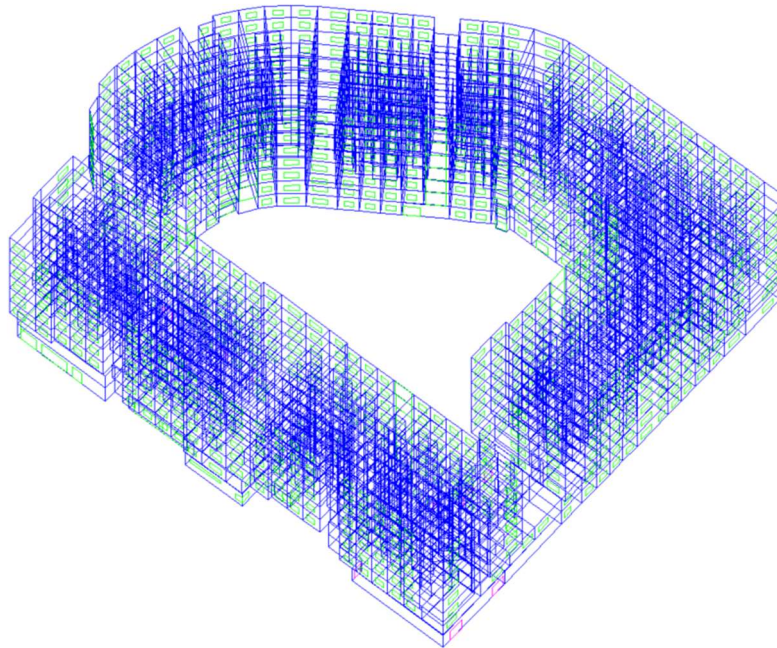


Image: Building Energy Model created in IES software

The system improvements to the domestic water system have been modelled to provide a revised indicative EPC rating. The assessment has taken into consideration the repositioning of the existing PV panels as well as the replacement of the existing electric panel heaters which forms part of the proposed internal refurbishment with new controls to provide a more efficient method of operation.

The revised EPC shows that a B rating is achievable.



6 STRATEGY IMPLEMENTATION

To implement the ASHP installation the building has been split into 3 areas due to the internal layout of the spaces. Each of the 3 areas will be served from a separate ASHP installation. This arrangement provides resilience as well as a logical division of the installation.

Each area will be provided with a modular plantroom to be located on the roof as there are no internal space which provides sufficient access and floor area to allow the installations to be integrated.



Image: Existing Roof Plan with PV array positions



Image: Proposed Roof Plan with Plantroom locations and re-positioned PV array

The plantrooms will consist of an external deck to house the ASHP units and an internal plant space for the thermal stores and associated pipework and accessories. The plantrooms are to be placed directly over the top of an existing riser to allow pipework to drop from the plantroom into the level 07 ceiling void.

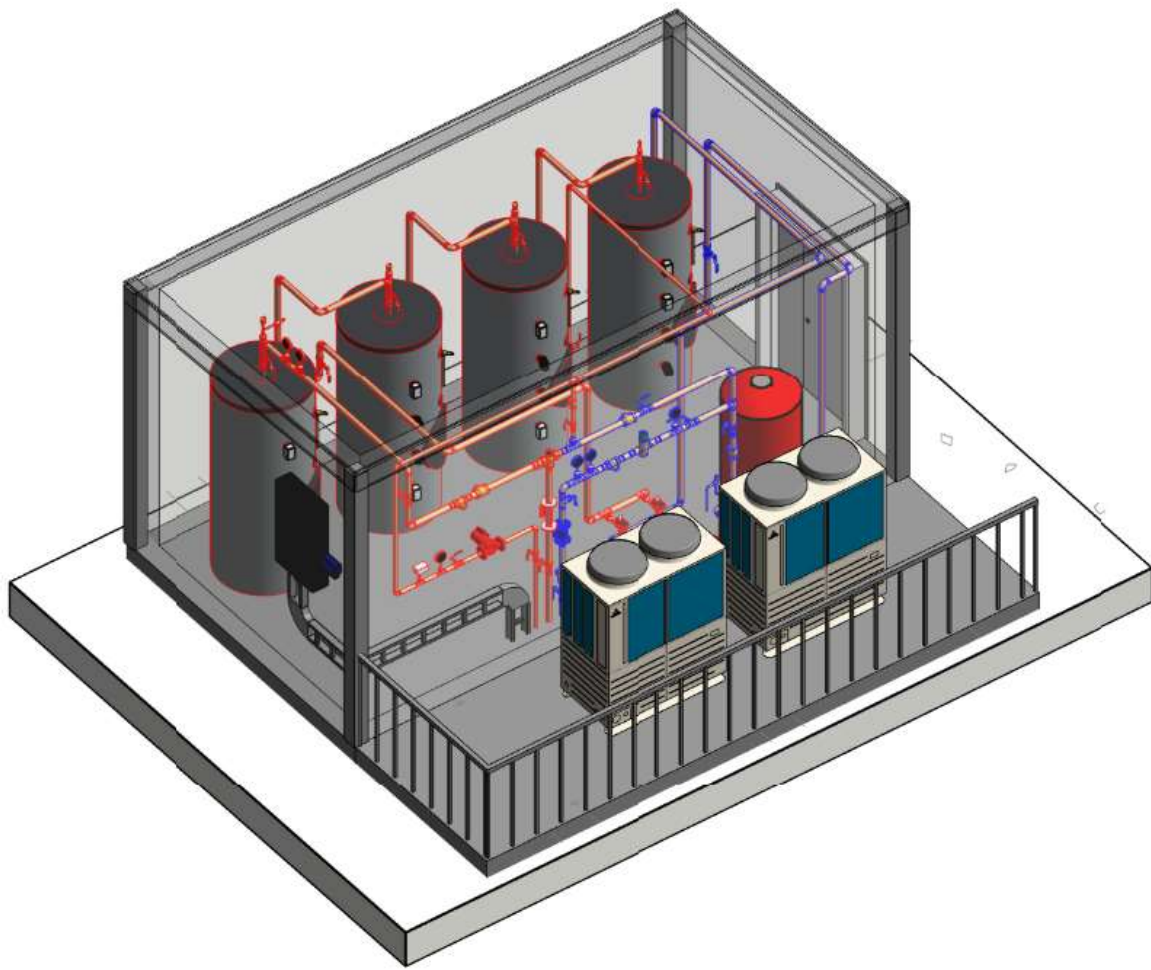


Image – Proposed Modular Plantroom arrangement

The pipework is to be routed within this ceiling void to each of the existing riser stores throughout the building to allow the hot water cylinders to be removed. The existing pipework runs within the clusters can then be maintained from a new connection in the riser store.

This ensures that there is minimal disruption within the clusters whilst allowing the hot water to be connected into the central system.

The existing electric showers are to be replaced with mixer showers to ensure that the complete hot water system is served from the ASHP installations.