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EVO BUILDING ENVIRONMENTAL STANDARDS & ENERGY STATEMENT

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1. INTRODUCTION

This report has been produced by Ramboll on behalf of Bruntwood (Didsbury TP) Ltd. The purpose of this document is to supplement the planning application for the proposed new commercial office building within the Didsbury area of Manchester. This report addresses the following aspects of the planning statement: -

- Energy Strategy – including the energy efficiency measures and renewable technology feasibility
- Environmental Design
- Water Management
- Construction & Waste Management
- Biodiversity
- Zero Carbon Standards Statement

This report will outline the procedures and methods which, when implemented, can help toward a reduction in carbon emissions across the site.

2. PLANNING POLICY

Manchester City Council are the local authority who are responsible for outlining the planning policies which will dictate the design of the office building. The key policies relating to sustainability are extracted from the 'Guide to Development in Manchester Supplementary Planning Document and Planning Guidance (SPD)' adopted April 2007 as listed below:

4.4 Developers will be expected to submit a statement on how their proposal will achieve the environmental standards set out in this chapter. This statement will be seen as an addition to the Design and Access Statement referred to in Government Circular 1/2006 and described in greater detail in paragraph 13.9 of this document. This additional Environmental Standards Statement will be required for all planning applications, both outline and full, with the exception of changes of use where no operational work is required, house extensions and mining or engineering work. (The exceptions listed do not of course negate the need for building regulations approval, where necessary). It will clearly assist in demonstrating how the planning policy context has affected the development of the site as required in the process of producing the Design and Access Statement.

The guide states that all new developments, where possible, should be created in a manner which ensures they adopt a responsible approach to:

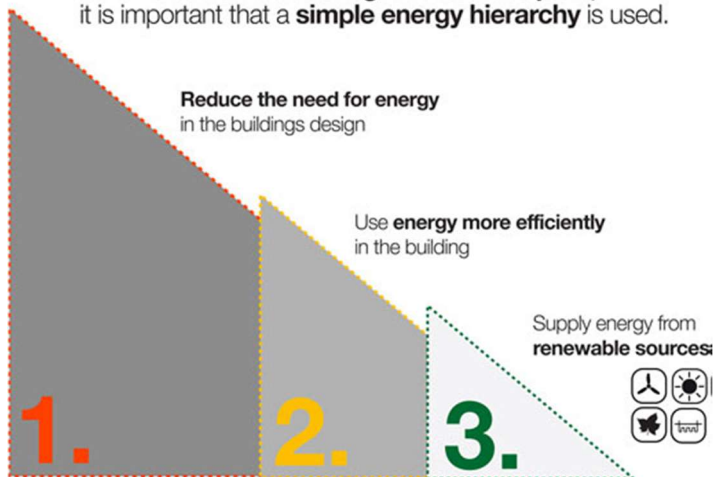
- a) Energy Efficiency
- b) Renewable Energy
- c) Environmental Design
- d) Water Management
- e) Construction & Waste Management
- f) Biodiversity

3. ENERGY STRATEGY

3.1 Energy Efficiency

The following section will include an assessment of the environmental design and energy efficiency measures proposed for the Ev0 Building project.

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



We have adopted a three-stage energy reduction strategy which looks to reduce the energy demand in the building by passive means in the first instance, then to use high efficiency / low energy building services systems and finally the consideration of renewable or Low or Zero Carbon Technologies (LZCTs). This approach is summarised in the adjacent diagram

To identify precisely how this has been applied for the new office building, the energy reduction strategy for each system is defined in the following tables overleaf.

Stage 1 – Passive Design - to reduce the buildings energy consumption and thereby CO2 emissions. Optimising the building façade and orientation to minimise solar gains and insulating the building and providing an airtight building to reduce the need for energy in the first instance.

Stage 2 – Efficient Design - to reduce the energy consumption from MEP systems and thereby CO2 emissions – we have developed building services strategies that provide the building with heating, cooling, ventilation, lighting and domestic hot water using electrical energy from the national grid. Our strategy has been to eliminate the requirement for fossil fuels (gas and/or oil) within the building, together with an increased use of (low carbon) electricity powered MEP systems, because of ongoing decarbonisation of the grid. Highly efficient services which maximise the use of heat recovery and heat recycling shall be used, which will look to be significantly improved beyond the efficiency requirements of Part L.

Stage 3 – Renewable Energy Design - The final stage to reduce the carbon emissions from the building is to consider the use of on-site renewable energy systems and LZC (Low Zero Carbon) technologies. With the building being electrically driven, for the Ev0 building, this has focussed on the use of heat pumps for heating and domestic hot water and photovoltaics to help offset electrical demand.

Heating					
Measure	Improvement of thermal performance of the fabric	Careful design of the glazing provision	High performance glazing	Use of thermal modelling software in design	Use of air source heat pump systems, ambient loop, heat recovery and VRF water-source systems
Description	Improved U-values beyond those required by Approved Document L2A 2013. This was specifically reviewed in terms of energy balance with cooling to obtain the best performing U-Values.	Maximised daylighting and optimised benefit from controlled solar gain in winter.	Improved U-values and low E internal coating to reflect heat within the building	This allows us to be significantly more accurate in design and take account of known gains in winter which can help to reduce design "margins on margins". The size of emitters, pipework and plant can therefore be selected with greater precision and the system can be designed to be smaller and harder working, hence operating at peak efficiency for greater periods of time	A low energy and cost system which has the benefit of a high coefficient of performance.
Benefit	Reduced heat loss	Reduced annual demand on the heating systems	Reduced heat loss	Greater system efficiency and reduced fuel consumption	Reduced annual heating demand and carbon emissions

	Ventilation		
Measure	Mechanical Ventilation with Heat Recovery	Heat recovery	Demand matched ventilation
Description	Reduction in electricity consumption due to limited usage period of fans	To maximise heat reclamation from exhaust air	Systems will only operate when required and to the minimum extent required through the use of time controls.
Benefit	Reduced electricity consumption	Reduced demand on heating system	Reduced electricity consumption, reduced demand on heating system and reduced demand on cooling system

	Small Power		
Measure	Best Practice (BCO) Occupancy Assessment and Small Power Load allowance	Power factor correction	Mechanical systems will be selected to maximise energy efficiency and reduce electrical demand
Description	This ensures that the use of electricity is efficiently balanced across all three phases. As the amount of electricity drawn is affected by the peak demand of any one phase, to ensure a similar load profile across all three phases reduces the peak and hence ensures that electricity is used efficiently	To balance still further the phases and deal with the occupant driven phase imbalances which cannot be designed out	This will be achieved through the use of such technologies as demand matched variable speed pumps and fans, high efficiency motors, etc.
Benefit	Reduced demand and improved efficiency	Reduced demand and improved efficiency	Reduced electricity consumption

Cooling						
Measure	Improvement of thermal performance of the fabric	Carefully designed shading devices	High performance glazing	Use of thermal modelling software in design	Use of air source heat pump systems, ambient loop, heat rejection and VRF water-source systems	High coefficient of performance
Description	Improved U-values against those required by Approved Document L2A 2013. This was specifically reviewed in terms of energy balance with heating to obtain the best performing U-Values.	Façade external shading devices have been optimised to significantly reduce solar gain. Early stage operational modelling has helped to refine the requirements	Low G-Values with high daylight transmittance values were proposed to decrease cooling loads whilst maintaining acceptable daylighting levels.	This allows us to be significantly more accurate in design and take account of known gains in winter which can help to reduce design “margins on margins”. The size of emitters, pipework and plant can therefore be selected with greater precision and the system can be designed to be smaller and harder working, hence operating at peak efficiency for greater periods of time	A low energy and cost system which has the benefit of a high coefficient of performance.	Systems with will be specified to ensure that where cooling is used it is extremely energy efficient – in practice this guides the use of one system over the other dependent on external conditions.
Benefit	Reduced cooling loads, reduced energy consumption	Reduced cooling loads, reduced energy consumption	Reduced cooling loads, reduced energy consumption	Greater system efficiency and reduced fuel consumption	Reduced annual cooling demand and carbon emissions	Reduced electrical demand for cooling provision

	Hot Water			Gas	
Measure	Use of flow and time restricted taps, sinks and showers			No gas proposed on site.	
Description	These deliver a controlled amount of hot water with automatic shut off when not required			The kitchen equipment will be selected as electrical only	
Benefit	Reduced consumption, hence reduced wastage of water and heat			No on-site combustion emissions	
	Lighting				
Measure	Dynamic modelling	High efficiency fittings	High efficiency external lighting	Daylight linking technology	Occupancy sensors
Description	Using IES and Grasshopper dynamic simulation modelling software, we have been able to inform, evaluate and optimise the daylight provision in the building form. We have analysed daylight factors and applied climate based daylight modelling to ensure that we provide daylight levels which are useful and do not result in a “blinds down, lights on” scenario on sunny days	The electric lighting system will be designed around energy efficient products, utilising LEDs throughout.	High efficiency external lighting will be utilised incorporating daylight sensors and time controls to ensure that the system is only operational when needed, including within the car park areas.	All electric lighting systems in occupied rooms with external windows will be provided with daylight linking technology. This will ensure that the lights will dim or even turn off whenever there is sufficient natural daylight available. The lighting system will be designed to operate as a top up to the natural daylight design, rather than from a “default on” perspective	These will be provided where appropriate (with manual override) to ensure that lights are not left on when rooms are unoccupied. Again, the default scenario for the lighting system will be off
Benefit	Reduced operating periods for electric lighting system, hence reduced electrical consumption	Reduced electrical consumption	Reduced electrical consumption	Reduced electrical consumption	Reduced electrical demand

3.2 Renewable Technology Feasibility

The following section will include a feasibility assessment of potential Low or Zero Carbon Technologies (LZCT's) for the Ev0 Building project.

3.2.1 Biomass

3.2.1.1 Overview

Biomass is the burning of any plant-derived organic material (such as wood) that renews itself over a brief period to generate energy, where this energy is usually used for heating.

As the CO₂ which is released during the burning process is offset by the CO₂ absorbed during the production of the fuel, biomass is known as carbon neutral.

Biomass, often called 'bio energy' or 'bio-fuel' falls in to two main categories:

- Woody biomass includes forest products, untreated wood products, energy crops and short rotation coppice (SRC), e.g. willow.
- Non-woody biomass includes animal waste, industrial and biodegradable municipal products from food processing and high energy crops, e.g. rapeseed, sugar cane, maize.



For small-scale domestic applications of biomass, the fuel usually takes the form of wood pellets/chips or wood logs. It is possible to use bio-liquids, but caution should be taken as these do produce high carbon factors due to the elements added in the manufacturing process. Non-domestic biomass boilers are mainly used in the form of wood pellet or wood chip burners. Wood pellets are comprised of wood chips and sawdust that are compacted into smaller volumes. In using wood chips, it will necessitate the requirement for a larger storage area.

Typically, a biomass system will burn wood in either a chip or pellet form instead of the conventional gas system. Biomass can save substantial amounts of carbon and are available in a range of system sizes. The drawback of biomass is the size of the required plant space and vehicle access area.

Advantages

- ✓ Carbon neutral
- ✓ Economic alternative to fossil fuels

Disadvantages

- ✗ Large storage areas are generally required
- ✗ Requires good access areas for deliveries
- ✗ Elevated levels of particulate emissions

3.2.1.2 Site Specific

Ev0 Office Building will sit in a constrained site, as such there isn't sufficient space to locate wood stores, increased plant space and vehicle access areas. This combined with the high particulate levels in a location which is already an Air Quality Management Area makes biomass an especially unfavourable technology from an air quality and climate change perspective.

3.2.2 Ground Source Heat Pump (GSHP)

3.2.2.1 Overview

GSHPs transfer heat from the ground into a building to provide space heating and/or pre-heat hot water; they can also be reversed so that heat from a building is placed into the ground to provide cooling during the summer months. Under the surface, the ground tends to be at a constant temperature throughout the year, at around 12°C, due to the high thermal mass of the earth.

A closed loop installation consists of plastic piping which is buried in the ground and connected to a pump. A mixture of water and antifreeze is passed through the looped pipes where it absorbs heat from the ground. This fluid then flows into an electrically powered heat pump, comprising a compressor and heat exchangers, before discharging back to the ground. There are three types of ground loop; they are vertical loop, horizontal loop and slinky loops and these require large areas of land. Slinky and horizontal loops are buried approximately 1-2m into the ground. Vertical loops require bore holes to be drilled deep into the ground (usually between 15m and 100m). GSHP's require extensive ground works which incur a higher capital cost than other heat pump systems.

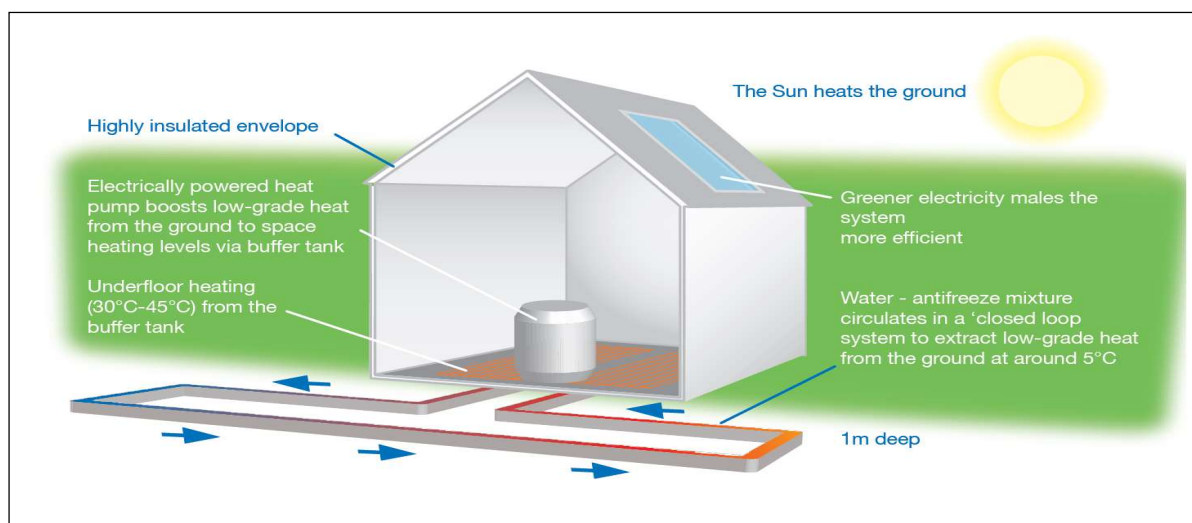


GSHP are a Low Carbon Technology, not a renewable system, as they require electricity to run the pumps and extract the energy from the ground, a minimum coefficient of performance (CoP) of 2.2 is required to start carbon saving, with a recommended design CoP of at least 3.5 to make the system cost-effective.

There are two forms of GSHP; closed loop and open loop, each of which is described below.

3.2.2.2 Closed Loop GSHP

Closed loop GSHP are by far the more common system, with the technology being more readily available. In a closed loop system there is no direct fluid transfer. In a vertical system a number of bore holes are drilled in the ground to approximately 15m - 100m, a U-tube is then dropped down the extent of each bore hole with a number of tubes being connected in parallel, such that individual tubes can be isolated should the need arise over the life of the system. The loops are connected back to a heat exchanger. The image below shows how a horizontal loop system works, but the basic philosophy is the same as with the vertical loop system.



3.2.2.3 Open Loop GSHP

Open loop GSHP systems work in a very similar manner to closed loop GSHP's, with the difference being that the heat transfer is actioned by direct fluid exchange. Bore holes are created down to the aquifer where ground water is pumped to a heat exchanger and the energy is extracted from the water. The water is then passed back down to the aquifer. The direct contact of the source water through the heat exchanger makes it more efficient, and the number of bore holes on an open system can be much smaller than a closed loop system for the same output capacity. Due to extracting water from the aquifer a license is required from the Environmental Agency, this license can be difficult to achieve with open loop systems and as such these are not usually advised.

Advantages

- ✓ Possibility for heating and cooling
- ✓ Reduced running costs

Disadvantages

- ✗ Large area of land required for bore holes or loops, which cannot then be developed
- ✗ High ground costs for installation
- ✗ Not considered a fully renewable technology

3.2.2.4 Site Specific

Significant capital costs make any form of payback on this technology difficult. This coupled with the large area required for the installation, the need to ensure we do not sterilise the site for the planned future developments and the cost of ongoing maintenance mean that the implementation of ground source heat pumps (GSHP's) are not recommended for the Ev0 Office Building.

3.2.3 Air Source Heat Pump (ASHP)

3.2.3.1 Overview

An ASHP is not regarded as a renewable technology, but it is a low carbon technology. An ASHP works by converting energy from the outside air into heat. This can be used for heating in the winter, but can be reversed for cooling in the summer months. ASHP's work by extracting latent heat from the outside air and passing it through a heat exchanger which increases its temperature. The heat is then fed to the required rooms. An ASHP will produce a lower CoP than a GSHP or WSHP due to the lower temperature of outside air and greater variance in temperature. However, the cost of an ASHP is lower as there is no need for ground works.



Advantages

- ✓ Possibility for heating and cooling
- ✓ Reduced running costs
- ✓ No ground works required

Disadvantages

- ✗ CoP is dependent on the air temperature
- ✗ Not considered a fully renewable technology

3.2.3.2 Site Specific

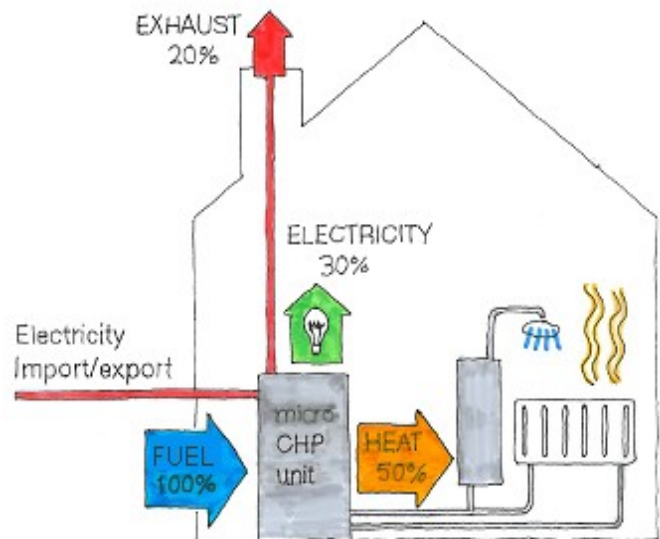
Air Source Heat Pumps are a readily available technology with good payback periods. They can be used to supplement the main services system or can be integrated into the air handling units to provide air heating/cooling whilst providing additional space saving. Given the potential benefits of utilising ASHP's this technology is recommended for use within the Ev0 office building.

3.2.4 Combined Heating and Power (CHP)

3.2.4.1 Overview

Combined Heat and Power (CHP), also known as co-generation, is the simultaneous generation of both usable heat and electrical power from the same source. CHP systems are ideal for use in buildings with very high, almost continuous hot water and/or heating demands, such as buildings with heated swimming pools.

Gas is the fuel predominately used for CHP systems; however other fuels such as oil, coal and wood can also be used. The principle is that an engine drives a generator that produces electricity. The heat from the engine block, oil cooler and exhaust, which would normally be wasted, is absorbed by coolant water through a specially developed high-efficiency heat exchanger. This energy, stored as hot water is then usable directly for central heating, hot water, or indirectly for air conditioning (tri-generation).



The real-life efficiency of a CHP system is high, around 80%, as it generates electricity at the point of use and therefore avoids the distribution loss of electricity across the National Grid. This gives great environmental benefits.

To make a CHP economically viable you need to maximize the run hours (approximately 4000 hrs a year), to do this you need to find use for all of the heat and electricity generated by the CHP. In the summer months this can be quite difficult as central heating systems are not required, and if the heat is dumped the CHP no longer becomes economically viable and is likely to generate more carbon than if the energy was sourced from standard utilities. During the summer months the CHP can either be turned off (and standard utilities or other sources used) or another use for the heat can be found such as domestic hot water, swimming pools or cooling loads through absorption chillers.

A benefit of CHP is that it allows for onsite standby generation, this is important if the running of the building depends upon a continuous supply of electricity – CHP can reduce the risk of losing money due to loss of power, as well as the considerable inconvenience loss of power incurs.

Advantages

- ✓ 80% efficient compared with conventional systems which are approximately 50% efficient.
- ✓ Provides a continuous supply of electricity and heating
- ✓ Ability to use bio-fuels for energy source
- ✓ Can allow for self sufficiency

Disadvantages

- ✗ With the projected and actual carbon reduction of the electrical grid kgCO₂/kWh CHPs are no longer viable from a CO₂ perspective.
- ✗ Requires predictable and constant heating loads for optimum performance
- ✗ Requires full use of generated heat for optimum efficiency

3.2.4.2 Site Specific

CHP, although a very good performing LZCT in Part L 2013 is projected to be a net CO₂ polluter based on the carbon factors kgCO₂/kWh declared in the latest SAP 10 and is therefore not recommended for use on the Didsbury project.

3.2.5 Wind

3.2.5.1 Overview

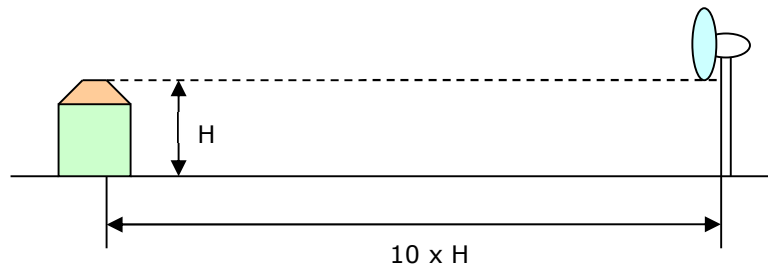
Wind turbines harness the power of the wind to produce electricity through circular motion. They can produce electricity without carbon dioxide emissions, and range in outputs from watts to megawatts. The most common design has three blades mounted on a horizontal axis, Horizontal Axis Wind Turbine (HAWT), which is free to rotate in to the wind on a mast. The blades drive a generator either directly or via a gearbox (generally for larger machines) to produce electricity. The electricity can either link to a distribution network or charge batteries. An inverter is required to convert the electricity from direct current (DC) to alternating current (AC). Alternative designs of turbine are available such as the Vertical Axis Wind Turbines (VAWT) which can have advantages aesthetically and are not reliant on a specific wind direction, but can be less efficient.



Roof-mounted wind turbines are also an option, but if used structural considerations need to be taken into account due to the weight and vibrations that will be incurred. Roof-mounted wind turbines generally require an average wind speed of 3m/s to be viable, and larger, stand-alone wind turbines typically require 6m/s to be viable.

Wind turbines work best in laminar flows. If turbulent wind, which is caused by obstructions etc is being passed through the wind turbines blades then productivity can be dramatically reduced.

For any obstructions in front of the wind turbine the distance between them should be approximately 10 times the height of the obstruction, as shown below:



It is also important to be aware that there should not be any obstacles too close to the wind turbine in the non-prevailing wind directions. The wind will not always be in the prevailing wind direction and as such a distance of at least 2 times the height of the nearest obstruction should be left in order to allow for reasonable electricity production.

Advantages

- ✓ Zero carbon technology
- ✓ Visual statement of sustainability
- ✓ Minimal capital cost

Disadvantages

- ✗ Planning permission can be a difficult and lengthy process
- ✗ Wind is an irregular source
- ✗ Noisy, especially if a gearbox is incorporated
- ✗ Can be a danger to birds and other wildlife.

3.2.5.2 Site Specific

The Ev0 office Building is situated adjacent to the busy Princess Parkway. The site constraints and high density of people on the site means that achieving planning permission for the installation of a wind turbine will be difficult. Also issues with damaging wildlife, noise disruption and light flickering from the wind turbine and the public perception means that other better suited technologies, such as PV and/or ASHP's would be better placed being adopted for this scheme.

3.2.6 Photovoltaics (PV)

3.2.6.1 Overview

Photovoltaics (PV) or solar cells, as they are often referred to, are semiconductor devices that convert sunlight into direct current (DC) electricity. Groups of PV cells are electrically configured into modules and arrays which can be used to charge batteries, operate motors and power any number of electrical loads. With the appropriate power conversion equipment (inverters), PV systems can produce alternating current (AC) compatible with any conventional appliances and operate in parallel with the utility grid.

PV systems require only daylight, not direct sunlight to generate electricity (although more is produced with more sunlight). Therefore, energy can still be produced in overcast or cloudy conditions and used successfully in all parts of the UK.

PV panels can be fitted to the top of roofs. They can also be attached to individual items such as street lights, parking meters, motorway noise barriers or the sides of bridges.



Ideally, PV panels should face between South-East and South-West, at an elevation of about 30-40°. However, in the UK, even flat roofs receive 90% of the energy of an optimum system. They are particularly suited to buildings that use electricity during the day and that are occupied during the summer.

Advantages

- ✓ PV Panels can be integrated into the building fabric
- ✓ Electricity is generated during daylight hours
- ✓ Electricity can be stored in batteries during the day for use in the evenings.

Disadvantages

- ✗ Obstructions will have a dramatic effect on the productivity of the panels
- ✗ Best results produced when there is a clear sky and direct sunlight
- ✗ Cleaning and maintenance issues, especially in areas with surrounding trees.

3.2.6.2 Site Specific

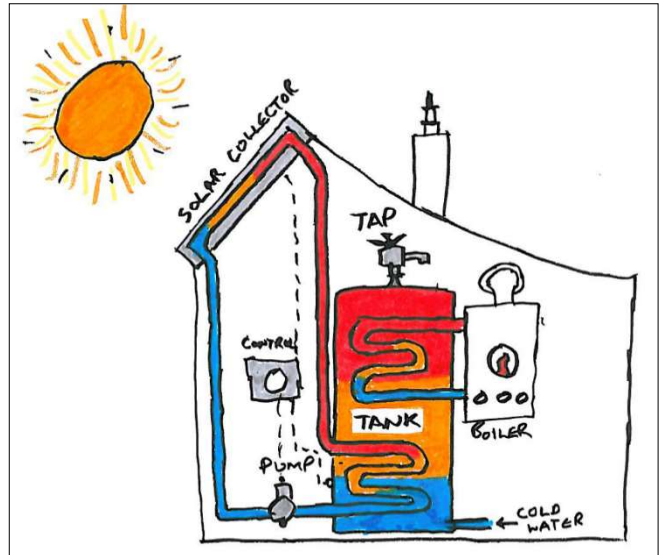
Photovoltaics are a readily available and widely used renewable technology. They can be mounted on the roof and car park and be used to offset the buildings electrical load. The cost of PV has reduced over the years whilst the efficiency of the system has improved. The use of PV is recommended for the Ev0 Office Building and could be used in tandem with ASHP's to provide a significant reduction in the buildings carbon emissions.

3.2.7 Solar Thermal

3.2.7.1 Overview

Solar thermal technologies generate hot water from the sun's energy through the use of solar collectors. The sun's heat energy is accumulated by the solar cells, and then water is pumped through these, thus heating the water. The heated water is then stored or distributed for domestic use. These systems tend to be incorporated on to roof space, so that they are clear of obstacles, as obstructions on the roof can have an effect on the solar cell array. As with Photovoltaic panels, the solar collectors are more effective if they are in a South-facing position.

There are two main types of Solar Thermal system; flat panel and thermal vacuum tubes. Flat panels consist of a flat "radiator" absorber, covered by glass and insulated. Their efficiency depends on the insulation properties and type of construction. More expensive double-glazed units have better efficiency, so that a smaller area of solar thermal panels is required – a compromise would need to be made between efficiency and cost. Solar thermal panels are especially worth considering for new buildings, since they can be effectively built into roof structures at the construction stage.



Thermal vacuum tubes are a more recently-developed technology designed for obtaining heat from the sun. These have been developed over the last thirty years into units that are now up to 90% efficient. Water is passed through an evacuated tube, which contains a black absorber plate. Vacuum tubes are more efficient and therefore a smaller area of collector is required. Solar vacuum tubes are capable of operating at higher working temperatures than flat plate collectors. Thermal losses for vacuum tubes also tend to be lower than those of flat plate collectors due to improved heat insulation. The vacuum provides insulation, and this allows the water to be heated to higher temperatures, and remain very effective even on cloudy days. The optimum generation tends to occur during the summer months.

Advantages

- ✓ Solar Panels can be integrated into the building fabric
- ✓ Hot water is produced during daylight hours
- ✓ Water can be stored during the day for use in the evenings.

Disadvantages

- ✗ Obstructions will have a dramatic effect on the productivity of the panels
- ✗ Best results produced when there is a clear sky and direct sunlight
- ✗ A high efficiency panel comes at a high cost

3.2.7.2 Site Specific

Solar-thermal systems work in the same manner as PV systems and therefore the same recommendation can be made for this technology. Whilst we had initially planned on installing both on site, following recommendations from installers we were advised that for the same foot print the operational CO₂ emissions reduction would be more favourable with Photovoltaics serving Heat Pumps – this is to ensure that surplus energy can be used on site or stored/fed back into the grid (and not wasted on weekends where there is low hot water demand for example).

3.2.8 Renewable Technology Proposals

Based on the above assessment, the main proposals for the Ev0 building are as follows:

- ASHPs providing low temperature hot water and chilled water
- Photovoltaics

Both technologies form part of the Ev0 building design.

The opportunities for practical implementation of PV arrays have been maximised across the development. This has resulted in the proposal to provide the following:

- PV array to the roof area of Ev0 building, and
- PV array to the roof of the covered car park structure.

3.3 Part L Analysis

Under policy EN6 there is a requirement to show CO₂ emission reductions in excess of Part L 2010 emission rates:

Non-domestic CO ₂ emissions reduction targets	
Table 12.2	
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 (Applies to commercial uses with a high proportion of emissions from electricity use (>45 kg CO ₂ /m ²))	+10% increase on Part L 2010
Target 3: Micro generation area	+15% increase on Part L 2010

Source: Manchester Councils Core Strategy

Part L 2013 (with 2016 amendments) was used for Part L calculations. For non-domestic buildings there was a 6% improvement in the building Target Emission Rate (TER) between the 2010 version and 2013 version of the regulations. Therefore, based on a "Target 3: Micro generation area" assessment there would be a requirement for a 9% improvement on Part L 2013.

A dynamic simulation assessment of the building operation following Part L2A 2013 (with 2016 amendments) of the building regulations has been undertaken using IES. The result of the simulation is as follows:

Criterion 1: The calculated CO₂ emission rate for the building must not exceed the target

CO ₂ emission rate from the notional building, kgCO ₂ /m ² .annum	24.3
Target CO ₂ emission rate (TER), kgCO ₂ /m ² .annum	24.3
Building CO ₂ emission rate (BER), kgCO ₂ /m ² .annum	9.1
Are emissions from the building less than or equal to the target?	BER ≤ TER
Are as built details the same as used in the BER calculations?	Separate submission

As such, the current results show a significant improvement over Part L 2013 (with 2016 amendments), of 62.6%, which is compliant with the planning condition. It should be noted that the analysis only accounts for the PV panels located on the main building roof and does not account for the car park PV array, due to the way in which the electricity is fed. Note that this is a theoretical performance of the regulated energy only based on National Calculation Methodology (NCM) templates and profiles. As such, the actual performance will be different to this especially when unregulated energy (plug in equipment) is included.

Part L of the building regulations has currently changed to Part L 2021. However, the software for assessing compliance is currently still a beta version. As such, the analysis will be re-assessed once the finalised version of the software is available for testing compliance with Approved Document L2: 2021.

Given the ambitious aspirations of the project and the current performance under Part L, there is a high degree of confidence that the development will achieve compliance with Part L of the building regulations.

The Part L analysis will be refined through the design development stages to ensure compliance is still achieved.

4. ENVIRONMENTAL DESIGN (BREEAM)

4.1 General

The guide encourages developers to use the Building Research Establishment Environmental Assessment Method (BREEAM) to demonstrate energy efficiency and environmental performance and suggests that the target for design and post-construction should be Very Good. The applicants aim is to achieve a rating of Excellent for the building and to that end Ramboll UK have been engaged to prepare a BREEAM study.

4.2 BREEAM

BREEAM UK New Construction 2018 scheme is being used to assess the environmental life cycle impacts of new non-domestic buildings at the design and construction stages. The latest version of the UK NC 2018 BREEAM guide is Issue 3.0. 'New Construction' is defined as a development that results in a new standalone structure, or new extension to an existing structure, which will come into operation or use for the first time upon completion of the works.

Dependant on the scope of works of the contract, assessments can be undertaken to Shell Only – Structural skeleton of the building; foundations, framework, walls, floors and roof. Shell & Core – the Shell plus installation of HVAC services. Or lastly, Fully Fitted – Shell & Core services plus local services, lighting and any equipment/materials used during building operation. Assessments also vary on building type, with a varied number of credits and weighting which are aligned with building best practice.

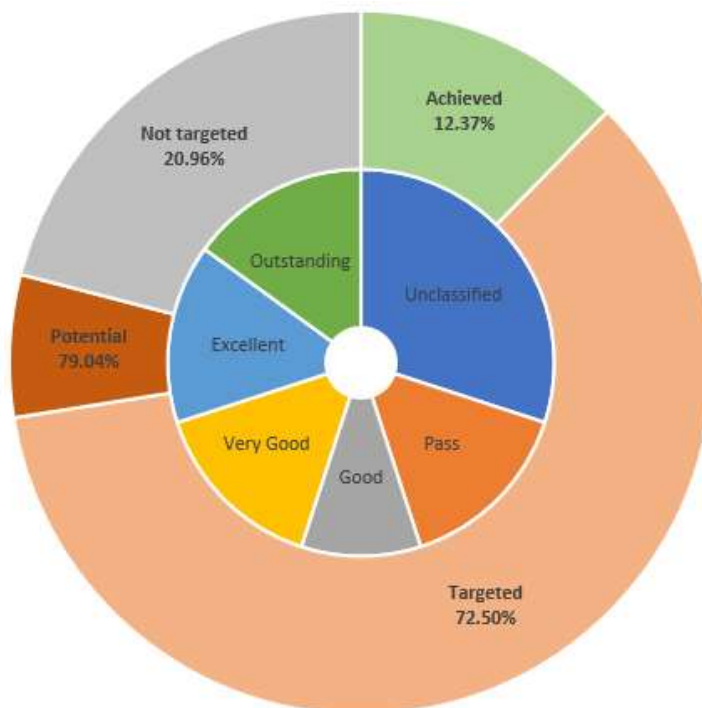


Figure 1: EvO Building - Didsbury Technology Park BREEAM NC UK 2018 Design Stage Assessment (As of 11.07.22)

The EvO Building – Didsbury Technology Park is being assessed under the BREEAM NC UK 2018 Scheme (Issue 3.0) as an Office Building type – Shell & Core scope. Ramboll Sustainable Solutions are appointed as the BREEAM Assessors working with Bruntwood and other relative stakeholders to achieve certification for the interim Design Stage and Post Construction Review Stage Assessments. The project is required to achieve an 'Excellent' BREEAM rating (>70%).

At present, the BREEAM assessment is within the Design Stage (See figure 1), actively exchanging documentation as evidence for the assessment. 12.37% is currently achieved and 72.50% targeted, which will succeed in achieving the targeted 'Excellent' (>70%) rating. Additional potential credits have been identified which the Design Team have been made aware of and engaged in their potential, should alternative credits be required to achieve the 'Excellent' rating.

The monitoring process and engagement with Design Team will continue with the aim of achieving Design Stage certification around the beginning of construction. will be monitored and updated throughout the design and build process to help steer the team to a successful outcome.

5. WATER MANAGEMENT

The Level 2 Manchester City Council, Salford City and Trafford Councils Strategic Flood Risk Assessment (SFRA) dated March 2011 has been reviewed. Criteria related to flood risk will be covered within the Flood Risk Assessment.

The SFRA indicates that the Application site is within the Didsbury Critical Drainage Area. The climate change assessment shows a general increase in flood risk across the Didsbury area with the worst affected area in central Didsbury.

There are no water courses on the site. The River Mersey meanders past the site in an overall easterly direction, approximately 250m to the south and is a main river at this point.

Public sewer records indicate that there are no known public sewers crossing the application site boundary. Storm water sewers do exist within the Kensal Drive on the western side of the site. However, it is not confirmed whether these are public or private. There is also a combined public sewer running along the Barlow Moor Road along the southern direction of the site.

Following the review of sustainable drainage options within the drainage strategy, a high level strategy is proposed as summarised below. Further detail is provided in the Drainage Strategy report and the Flood Risk Assessment document.

- Infiltration to ground has been prioritised over other routes. This includes direct infiltration, tree pits, channels and water gardens.
- The surface water from the temporary car park will be drained by infiltration via permeable paving.
- The high water-table (ground conditions) limits what can be feasibly managed through infiltration.
- Surface water is collected from the roof of Ev0 building, the roof of the covered car park and the immediate car park surrounds. This is collected in a series of attenuation tanks under the car park and gradually discharged into the existing public sewer.

In accordance with the Building Regulations Part H, foul and surface water drainage systems are to be designed as separate networks on the Application Site prior to discharge offsite into an existing combined sewer.

United Utilities have agreed for the foul water connection to the 625mm combined sewer via a saddle connection in Barlow Moor Road on the southern side of the site and this has been installed during the construction for building D3. Foul water flows will be calculated using the Population Method as described in BS EN 752:2017 and references British Water Flows and Loads 4.

6. CONSTRUCTION & WASTE MANAGEMENT

6.1 Waste Management

6.1.1 General

The Development control policy sets out how the council will deal with applications for development involving the disposal or recycling of waste materials. Greater emphasis is now being placed on the reduction and recycling of waste at source.

In order to demonstrate how this is being considered a waste management strategy plan has been prepared by Shephard Robson. The general provisions are outlined below.

6.1.2 Construction Waste

In line with the "Site Waste Management Plan Regulation 2008" a Site Waste Management Plan (SWMP) will be developed once the principal contractor has been appointed and this will be formulated and agreed with Manchester City Council.

To reduce the amount of waste from landfill, the waste is to be segregated at the waste transfer station into the following categories:

- CAT A: Hazardous waste e.g. paint tins, mastic tubes etc.
- CAT B: Metal
- CAT C: General waste / build debris

6.1.3 Operational Waste

As part of the BREEAM UK NC 2018 Assessment, *Wst 03 – Operational Waste* credit has been agreed and targeted for the development, with evidence to be provided as part of the Design Stage. This credit will ensure the following is provided:

A dedicated space for the segregation and storage of operational recyclable waste generated. The space is:

- a. Clearly labelled, to assist with segregation, storage and collection of the recyclable waste streams
- b. Accessible to building occupants or facilities operators for the deposit of materials and collections by waste management contractors
- c. Of a capacity appropriate to the building type, size, number of units (if relevant) and predicted volumes of waste that will arise from daily or weekly operational activities and occupancy rates.

Where consistent and/or large amounts of operational waste are generated, provide:

- a. Static waste compactors or balers; situated in a service area or dedicated waste management space
- b. Vessels for composting suitable organic waste OR adequate spaces for storing segregated food waste and compostable organic material for collection and delivery to an alternative composting facility
- c. A water outlet provided adjacent to or within the facility for cleaning and hygiene purposes where organic waste is to be stored or composted on site.

The waste facility will be of at least 2m² per 1000m² GIA for recycling and general waste and will be easily accessible for building facilities staff and off-site waste collection services.

6.2 Construction Management

6.2.1 General

UDP part 1 policy E1.6 requires the building materials used in new developments and refurbishment schemes to be environmentally friendly wherever possible, and encourages the use of recycled building materials. The guide calls for a site waste management plan to be

implemented. Recycling materials is encouraged as is the use of environmentally friendly, locally source, low embodied energy materials. Materials containing damaging chemicals are to be avoided.

6.2.2 Contractors Construction Management Plan

At this stage no firm engagement of the construction management team has been made however, it has been confirmed that the eventual contractor is required to establish a suitable construction management plan and to be in accordance with the considerate constructor's scheme.

7. BIODIVERSITY

The site has been found to support a limited number of common man-made and highly disturbed habitats of low ecological value, including amenity grassland, ornamental hedgerows, young tree planting, developed land and buildings, and amenity landscaping. Impacts upon protected or notable fauna have been ruled out in association with the development. The proposals will seek to offset any impacts upon low value habitats via the creation of new habitats of equivalent or higher ecological value on site post development, in order to achieve a net gain in biodiversity.

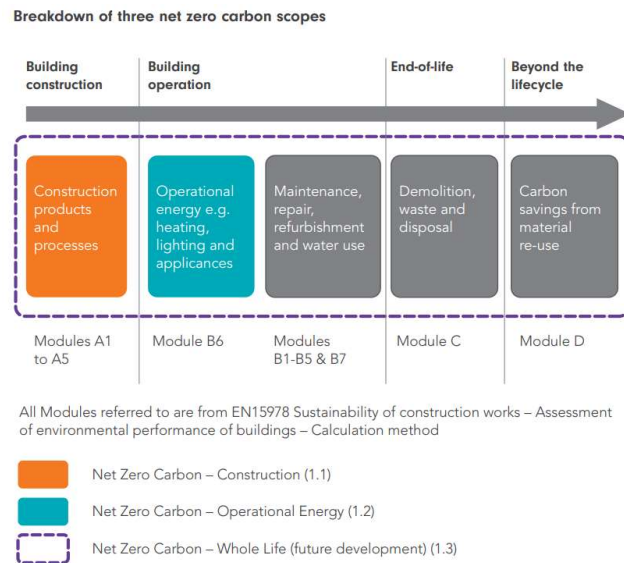
More details are included within the Ecological Impact Assessment (report reference: ER-5143-02)

8. ZERO CARBON STANDARDS STATEMENT

8.1 Operational and Embodied Carbon Targets

The target for this project set by the client and design teams is to align with the UK Green Building Council Net Zero Carbon Framework (2017). As such the aim is to reduce the carbon emissions under the two main categories defined by the UKGBC:

- Net Zero Carbon – Construction: the embodied carbon emissions arising from the extraction, treatment, transport of construction materials and equipment. The emissions generated from the construction process to practical completion.
- Net Zero Carbon - Operational Energy: The reduction of the operational carbon emissions generated from the use of the energy needed to operate the building such as the lighting installation, ventilation, heating and cooling equipment defined as the regulated energy use but also the unregulated energy as well, such as the small power needed to run computers, servers and lifts. This can be defined as the carbon translated from the energy required to make the commercial office a suitable building to work in.



Source - UKGBC: Net Zero Carbon Buildings: A Framework Definition

Achieving Net Zero in Construction includes

- measuring Whole Life Carbon
- reducing impacts through design and construction
- achieving the London Energy Transformation Initiative (LETI) upfront embodied carbon target of 600kgCO₂e/m²
- offsetting all upfront embodied carbon through verified emissions reduction and removal

Achieving Net Zero in Operation includes reaching a Paris-Proof Target as defined by the UKGBC for Whole Building Energy (Table 1).

Table 1: Energy performance targets for buildings targeting net zero carbon for operational energy

Scope	Metric	Interim Targets			Paris Proof Target
		2020-2025	2025-2030	2030-2035	2035-2050
Whole building energy	kWh _e /m ² (NLA) / year	160	115	90	70
	kWh _e /m ² (GIA) / year	130	90	70	55
	DEC rating	D90	C65	B50	B40
Base building energy	kWh _e /m ² (NLA) / year	90	70	55	35
	kWh _e /m ² (GIA) / year	70	55	45	30
	NABERS UK star rating	4.5	5	5.5	6
Tenant energy	kWh _e /m ² (NLA) / year	70	45	35	35

NLA = net lettable area GIA = gross internal area

Source - UKGBC: Net Zero Carbon: Energy Performance Targets for Offices

This report focusses on the reduction of embodied and operational carbon and will detail the strategy adopted to minimise the energy needed to operate the commercial office building. The aim is therefore in the first instance to reduce as much as feasibly possible the energy demand within the building through the improvement of thermal fabric performance, careful design of glazing provision, energy demand reduction through the use of sensors and monitoring the use of the building, the use of high energy efficient equipment and maximisation of the local renewable energy generation.

8.2 NABERS

NABERS UK is a simple, reliable system for rating the energy efficiency of office buildings across England, Wales, Scotland and Northern Ireland. Unlike existing design metrics, it is a performance metric that considers the recorded metered data in operation. The building star rating is determined by the actual energy consumption of the building in operation with a reduction in the energy use leading to higher star ratings.

NABERS UK is built on the following seven key principles which help maintain quality and integrity:

- Measure actual impact, not intent
- Relevant to building operations
- Ratings are meaningful
- Ratings are simple and easy to perform
- Ratings are reliable
- Management is trustworthy
- Development is collaborative

The NABERS UK scheme being used for Ev0 Building is the 'Design for Performance' (DfP). DfP is the process whereby a developer or owner commits to design, build and commission a new office development or major refurbishment to achieve a specific NABERS UK star rating.

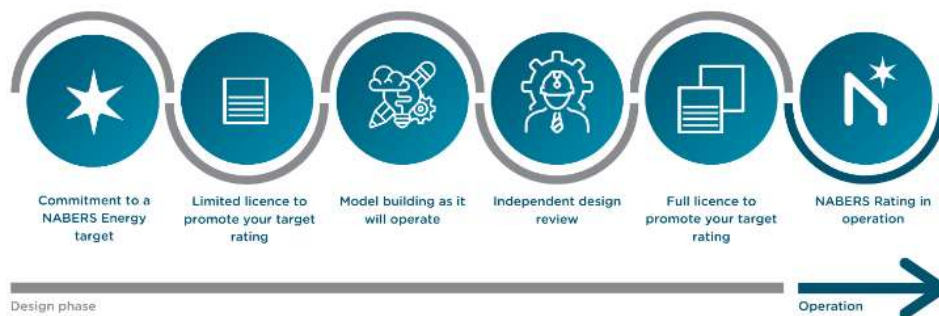


Figure 2 - NABERS Design for Performance process

Design for Performance (DfP) provides a framework by which projects can commit preconstruction to achieve a specific NABERS Energy for Offices star rating in post-construction. Analysis and optimisation are undertaken during the design of the building and is validated by the final energy consumption figures following 12 months of 75% minimum occupancy.

The DfP Agreement allows developers, building owners and tenants to promote and market the expected energy performance of a new or refurbished office from the design stage.

DfP offers an opportunity for enhanced engagement between the client, the design team, contractor and FM team with those undertaking the operational energy assessment to help optimise energy performance in practice. It brings value to the work of the engineers and enhances the responsibilities in detail design.

A 5+ star rating is currently being targeted for Ev0 building.

9. CONCLUSION

Ev0 building is targeting to achieve Net Zero Carbon in Construction and Operation under the UKGBC definition. Key performance items which will help in achieving this target includes:

- Optimisation of building form, fabric and shading
- The maximisation of heat recovery and recycling of building energy
- The use of highly efficient building services and a move to all-electric systems (ASHP's etc)
- The use of photovoltaics (PV) to help offset any remaining energy still needed to serve the building.
- The building will be designed to perform using the NABERS design process with a target of 5.5 stars
- Achieving the London Energy Transformation Initiative (LETI) upfront embodied carbon target of 600kgCO₂e/m²
- Target of achieving BREEAM 'excellent'