



DESIGN ENGINEER SUSTAIN

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M1 Piccadilly, Manchester

Energy Statement

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Contents

Section 1 – Executive Summary	4
Section 2 – Introduction	6
Section 3 – Development Proposals	7
Section 4 – Policy and Legislation	8
Section 5 – Energy Strategy	11
5.1 - Baseline Energy Assessment.....	12
5.2 - Passive Design Improvements	12
5.3 - Energy Efficiency Improvements	13
5.4 - Renewable Energy Improvements	14
5.5 - Energy Generation and Distribution Systems	20
5.6 - Energy Performance Calculations.....	20
Section 6 - Conclusions.....	21

Section 1 – Executive Summary

This Energy Statement addresses the planning requirements of Manchester City Council as set out in Manchester's Local Development Framework, Core Strategy Development Plan Document, adopted 11th July 2012. The document sets out the long-term strategic policies for Manchester's future development and will form the framework that the planning application for Piccadilly Wharf Site will be assessed against

Specific policies that will be targeted to be achieved within this report will be:

- **Policy EN 4 Reducing CO2 Emissions by Enabling Low and Zero Carbon Development**
- **Policy EN 6 Target Framework for CO2 reductions from low or zero carbon energy supplies**

This Energy Statement has been prepared to illustrate the environmental aspects of the proposed development highlighting the Energy/Carbon emission profile and, assess the options available for reducing energy consumption and associated CO₂ emissions in accordance with Manchester City Council's policies and guidelines.

A number of planning policies, both national and local that apply to the proposed development, have been reviewed together with the Building Regulations Approved document part L1A. Local policy EN 6 advises that in all new developments that contain 10 or more units, the carbon emissions must be at least a 15% improvement from the requirements of Part L 2010.

The baseline energy emissions have been developed, producing a preliminary SAP calculation for selected apartments. Passive fabric measures across the building, including improvements to the thermal performance and air tightness above Part L requirements of the Building Regulations, have been incorporated.

Construction Element	Building Regulation Specification	Development Specification
Floor	0.25 W/m ² K	0.2 W/m ² K
Wall	0.30 W/m ² K	0.16 W/m ² K
Roof	0.20 W/m ² K	0.14 W/m ² K
Window	2.0 W/m ² K	1.2 W/m ² K
Air Permeability	10 m ³ /h/m ²	3 m ³ /h/m ²

In addition to the Passive design measures, Active Building Services are to be designed to minimise direct energy consumption and CO₂ emissions, with particular emphasis on the following;

- Improved Heating Efficiencies;
- Reduced Standing Losses from Pipes and Cylinders;
- Increased Hot Water Generating Efficiencies;
- Energy Efficient LED Lighting;
- Low Energy Motors in Pumps and Fans;
- Efficient Heat Recovery in relevant systems and,
- Enhanced heating controls

Renewable and Low Carbon technologies have been considered and of the available solutions, it is recommended that the proposed scheme implements air source heat pump hot water cylinders and a small array of roof mounted photovoltaic (PV) solar panels.

Utilising an air source heat pump for the hot water generation is up to 3 times more efficient, when compared with electric immersion heaters.

Solar panel efficiency is a measure of how much sunlight a solar panel can convert into usable electricity. The majority of residential solar panels typically have an efficiency of 15-18%, the buildings design and flat roofs are suitable to accommodate a small array of PV.

The Energy Model has been calculated to take account the selected renewable energy technologies proposed for this proposed development.

The anticipated carbon emissions for the apartments are **23.35 kg/CO₂/m²**.

This is a total carbon reduction of **2.42 kg/CO₂/m²** from the baseline emissions of **25.77 kg/CO₂/m²**, or **9.4%** over the 2013 target from Building Regulations.

Therefore, the CO₂ reduction due to utilising the energy hierarchy on this proposed development has been calculated to be **15.4% for Part L 2010** and therefore in line with Manchester City Council Core Strategy Development Plan Document.

This performance has been calculated using current Building Regulations compliance software which uses out of date data for the Carbon Intensity of the national electrical grid, 0.519 kgCO₂ /kWh.

If we interpolate the current electrical Carbon Intensity into the assessment, as stipulated in the new version of Part L, 0.233 kgCO₂ /kWh, which will be released later this year then we can see the development actually provides an **improvement over the Part L 2013 benchmark of around 57%**, and this figure is set to improve further as the Carbon Intensity of the National Electricity Grid falls further in the future as more renewables are introduced.

Section 2 – Introduction

This report relates to the development at 48 Store Street, Piccadilly Wharf in central Manchester.

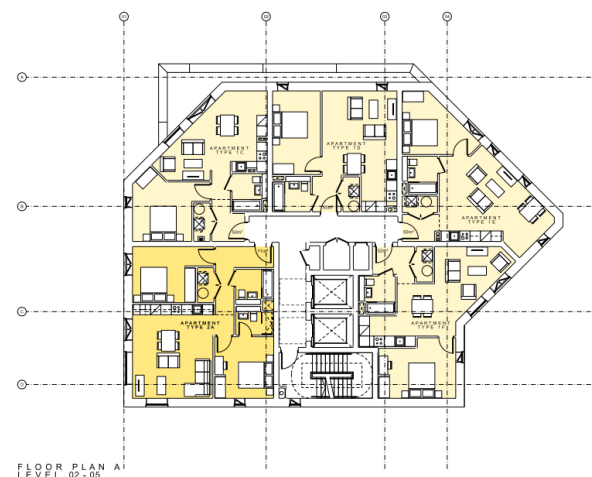
Futureserv Ltd have been appointed to produce an Energy Statement to support the planning application for a proposed development on Store Street, Manchester. The proposed development shall consist of 54 residential apartments with a mixture of 2Bed and 3Bed accommodation, as well as duplex and triplex apartments at levels 12-14, with a private terraced area at level 15.

This Energy Statement addresses the planning requirements of Manchester City Council as set out in Manchester's Local Development Framework, Core Strategy Development Plan Document, adopted 11th July 2012.

The strategy proposed for this development is the use of a mixture of central and local Energy System incorporating renewable and Low Carbon techniques to meet Manchester City Council's desire for carbon reduction using Low or Zero Carbon Technology.

The strategy is essentially based on the reduction of energy consumption by use of passive construction measures, active energy efficient equipment and Low Carbon technology.

Proposed CGI of the Development

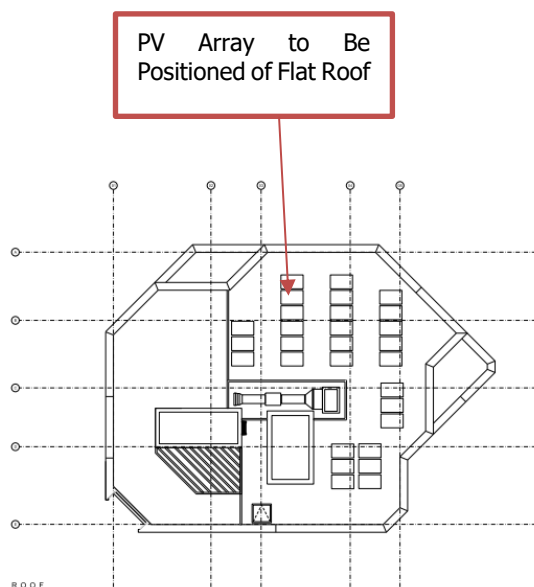


Typical Floor Plan

Section 3 – Development Proposals

The development consists of 54 residential apartments across 15 storeys, varying in size between 2 bedrooms and duplex apartments across the floors 14 and 15. The development also includes ground floor plant space, cycle store, and social space.

The top of the development will house a number of duplex and triplex apartments as indicated below. As section of the flat roof will be accessed via a hatch in the communal lobby and will house a PV array which will contribute to the zero-carbon technology implementation and to achieve the specified carbon reduction.



This Energy Statement has been prepared to illustrate the environmental aspects of the proposed development highlighting the Energy/Carbon emission profile and, assess the options available for reducing energy consumption and associated CO₂ emissions in accordance with Manchester City Council's policies and guidelines.

Futureserv Consulting Engineers have collaborated with the design team in order to provide a holistic solution for the building that will provide an efficient envelope and contain intelligent building services reducing the environmental impact of the development whilst providing comfortable living accommodation.

The existing site has no current building structure and is bound by a high wall along Store Street with no existing road access in to the proposed site area. There will be an element of landscaping works required to remove existing greenery.



Existing Site

Section 4 – Policy and Legislation

There are a number of planning policies both national and local that apply to the proposed development.

The UK government has signed up to a legally binding agreement to reduce Carbon emissions by 34% based on 1990 levels before 2020 and by 80% before 2050, this responsibility is being discharged using the Climate Change Act 2008.

The National Planning Policy Framework (NPPF), offers specific guidance which highlights the UK's aspiration to support a transition to a Low Carbon future in a changing climate and in particular, to encourage the use of renewable resources such as Renewable Energy and states;

Planning authorities should ensure that development plans contribute to global sustainability by addressing the causes and effects of climate change through policies which reduce energy use and emissions, promote development of renewable energy resources, and take climate change impacts into account in the location and design of development.

Local Policies

The proposed development is located at Goulden Street within Manchester City Centre, with the local policies adopted by Manchester City Council outlined within Manchester's Local Development Framework Core Strategy Development Plan 2012 – 2027.

Within this document specific policies highlight carbon emissions reductions and the impacts of climate change. These are as follows;

Core Strategy Policy EN4 – 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



Manchester's Local Development Framework

Core Strategy Development Plan Document

Adopted 11th July 2012

Published by Manchester City Council
planningstrategy@manchester.gov.uk



- 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

To reduce a **building's carbon footprint**, it is important that a **simple energy hierarchy** is used.



Reduction in CO₂ emissions is seen as a major component in mitigating climate change. In this regard, areas of Government policy give rise to the following three national and regional targets:

- A national reduction in CO₂ emissions by 34% in 2020 and by 80% in 2050, (from a 1990 baseline) to which buildings will need to make a proportionately higher contribution, as set out in the Climate Change Act 2008.
- 'Zero' carbon targets for all new housing by 2016 and for all new non-residential development by 2019, for which preparation will be required (See table 12.3).

- A national increase in renewable energy capacity by 15% by 2020 as set out in the UK Renewable Energy Strategy, which will require an uplift in current levels.

Core Strategy Policy EN6 - Target Framework for CO₂ reductions from low or zero carbon energy supplies

This policy requires applications for residential development of 10 or more units and all other developments over 1000sq m will be expected as a minimum, to meet the targets shown in the table below;

Domestic CO₂ emissions reduction targets

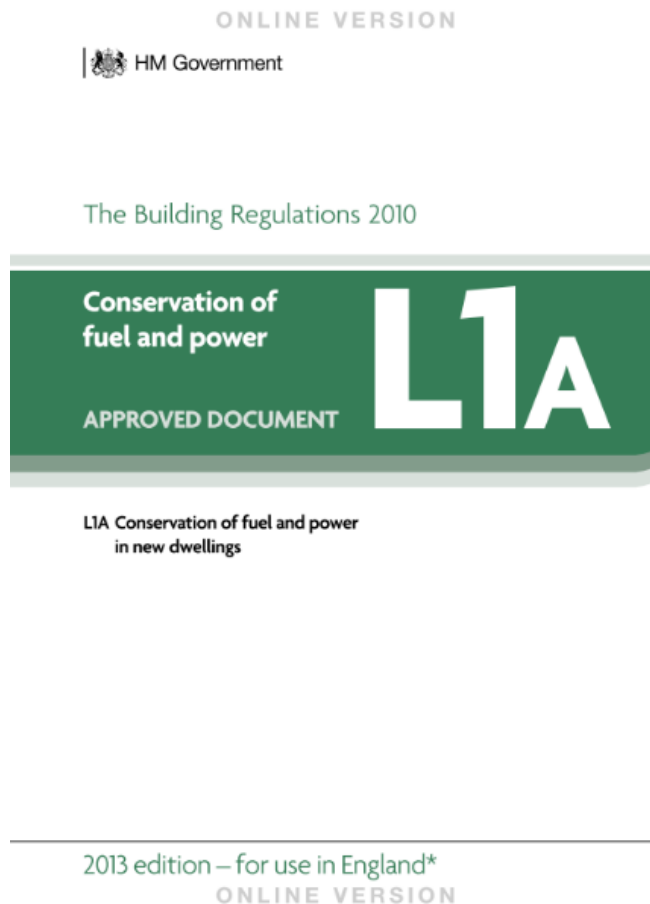
Table 12.1

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	+15% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

As above the development will need to have a 15% improvement from 2010 but following the 2013 iteration which improved on the regulation by 9% - our energy model will need to be improved by a further 6% to fall in line with Manchester's local policy.

Building Regulations Part L1A (2013)

The proposed development is being designed to comply with the Building regulations approved document Part L1A, 2013 edition. This approved document takes effect from 6th April 2014.



The main changes in this approved document from the previous revisions are that.

- A new requirement has been introduced that requires new dwellings to achieve or better a fabric energy efficiency target in addition to the carbon dioxide target.
- The notional dwelling used to determine carbon dioxide and fabric energy efficiency targets is the same size and shape as the actual dwelling, constructed to a concurrent specification.
- A new requirement has been introduced that requires new dwellings to achieve or better a fabric energy efficiency target in addition to the carbon dioxide target.

Section 5 – Energy Strategy

Futureserv have conducted analysis for this stage of the development on the current design of the building, to show compliance with the Building Regulations Part L1A:2013, therefore setting a reference baseline. This was carried out in order to understand the development's Carbon emissions without any Carbon Emission mitigation measures.

This Lean Improvement energy assessment has been developed, producing a preliminary Standard Assessment Procedure (SAP) calculation for the building. The baseline model has been created to provide Target Emission rates (TER). The SAP calculations then in turn produce Dwelling Emission rates (DER) which are equal to or lower than that of the TER.

SAP is the government's Standard Assessment Procedure for calculating the energy aspects of a dwelling. SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling generated by the SAP engine within the software.

- A clean improvement energy assessment – Incorporating a high efficiency heat recovery ventilation system within each dwelling.
- A green improvement energy assessment – incorporating a zero-carbon emission hot water generation within each dwelling

In order to achieve passes in the Lean and Clean models, a large array of PV was required, however, on the final Green model – the PV requirement was significantly reduced whilst still achieving the required energy reduction target,

The notional energy assessment produced the buildings Target Emission Rates (TER) and this became the benchmark for which each of the remaining assessments was calculated against.

5.1 – Baseline Energy Assessment

Futureserv Ltd have conducted analysis for this stage of the development on a number of chosen apartments to show compliance with the Building Regulations Part L1A:2013 therefore setting a reference baseline. This was carried out in order to understand the developments Carbon emissions without any Carbon Emission mitigation measures.

This baseline energy assessment has been developed, producing preliminary SAP calculations for the dwellings. The baseline model has been created to provide Target Emission rates (TER). The SAP calculations then in turn produce Dwelling Emission rates (DER) which are equal to or lower than that of the TER.

SAP is the government's standard assessment procedure for calculating the energy aspects of a dwelling. SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling generated by the SAP engine within the software.

5.2 – Passive Design Measures

On the completion of the model and establishment of the Target Emission Rates (TER), the dwelling emissions have been reduced through judicious passive design. This has involved an assessment of non-energy consuming design decisions to create a fabric first approach to energy efficiency. This is through;

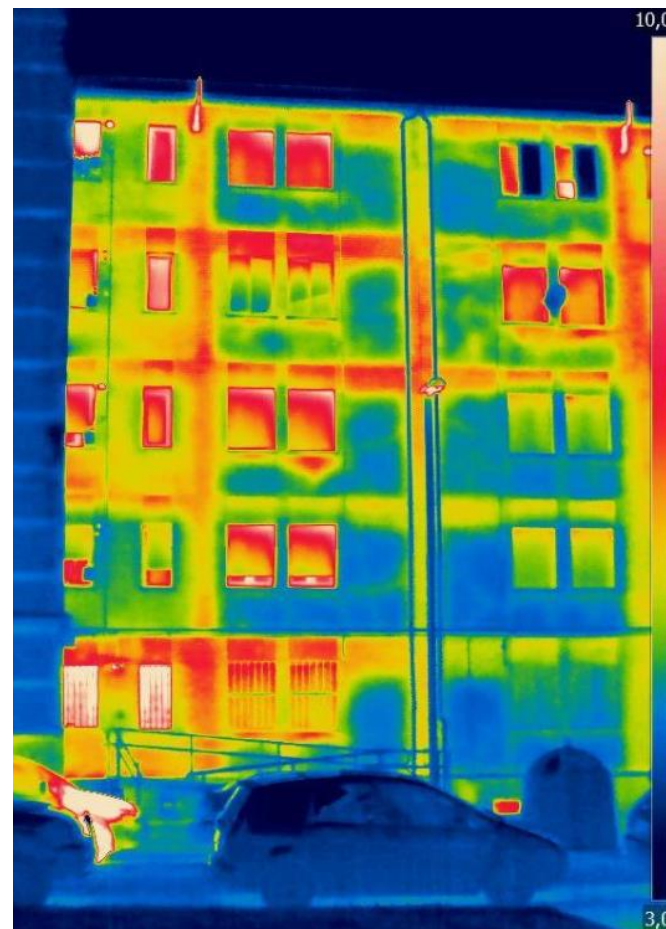
- Improved air permeability performance
- Better thermal insulation

Passive fabric measures across all the building include improvements to the thermal performance and air tightness above Part L requirements of the Building Regulations and this effectively allows the building envelope to attenuate external conditions without recourse to active Building Services. The table to the right shows the proposed material specification that will be incorporated within the building design to limit heat losses and ensure efficient operation of the proposed development on Store Street.

An airtightness of 3 m³/hr/m² @50Pa is targeted for this development in order to minimise uncontrolled ventilation. An improved air tightness reduces heat losses and energy demand of the development.

Construction Element	Building Regulation Specification	Development Specification
Floor	0.25 W/m ² K	0.2 W/m ² K
Wall	0.30 W/m ² K	0.16 W/m ² K
Roof	0.20 W/m ² K	0.14 W/m ² K
Window	2.0 W/m ² K	1.2 W/m ² K
Air Permeability	10 m ³ /h/m ²	3m ³ /h/m ²

These improvements will make a significant passive improvement to the energy performance of the development.



5.3 – Energy Efficiency Improvements

In addition to the Passive design measures described in the preceding Section to improve the building envelope performance, the Active Building Services are to be designed to minimise direct energy consumption and CO₂ emissions, with particular emphasis on the following.

- Reduced Standing Losses from Pipes and Cylinders.
- Increased Hot Water Generating Efficiencies
- Energy Efficient LED Lighting.
- Improved Lighting Controls.
- Heat Recovery Ventilation.
- Low Energy Motors in Pumps and Fans.
- Efficient Heat Recovery in other systems
- Enhanced panel heater controls

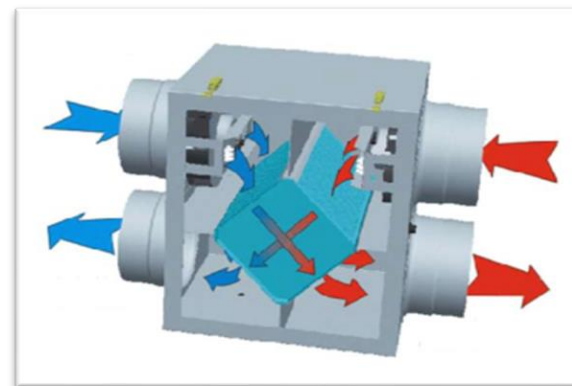
It is currently proposed that the heating will be all via electric panel heaters, which is proving to be increasingly lower carbon compared with gas powered heating systems. These will be complete with thermostatic and time controllers integrated.

The ventilation will be via whole dwelling Mechanical Heat Recovery Ventilation (MVHR) units in each apartment. These will provide extract ventilation to kitchens and bathrooms, and balanced supply ventilation to all occupied rooms. Purge ventilation will be via openable windows, giving the occupants the final control over the environment in their homes.

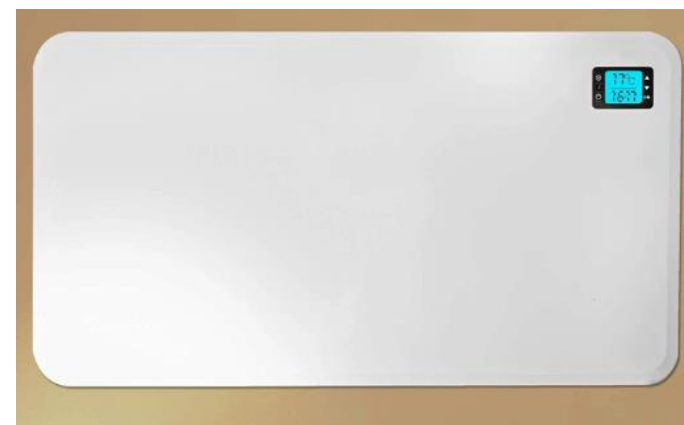
All dwellings will make use of 100% low energy lighting provision. LED lighting is over 5 times more efficient than older methods of lighting and should also need less frequent replacement bulbs. This makes it an overall improvement in both energy and cost saving.

All fans, motors and pumps shall be specified to incorporate ECA accredited technology and appropriate controls.

These efficiency specifications will make a further improvement to the energy performance of the development.



Mechanical Heat Recovery Ventilation



Electric Panel Heater with
Integrated Thermostat and Timer

5.4 – Renewable Technologies

The code for sustainable living highlights the requirement for utilising zero carbon technologies where possible throughout the development. One of the largest energy outputs in a dwelling is hot water generation, traditionally this would be provided by central plant serving the entire building or electric hot water heater local to each dwelling, neither of which is classed as energy efficient.

Therefore, the hot water generation will be via air source heat pump cylinders in each apartment. This system utilises the ambient heat in the external atmosphere to heat the water and are significantly more efficient than electric water heaters.

The final assessment was calculated by incorporating the most accurate representation of each building service strategy and removing the element of PV. A marginal fail was calculated which confirmed PV will be required in order to achieve the target energy reduction.

Please see table below of all technologies incorporated into the final assessment.

Construction Element	Specification
Ventilation	Whole dwelling MVHR (Vent Axia Sentinel Kinetic Advance)
Lighting	100% low energy fittings (LED)
Space Heating	Electric Panel Heaters
Heating Control	Thermostatic and time controlled
Water Heating	ASHP hot water cylinder (Dimplex Edel)
PV Solar Panels	** KWh/year total Roof Mounted

Combined Heat and Power (CHP)

On-site generation of electricity and the utilisation of waste heat from this process within a building can create a beneficial arrangement whereby the transmission losses of grid supplied electricity can be omitted. The use of CHP tends to require a steady and continuous heat demand, which is often met by the domestic hot water load. Due to the incorporation of ASHP cylinder there won't be any demand, therefore deeming this strategy discounted.



CHP unit

Solar Thermal Collectors

The use of flat plate & evacuated tube thermal panels has been identified as a potential method of harnessing renewable solar energy by pre-heating domestic hot water provision.

The recent introduction of the renewable Heat Incentive may further improve the financial viability for the technology.



Example of Solar Thermal unit

However, for similar reasons as the CHP (lack of constant heat demand), this may not be the most suitable form of renewable energy.

For this reason, we have not considered the use of solar thermal collectors on this development.

Solar Photovoltaic Panels

The option to utilise roof mounted or Building Integrated Photovoltaic panels to generate electrical energy is a renewable energy method of generating Carbon free electrical power.

During most times of the day, there is likely to be a reasonable base electrical load prevalent on the building which may be mitigated in part by the use of There has been adequate roof space identified and it is the most appropriate technology for our requirements.

Solar PV power generation is an option to be included for the development and this will generate approximately **30kW** power per apartment.



PV System component

Wind Turbines

Wind energy can be a cost effective method of renewable power generation and turbines can produce Carbon neutral electricity with outputs ranging from watts to megawatts.

City centre and sub-urban locations generally experience poorer yields for electricity output from small and medium scale wind turbines, due to obstructions and variations in local topography.

Also taking into account the visual impact and unwanted noise in an environment with sleeping accommodation the use of wind turbines is discounted from inclusion at this development.



Wind Turbine Installation

Ground Source Heat Pumps

The ground below buildings remains at a constant temperature of around 10°C to 12°C offering the ability to extract energy in the winter and discharge energy in the summer from cooling with the energy exchange being achieved via open or closed loop systems linked to heat pumps.

The footprint of the development and the surrounding site conditions do not have the potential to deliver an element of space available for closed loop heat exchange, so due to the likely yield, peak load demand and cost feasibility, we have discounted Ground Source Heat Pumps at this development in favour of better performing technologies.



Ground Source Heat Pump Installation

Air Source Heat Pumps

Air source heat pumps provide an accepted solution for using renewable energy taken from ambient air to heat a building in the winter and discharge heat from cooling in the summer.

The reverse cycle operation of the heat pump and having the ability to heat and cool would make it a good strategy to incorporate within ground floor communal spaces, where it is expected that there will be higher occupancy levels and cooling would be required during summer months.



Typical External Condenser Unit for Heating and Cooling

Air Source Heat Pump Hot Water Cylinder

Air source heat pumps provide an accepted solution for using renewable energy taken from ambient air to provide hot water demand to apartments. This is up to 3 times more efficient when compared with electric immersion heaters.

The hot water cylinders are located within apartment utility cupboards the same as traditional units, but incorporate a heat-pump which comes part of the unit within a sound proof hood to mitigate noise outbreak and a pair of ducts which provide a circulation of fresh air to the unit.

It is proposed that the heat pump is incorporated into the scheme in order to satisfy SAP.



ASHP Hot Water Heater

Total Assessments

The Building Services Systems will be supplemented by Renewable and Low Carbon technologies to further reduce the associated Carbon emissions.

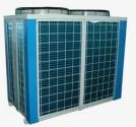
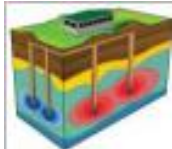
Of the available solutions considered, it is therefore recommended that the proposed scheme implements the following renewable energy technologies:

- Solar Photovoltaic Panels
- Air Source Heat Pumps (hot water cylinders)
- Air Source Heat Pump (heating and cooling – communal area)

Air source heat pumps are a very efficient method of producing heat for the domestic hot water, without taking much additional space in each apartment.

Solar Photovoltaic Panels are a 100% on site renewable energy source, and the nature of the development represents a good opportunity to utilise these

The Energy Model has been calculated to take account of the selected renewable energy technologies proposed for this development.

Renewable Technology	Image	Comments
Combined Heat and Power DISCOUNTED		The integration of Combined Heat and Power technology is not suitable for this development, due to a lack of constant heat demand.
Solar Photovoltaic SELECTED		The flat roof areas of the building are relatively exposed to the sunlight and the continuous electrical demand makes this a good renewable energy option.
Air Source Heat Pumps SELECTED		Air Source Heat Pump hot water cylinders will be utilised in each department and deliver hot water while using up to 5 times less electricity than immersion heaters. Also, to provide cooling to basement level gym area.
Solar Thermal DISCOUNTED		There is potential to include flat panel solar thermal collector located at roof level. However, for the same reason as discounting CHP, there is not a constant heat demand.
Wind Turbines DISCOUNTED		Wind turbines have been discounted due to the resulting visual/noise impact from the equipment, and relatively poor performance of the solution when used within Urban and Sub-Urban locations.
Ground Source Heat Pump DISCOUNTED		The inclusion of Ground Source Heat Pumps has been discounted within this development due to system cost viability and also the site constraints.

5.5 - Energy Generation and Distribution Systems

The case for renewable energy systems is clear and Manchester City Council's current energy policy requires developments to make the fullest contribution to the mitigation of climate change, and to minimise Carbon Dioxide emissions.

As a consultant, Futureserv has an over-arching philosophy delivering design of truly sustainable energy systems, employing the widely recognised hierarchy;

- Be Lean - Reduce demand wherever possible utilising passive measures.
- Be Clean - Where energy is used, then it should be optimised to operate at the highest efficiencies practical.
- Be Green - Take advantage of renewable options to reduce fossil fuel energy sources.

The proposed development will be designed to be served by electric panel heaters throughout, utilising the ever-increasing clean electricity provided from the grid. This will be supplemented by the electricity generated from the roof mounted PV panels.

The domestic hot water will be provided by each apartment having its own dedicated air source heat pump powered cylinder. This consumes up to 5 times less electricity than a standard electric water heater.

Hot and cold water will be distributed around each apartment and all sanitaryware appliances will be fitted with low water flow devices.

Ventilation will be via MVHR to each apartment, so the maximum amount of heat will be recovered from the extract air.

All plant and equipment would be equipped with energy control measures incorporating variable speed drives, with low energy motors provided on ventilation fans and hydraulic pumps.



5.6 - Energy Performance Calculations

To enable demonstration that the environmental benefits associated with our energy hierarchy approach to energy demand and emission reductions for Store Street, approved SAP software SAP2012 Calculator (Design System) version 4.12r02 has been used to generate energy demand calculations for the building.

At this stage of the development, typical values and efficiencies have been selected for the assessment. These will be updated to more precise figures when equipment selections are made during the detailed design stage.

The below tables presents each energy demand and emissions and actual energy demand and emissions for the development in the form of average Target Emission Rates and average Dwelling Emission Rates (Kg CO₂/m²/annum) and Target Fabric Energy Efficiency and Building Fabric Energy Efficiency (kWh/m²/annum).

Assessment	TER	BER
Lean Energy Assessment – Improved Building Fabric – Large PV Array	25.77 kg/CO ₂ /m ²	25.50 kg/CO ₂ /m ²
Clean Energy Assessment – Improved Ventilation System - Large PV Array	25.77 kg/CO ₂ /m ²	24.80 kg/CO ₂ /m ²
Green Energy Assessment – Improved Hot Water Efficiency - Small PV Array	25.77 kg/CO ₂ /m ²	23.35 kg/CO ₂ /m ²

The final energy assessment incorporates a number of intelligent building services technologies which work to maximise energy efficiencies. To achieve the high targets set within the council's energy strategy an element of PV solar panels has been implemented. The CO₂ reduction due to utilising the energy hierarchy on this development has been calculated to be in excess of **9% based on the 2013 Part L requirement** or **15% improvement on the Part L 2010**, and is therefore in line with the Manchester City Council Core Strategy Plan and the code for sustainable homes.

This performance has been calculated using current Building Regulations compliance software which uses out of date data for the Carbon Intensity of the national electrical grid, 0.519 kgCO₂ /kWh. If we interpolate the current electrical Carbon Intensity into the assessment, as stipulated in the new version of Part L, 0.233 kgCO₂ /kWh, which will be released later this year then we can see the development actually provides an **improvement over the Part L 2013 benchmark of around 57%**, and this figure is set to improve further

as the Carbon Intensity of the National Electricity Grid falls further in the future as more renewables are introduced.

Section 6 - Conclusions

This energy statement has summarised the energy hierarchy requirements for Store Street to respond to emission reduction aspirations set out within the Manchester City Council Core Strategy Plan, to improve on the Part L 2010 carbon emission requirements by at least 15%, and to follow additional energy reduction measures set out in the The Code for Sustainable Homes.

The proposed development will incorporate passive energy techniques available in the construction industry to reduce its ongoing requirement to consume energy to heat, ventilate and light the building, this is achieved by improved efficient fabric design in excess of the thermal properties set out within the Building Regulations.

The proposed development will incorporate energy efficiency measures in its Building Services to reduce the carbon footprint of the site below the passive improvement stage, using highly efficient heat generation plant, heat recovery systems and energy efficient and highly controllable lighting.

The proposed development will make use of renewable and Low Carbon energy techniques, comprising of either an air source heat pump cylinder to generate hot water, or solar PV panels. This will ensure that the development meets Manchester City Council's aspirations to utilise renewable energy generation wherever possible and meet the carbon emissions requirement of 15% better than Part L 2010.

Overall, the Carbon emissions from the proposed Store Street development shows potential for a **total reduction in emissions from baseline set by current Building Regulations Part L 2010, of over 15%.**

The strategy improves on the fundamental principles of the Building Regulations and will make a significant contribution to reducing the annual CO₂ emissions of the proposed development.