

8 Minshull Street Manchester

Energy & Environmental Standards
Statement

Ref: P2378-ES-001 Rev B

NOVO

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AMENDMENT HISTORY



REVISION	DESCRIPTION	DATE	AUTHOR	CHECKED
A	Initial Issue	Feb 2025	A. Smith	C. Pearson
B	Design Update	Mar 2025	A. Smith	C. Pearson

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1 EXECUTIVE SUMMARY

The proposed development known as 8 Minshall Street is located within Manchester. The development is a Grade II listed building that is proposed to be converted into 39 apartments. As such the policies detailed in the Manchester Core Strategy must be adhered to. This report will directly address policies EN3 and EN4 of the Manchester Core Strategy, ultimately concluding that the change of use development produces less CO₂ emissions, by adopting sustainable design and construction measures.

The methodology for this report will follow the Energy Hierarchy as set out in the Manchester Core Strategy. First, improvements to the envelope will be made. Then, the results of these fabric improvements will be reviewed, and suitable technologies will be reviewed to enhance this design philosophy where feasible.

The proposed fabric specification is described in Table 1 below. SAP 10.2 The default value for thermal junction PSI-values have been used as the proposed development is an existing building.

For the energy assessment it is estimated that the existing construction build ups will not meet the Part L limiting U-Values as defined in Table 1 below (subject to architect confirmation). To maintain compliance with Part L any fabric elements that do not achieve limiting values are required to achieve minimum improved values as per column 2 in Table 1. There are no specific requirements however with respect to glazing Fletcher Rae have provided a proposed glazing specification which quotes a centre pane U-Value of 0.7 W/m².K. Subject to confirmation with the architect/glazing provider, it is assumed that the overall net U Value inclusive of the frame will be 1.2 W/m².K.

Please note that should existing elements exceed limiting U values as described in column 1 Table 1 below, then the upgrades required will involve boarding over the existing brickwork to improve thermal performance. Based on an initial calculation we estimate the U-value would be circa 2.37W/m².K. Based on these results further discussion between the architect, English Heritage and Building Control would be required.

The current as designed Part L calculations, which incorporate fabric upgrades, achieve predicted EPC ratings of C. It should be noted that any relaxation of the fabric specification may result in reduced EPC Ratings of D or lower, subject to reassessment.

Table 1 Building Fabric Specification

Building Fabric			
Element	Part L Vol 1: 2021 Limiting U-values for existing elements in existing dwellings (W/m².k)	Part L Vol 1: 2021 Limiting U-values for Improved fabric elements in existing dwellings (W/m².k)	Proposed U-values (W/m².k)
Floors	0.70	0.25	0.25
External Walls	0.70	0.30	0.30
Roof	0.35	0.16	0.16
Windows	-	-	1.20 (G-Value 0.62)
Air permeability (m²/h.m² @ 50 pa)			
All dwellings	15 (Not Tested)	-	15 (Not Tested)
Thermal Mass Parameter (TMP)			
Calculated based on construction drawings. Preliminary construction types entered as follows:			
Construction Type		General Description	
External Floors		Slab on ground, screed over insulation	
External Wall		Solid Wall: dense plaster, insulation, any outside structure	
Roofs		Other	
Internal Partitions		Other	
Floor/Ceiling within Dwellings (Duplexes)		Other	

Regarding the systems used, the development will utilise a local communal specification where a gas boiler will serve both radiators and hot water through a heat interface unit. Due to the building being Grade II listed the dwellings will have centralised mechanical extract ventilation systems.

In addition to efficient systems, consideration has been given to the reduction of mains potable water usage through efficient water fixtures. This is further detailed in section 4.5 however potable water demand is to be reduced to <16 litres/person/day as per the requirement within Building Regulations. For each of the 39 dwellings within the development, the following results have been obtained, based on an area weighted average calculation to produce a single result for all units.

Table 2 As-Designed Building Regulations Part L 2021 Results

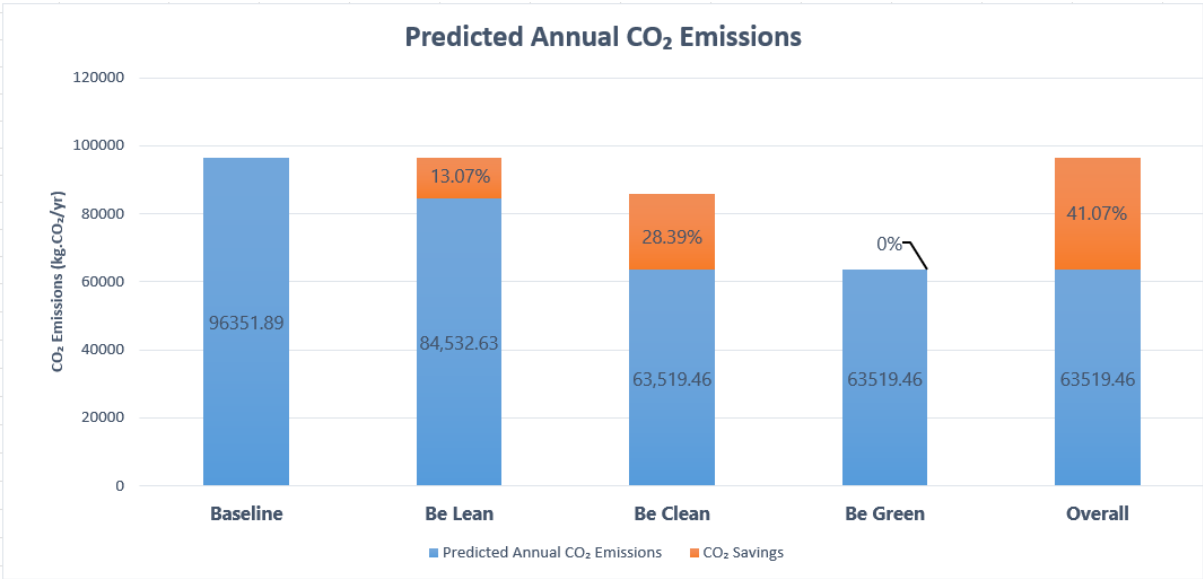
Target Emission Rate vs Dwelling Emission Rate	
Base Carbon Dioxide Emission Rate	96,351.89 kgCO ₂ /m ²
Combined Dwelling Carbon Dioxide Emission Rate (DER)	63,519.46 kgCO ₂ /m ²
% Reduction	41.07%

As all compliance metrics have been passed it is deemed that the development complies Part L Vol 1: 2021 and supports policies EN3 and EN4 of the Manchester Core Strategy.

The below graph displays the performance of this development within the Energy Hierarchy.



Figure 1 Energy Hierarchy Overall Results



2 INTRODUCTION

2.1 PURPOSE

NOVO Integration Ltd has been appointed as Energy Consultants to produce an Energy and Environmental Standards Statement for Minshull Street, Manchester.

This is to support the scheme design process, demonstrate Building Regulations Part L compliance and achieve the applicable planning policies set out in the Manchester Core Strategy.

Figure 2: Minshull Street, Manchester



This report will outline the following:

1. Assess the proposed development site's estimated CO₂ emissions, it will look into the feasibility of Low Zero Carbon technologies, examining the following aspects relative to LZC/renewable technologies:
 - Energy generated by Renewable/Low Zero Carbon Technologies (LZC)
 - Feasibility assessment for each Renewable/Low Zero Carbon Technologies (LZC)
 - Local Planning Requirements
2. The proposed building fabric and Low Zero Carbon (LZC) design strategy and analysis calculations, with respect to the Standard Assessment Procedure (SAP). Demonstration of how the design is compliant with Part L1A 2021 Building Regulations

2.2 BACKGROUND POLICY DOCUMENTS

The following statements and regulatory guidelines form the policy background to this energy strategy:

- The Kyoto Protocol at the United Nations.
- Framework Convention on Climate Change as negotiated in December 1997 has come into effect on 16 February 2005 following the ratification of the agreement by Russia on 18

November 2004. The Burden Sharing Agreement of the EU mandates a 12.5% reduction in greenhouse gas emissions for the UK by 2008 - 12.

- The Department of Transport and Industry White Paper, titled "Our Energy Future - Creating a Low Carbon Economy", spells out a target for 10% of electricity to be from renewable sources nationally by 2010 and twice this by 2020.
- National Policy Objectives in regard to renewable energy Planning Policy Statement 22: Renewable energy guidance for local governing bodies concerning implementation of renewable energy technologies through appropriate planning.
- The United Kingdom has made commitments that extend beyond this requirement. National Targets are for a reduction to 20% below 1990 CO₂ levels by 2010 and a 60% reduction by 2050.
- Integrating renewable energy into new developments: Toolkit for planners, developers and consultants, September 2004.
- National Planning Policy Framework (July 2021).

The National Planning Policy Framework is a key part of our reforms to make the planning system less complex and more accessible, to protect the environment and to promote sustainable growth. In particular point A of paragraph 16 which states the following:

Plans should:

- a) be prepared with the objective of contributing to the achievement of sustainable development.*
- b) be prepared positively, in a way that is aspirational but deliverable*
- c) be shaped by early, proportionate, and effective engagement between plan makers and communities, local organisations, businesses, infrastructure providers and operators and statutory consultees*
- d) contain policies that are clearly written and unambiguous, so it is evident how a decision maker should react to development proposals*
- e) be accessible through the use of digital tools to assist public involvement and policy presentation; and*
- f) serve a clear purpose, avoiding unnecessary duplication of policies that apply to a particular area (including policies in this Framework, where relevant).*

Another key point of the NPPF is paragraph 8, point C which states the following:

Achieving sustainable development means that the planning system has three overarching objectives, which are interdependent and need to be pursued in mutually supportive ways (so that opportunities can be taken to secure net gains across each of the different objectives):

- a) an economic objective – to help build a strong, responsive and competitive economy, by ensuring that sufficient land of the right types is available in the right places and at the right time to support growth, innovation and improved productivity; and by identifying and coordinating the provision of infrastructure;*
- b) a social objective – to support strong, vibrant and healthy communities, by ensuring that a sufficient number and range of homes can be provided to meet the needs of present and future generations; and by fostering a well-designed and safe built environment, with accessible services and open spaces that reflect current and future needs and support communities' health, social and cultural well-being; and*

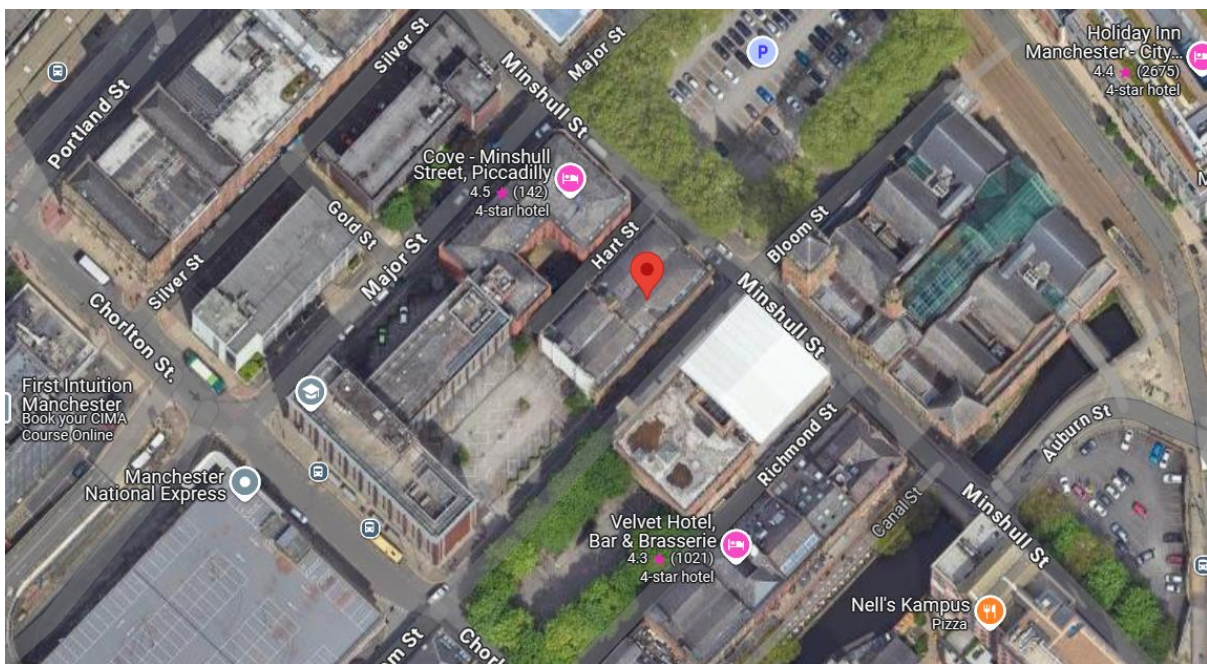
c) *an environmental objective – to contribute to protecting and enhancing our natural, built and historic environment; including making effective use of land, helping to improve biodiversity, using natural resources prudently, minimising waste and pollution, and mitigating and adapting to climate change, including moving to a low carbon economy.*

- Manchester Core Strategy 2012-2027
- RIBA 2030 Climate Challenge
- Approved Document Part L Volume 1: Dwellings 2021

2.3 SITE DESCRIPTION

The site is located in the centre of Manchester near the Northern Quarter. The surrounding building make-up is comprised of a dense urban mixture featuring multiple public, commercial and multi-res developments in the immediate vicinity.

Figure 3: Ariel View



2.4 PLANNING POLICY

2.4.1 Local Policy

The locality of the development site means it falls under the jurisdiction of Manchester City Council. As such the policies adopted by Manchester City Council must be adhered to. The document that details Manchester's strategy for development is the Manchester Core Strategy 2012-2027, throughout the remainder of this report it shall be referred to as Manchester Core Strategy.

Policy EN3 – Heritage:

Throughout the City, the Council will encourage development that complements and takes advantage of the distinct historic and heritage features of its districts and neighbourhoods, including those of the City Centre.

New developments must be designed so as to support the Council in preserving or, where possible, enhancing the historic environment, the character, setting and accessibility of areas and buildings of acknowledged importance, including scheduled ancient monuments, listed buildings, registered parks and gardens, conservation areas and archaeological remains. Proposals which enable the re-use of heritage assets will be encouraged where they are considered consistent with the significance of the heritage asset.

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:

- *All development must follow the principle of the Energy Hierarchy, being designed:*
 - *2027 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 above extracts are particularly relevant and will be addressed throughout this report.

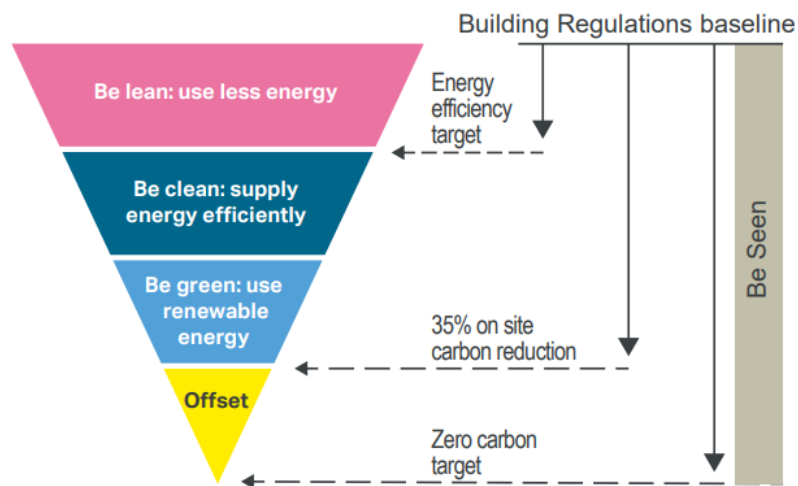
2.4.2 Energy Hierarchy

As part of the Sustainability and Energy analysis of the development Energy Hierarchy has been used as a means of structuring the sustainable design process.

We have taken this approach in order to properly address the Salford Local Plan Policies which promote low carbon design, assessment of connection to CHP and consideration of other low – zero carbon technologies.

An overview of the Energy Hierarchy is provided below:

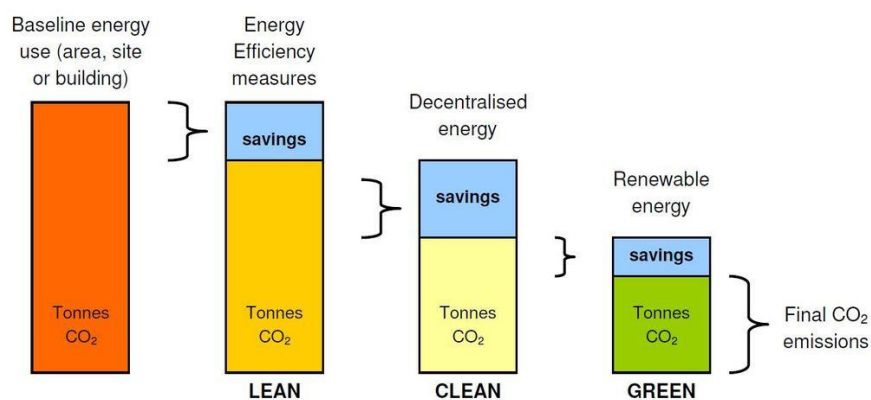
Figure 4: Energy Hierarchy Diagram



The development Energy strategy has adopted the following design ethos:

- **BE LEAN** – By using less energy and taking into account the further energy efficiency measure in comparison to the baseline building.
- **BE CLEAN** – By supplying energy efficiently. The clean building looks at further carbon dioxide emission savings over the lean building by taking into consideration the use of decentralise energy via CHP.
- **BE GREEN** – By integrating renewable energy into the scheme which can further reduce the carbon dioxide emission rate.

Figure 5: Energy Hierarchy Example Graph



2.5 BUILDING REGULATIONS

When dealing with Existing buildings compliance with Building Regulations Part L Vol 1: 2021 is required. To comply with these regulations 2nr compliance metrics must be met, these are:

- 1) Limiting U values for both new and existing fabric elements must be met.
- 2) Provide building services which are energy efficient to a reasonable standard.

The following are some key extracts from the Building Regulations detailing the requirements of the regulations, for full details please refer to Part L Volume 1 2021.

Regulation	
Requirements for the renovation or replacement of thermal elements	
23. (1) Where the renovation of an individual thermal element— (a) constitutes a major renovation; or (b) amounts to the renovation of more than 50% of the element's surface area; the renovation must be carried out so as to ensure that the whole of the element complies with paragraph L1(a)(i) of Schedule 1, in so far as that is technically, functionally and economically feasible.	
Requirement	
<i>Requirement</i>	<i>Limits on application</i>
Schedule 1 – Part L Conservation of fuel and power	
L1. Reasonable provision shall be made for the conservation of fuel and power in buildings by: (a) limiting heat gains and losses— (i) through thermal elements and other parts of the building fabric; and (ii) from pipes, ducts and vessels used for space heating, space cooling and hot water services; (b) providing fixed building services which— (i) are energy efficient to a reasonable standard; (ii) have effective controls; and (iii) are commissioned by testing and adjusting as necessary to ensure they use no more fuel and power than is reasonable in the circumstances.	

3 DESIGN PARAMETERS

3.1 METHODOLOGY

The Standard Assessment Procedure (SAP) is the Government's approved methodology for assessing the predicted energy consumption and carbon dioxide emissions for domestic developments.

Results are derived in respect of floor area and consider energy use (kWh/m²/yr) and associated CO₂ emissions (kg.CO₂/m²/yr) from the following:

- Space heating
- Domestic hot water
- Ventilation
- Lighting
- Ancillary pumps and fans
- Energy generation technology

SAP is compliant with the EU Energy Performance of Buildings Directive and is carried out using approved software. For the purpose of this report, data has been produced by an Accredited Energy Assessor using SAP 10 software to produce the data for this report.

To enable a review of each level of the Energy Hierarchy, firstly the Baseline CO₂ emission figures must be established. These figures are based on Part L Vol 1: 2021 'Notional Building', a specific set of specification criteria referenced in section 3.4 of this report.

All additional measures included to reduce the overall CO₂ emissions such as improved building fabric and low carbon technology will be compared against the Baseline figures. These figures are the Target Emission Rate derived from the SAP assessment and resulting Design Stage SAPs.

A 'fabric first' approach will be undertaken throughout this report, looking at improvements to the thermal envelope initially to understand the improvements that can be gained prior to the feasibility of any renewable / low carbon technologies.

Renewable / low carbon technologies will then be considered with regards to special constraints, feasibility, and appropriateness in relation to the site.

NOVO Integration Ltd has used the following information to formulate the Energy Strategy.

3.2 ARCHITECTURAL DRAWINGS BY FLETHCHER RAE ARCHITECTS

Table 3 Architects Drawing Schedule

Drawing Number	Drawing Contents
24029-HFR-MS-B1-DR-A-SK2005_P8	Lower Ground Floor
24029-HFR-MS-00-DR-A-SK2000_P8	Upper Ground Floor
24029-HFR-MS-01-DR-A-SK2001_P8	Level 01
24029-HFR-MS-02-DR-A-SK2002_P8	Level 02
24029-HFR-MS-03-DR-A-SK2003_P8	Level 03
24029-HFR-MS-04-DR-A-SK2004_P9	Level 04

Drawing Number	Drawing Contents
24029-HFR-MS-04-DR-A	Sections for M&E

3.3 BASELINE CO₂ EMISSIONS

For the purpose of this report the baseline energy use and CO₂ emissions are calculated based on the 'Notional Dwelling' requirements specified in the Building Regulations Part L Vol 1: 2021 (Table 1.1).

Table 5 Residential Baseline Building Fabric

Building Fabric			
Element	Part L Vol 1: 2021 Limiting U-values for existing elements in existing dwellings (W/m ² .k)	Part L Vol 1: 2021 Limiting U-values for Improved fabric elements in existing dwellings (W/m ² .k)	Proposed U- values (W/m ² .k)
Floors (Existing)	0.70	0.25	-
External Walls (Existing)	0.70	0.30	-
Roof (Existing)	0.35	0.16	-
Windows	-	-	-
Air permeability (m ² /h.m ² @ 50 pa)			
All dwellings	15 (Not Tested)	-	-

The following table details the notional baseline area weighted CO₂ regulated emissions for the development. The target emission rates (TER's) in the above figures combined with the total floor area was used to produce the baseline CO₂ emissions below.

Table 6 Estimated Baseline Carbon Emissions SAP 10 Building Regulations

Building Services	Baseline CO ₂ Emissions (kg CO ₂ /m ²)
Total regulated emissions (heating, hot water, lighting, fans & pumps)	96,351.89

An area weighted block compliance baseline carbon emission result is presented above, produced by the SAP 10 software.

By using low u-values and high-performance materials to reduce greenhouse emissions and improve energy efficiency; the Be Lean stage of this report addresses policies EN3 and EN4 of the Manchester Core Strategy. Section 4 below will now detail how the reduction between the dwelling emission rate (DER) and the target emission rate (TER) has been achieved.

4 ENERGY STRATEGY

4.1 ENERGY EFFICIENT DESIGN

This section outlines the design energy efficient measures taken to minimise the building's energy demand and therefore reduce energy use and CO₂ emissions further than the baseline notional building, often referred to as the 'Fabric First' approach.

The energy efficient measures include:

- a) Inclusion of better U-values than the minimum U-values set in Part L Vol 1: 2021
- b) Utilising efficient ventilation, heating and hot water systems
- c) Utilising low energy efficient lighting such as LED lighting

The table below outlines the improvements made to the building fabric elements compared against both the Building Regulations limiting U-values and the 'Notional Dwelling' U-values which the baseline is derived from.

Table 7 Proposed Building Fabric Specification

Building Fabric			
Element	Part L Vol 1: 2021 Limiting U-values for existing elements in existing dwellings (W/m ² .k)	Part L Vol 1: 2021 Limiting U-values for Improved fabric elements in existing dwellings (W/m ² .k)	Proposed U-values (W/m ² .k)
Floors (Existing)	0.70	0.25	0.25
External Walls (Existing)	0.70	0.30	0.30
Roof (Existing)	0.35	0.16	0.16
Windows	-	-	1.20
Air permeability (m ² /h.m ² @ 50 pa)			
All dwellings	15 (Not Tested)	-	15 (Not Tested)

4.1.1 Heating Demand

The heating energy demand will be reduced by making improvements to the existing building fabric and providing high performance windows to minimise heat losses.

4.1.2 Ventilation

All dwellings will mechanical extract ventilation and there will also be natural ventilation methods available to occupants via openable windows.

4.1.3 Lighting

The proposed light fittings will be low energy efficient fittings, in this instance LED fittings only throughout. For Part L compliance the lighting efficacy for each fitting type will stand at 100lm/w or higher.

4.1.4 Embodied Carbon

All materials used within the construction of the development will have embodied carbon within them, taking into consideration manufacturing processes and supply chains. It is assumed that the developer will seek to procure materials and construction elements with appropriate sustainable accreditations, for example FSC for timber, ISO:140001 accreditations where applicable etc, to minimise the use of high embodied carbon within the building.

4.2 CO₂ REDUCTIONS AFTER FABRIC FIRST APPROACH

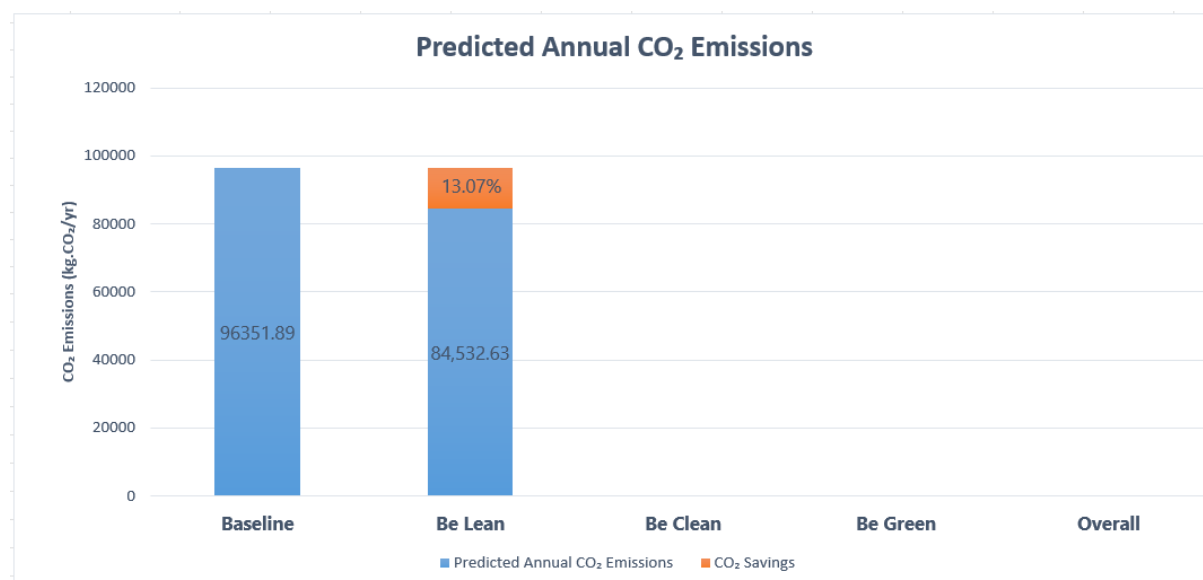
The following table demonstrates the reduction in CO₂ emissions based on an area weighted average calculation utilising a fabric first approach.

Figure 7: Be Lean Stage CO₂ Emission Results

Regulated Emissions	Baseline CO ₂ Emissions	Fabric First Building CO ₂ Emissions	CO ₂ Emission Savings	% reduction in CO ₂ Emissions
kg of CO ₂ /m ²	96,351.89	84,532.63	11,819.26	13.07%

The above table shows that, in terms of CO₂ emissions the fabric first result is circa 13.07% reduced over the baseline target CO₂ emissions. This is a direct result of the fabric efficiency measures. In keeping with the Energy Hierarchy, this result does not include any renewable technology, this will be further assessed at the Be Green stage.

Figure 9: Be Lean Stage CO₂ Emission Results



4.3 CLEANER ENERGY - CHP & DECENTRALISED ENERGY NETWORKS

The Energy Hierarchy encourages the use of a CHP system and/or the connection to District Heating system to reduce CO₂ emissions further.

4.3.1 CHP

The Energy Hierarchy identifies combined heat and power (CHP) as a method of producing heat and electricity with much lower emissions than separate heat and power. Also, it encourages the creation of district heating systems supplied by CHP.

The implementation of a CHP strategy should be decided according to good practice design. Key factors for the efficient implementation of the CHP system are:

- Development with high heating load for the majority of the year
- CHP operation based on maximum heat load for minimum 10 hours per day
- CHP operation at maximum capacity of 90% of its operating period

A CHP system will not be considered for this development due to the following reasons:

- Due to restrictions on site space would be limited for the level of plant required for a CHP system, which would require accumulators, additional boiler power, pumps, pressurisation units etc.
- Pollution discharged from the CHP unit may not be appropriate given the site locality and the number of people passing the site given its location within a residential area.
- Noise pollution is a consideration given the function of the development and its proximity to other surrounding buildings.
- Economic viability is heavily dependent on the constant demand for heat and power, as well as the price of electricity and gas.

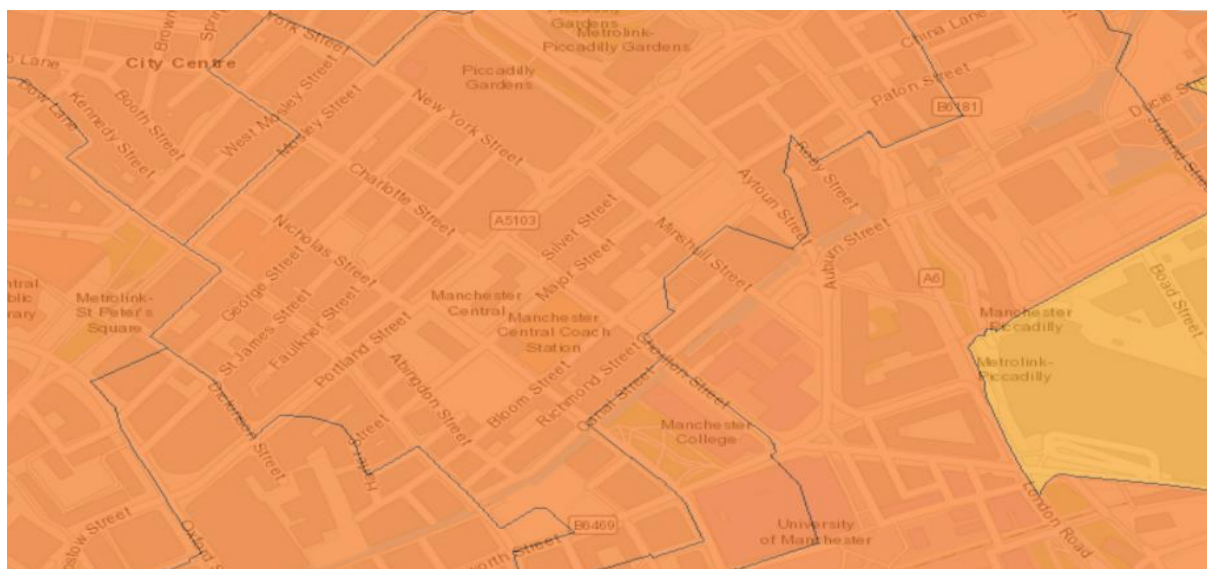
Hence, the implementation of a CHP strategy is not recommended for this development.

As a result, no CO₂ reduction can be achieved as part of the Be Clean section of the Energy Hierarchy.

4.3.2 Decentralised Energy Network

The feasibility of connecting into an existing heating network or providing the building with its own combined heat and power plant has been assessed through the use of UK CHP Development Map, for Manchester as for a District Heating network.

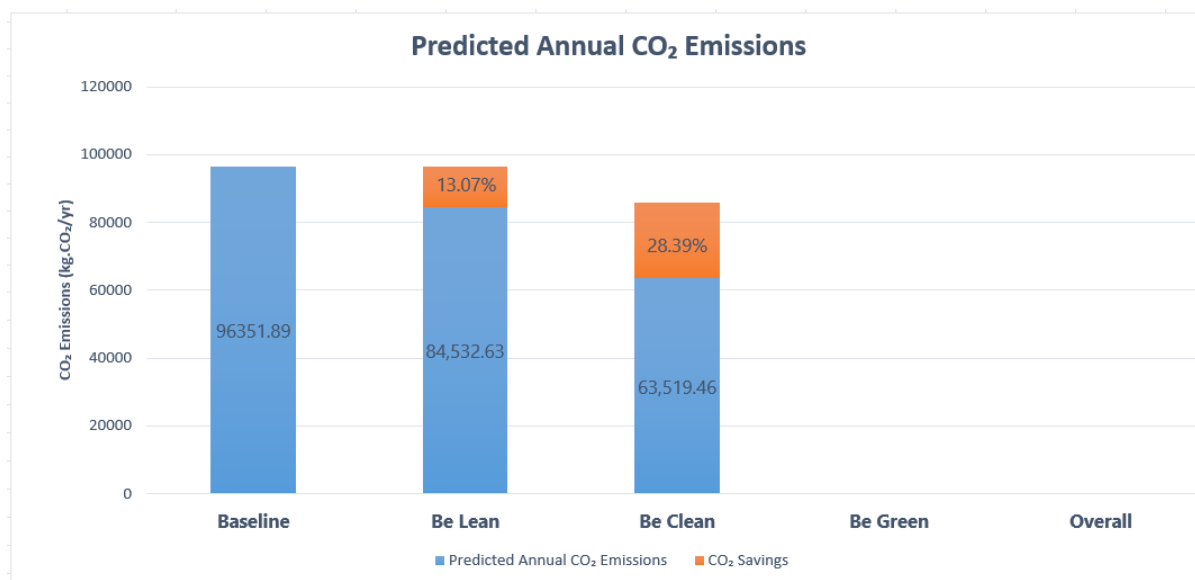
Figure 10: CHP Development Map – Local Heat Loads



Presently the total heat loads within the area are high and there will be allowances made to make future connections to Heat Networks possible.

This development will implement a local communal gas boiler system where all apartments will be serviced with heating and hot water via a heat interface unit. As such a CO₂ reduction can be observed at the Be Clean stage, this is described in the graph below:

Figure 11: Be Clean Carbon Emissions Estimated SAP 10 Result



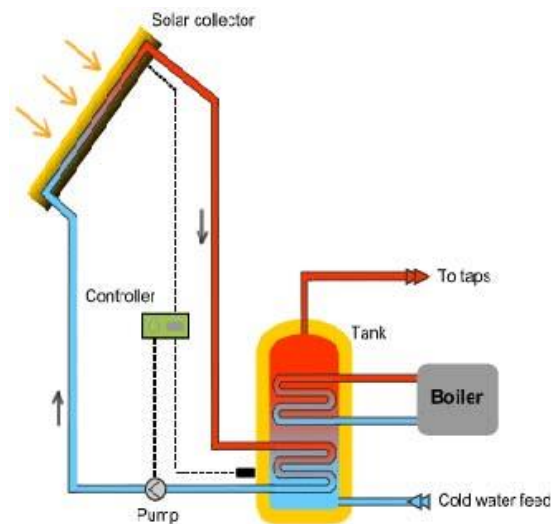
4.4 LOW & ZERO CARBON TECHNOLOGIES

4.4.1 General

Low and zero carbon (LZC) technologies are systems that generate energy with either zero or reduced CO₂ emissions when compared against traditional energy generation methods.

The alternative LZC technologies have been assessed in relation to the development and their viability assessed. Some of the LZCs are intrinsically unsuitable due to the development type and location whereas others are potentially viable.

Figure 12: Solar Thermal Diagram



4.4.2 Solar Water Heating

Solar thermal panels utilise the sun energy to generate hot water for use within the building. The panels are commonly provided in either flat plate or evacuated tube arrangements. The panels are ideally located facing south at an approximate 30° inclination angle in areas where they are not subjected to shade.

This system alone would not generate a large enough CO₂ reduction in proportion to other comparable technologies. This technology has also been discounted due to the inflated cost of installation with regard to additional pipe runs, maintenance requirements and the significant roof area that would be required.

4.4.3 Wind Turbines

Wind turbines generate electrical energy derived from kinetic energy provided by the local wind resource. The performance of wind turbines depends greatly on the wind speed and turbulence that in turn is influenced by the terrain and installation height.

Figure 13: Typical Small Scale 6kW Wind Turbine



The use of wind turbines on the development will also have a significant visual impact on the city centre location and neighbouring buildings, as well as low frequency noise source and hence it is likely to meet opposition within the local area.

In very simplistic terms, space for such a large technology on this development site cannot be considered.

For the reasons detailed above wind turbines are not considered viable for the development.

4.4.4 Photovoltaic Cells (PV)

Photovoltaic (PV) panels utilise the sun's energy to generate electricity. The optimum location for PV panels is south facing at an approximate 30° inclination angle in areas where they are not subjected to shade.

Figure 14: PV Examples



Due to the proposed development being a listed building Photovoltaic panels would not be a viable option.

4.4.5 Source Heating and Cooling

The Air Source Heat Pumps can be linked with indoor units to heat and cool the space. Heat pumps use electricity as fuel, however, their efficiency in both heating and cooling modes can be over 4 times as efficient as electrical panel heating, meaning for every 1kW of electricity you can achieve 4kW of heating depending on unit sizes etc.

These could be either ceiling mounted cassette units, wall mounted units or floor mounted units. This option therefore has good flexibility in terms of installation. The outdoor units can be located anywhere and are not dependent on orientation. They need to be externally mounted and in a local compound to be safe.

This technology would not be feasible at this site as they would require outdoor units and wall penetrations which would compromise the heritage asset and counter the ethos of policy EN3.

4.4.6 Biomass Boiler

Biomass is considered to be a renewable fuel source as the CO₂ absorbed during the growth period is assessed as being approximately equal to the CO₂ emitted during combustion and hence deemed "carbon neutral". Biomass for boilers is typically wood either in chip or pellet form.

Biomass boilers require fuel storage together with associated transportation and delivery to the store location.

Figure 15: Biomass Example



With the minimal plant areas available for a biomass generator combined with the logistics and increase in pollution from wood pellet deliveries/transportation, biomass generators have not been included in this Energy Strategy.

For the above reasons, the use of a biomass boiler plant is not considered viable for the development.

4.4.7 Fuel Cell

The fuel cell technology essentially converts chemical energy into both electrical and heat energy. The cell needs to be continually supplied with hydrogen (derived from either a piped or storage source) and oxygen (derived from air) that are combined and the chemical reaction produce electrical energy, heat energy and water vapour.

The fuel cell requires a hydrogen fuel source that can either be from a piped source (not currently available) or from stored gas. However, the more usual approach currently in the UK is to use natural gas in order to generate the hydrogen required to operate the fuel cell.

Fuel cells have various commercial and technical limitations. There is a high initial capital cost together with there being few established suppliers and a very limited specialist design, installation, and maintenance capabilities.

Certain fuel cell elements require regular replacement imposing a significant on-going cost implication. The fuel cells themselves are generally large, heavy and require fresh air ventilation.

Due to the initial capital cost, space requirements and on-going maintenance costs fuel cells are not considered viable for this development.

4.5 WATER

The development will be designed to reduce mains/potable water and include water efficient devices and equipment. This will comprise of efficient water fixtures (low flow taps and showers, dual flush WCs and low volume baths) to reduce potable water demand to <16 litres/person/day as per the requirement within Building Regulations.

As stated previously <16 litres/person/day is the 2020 target in the RIBA 2030 Climate Challenge and the next target 2025 is <13 litres/person/day, this surpasses the requirement of Part G and we will use our best endeavour to reach this target.

This will be done using low flow rate sanitaryware and the use of flow restrictors throughout the development.

An example of the flow rates and capacities that could potentially be used are as follows. Please note these are a guide at this stage and actual figures may differ at the time of construction. However, they will fall within the required level:

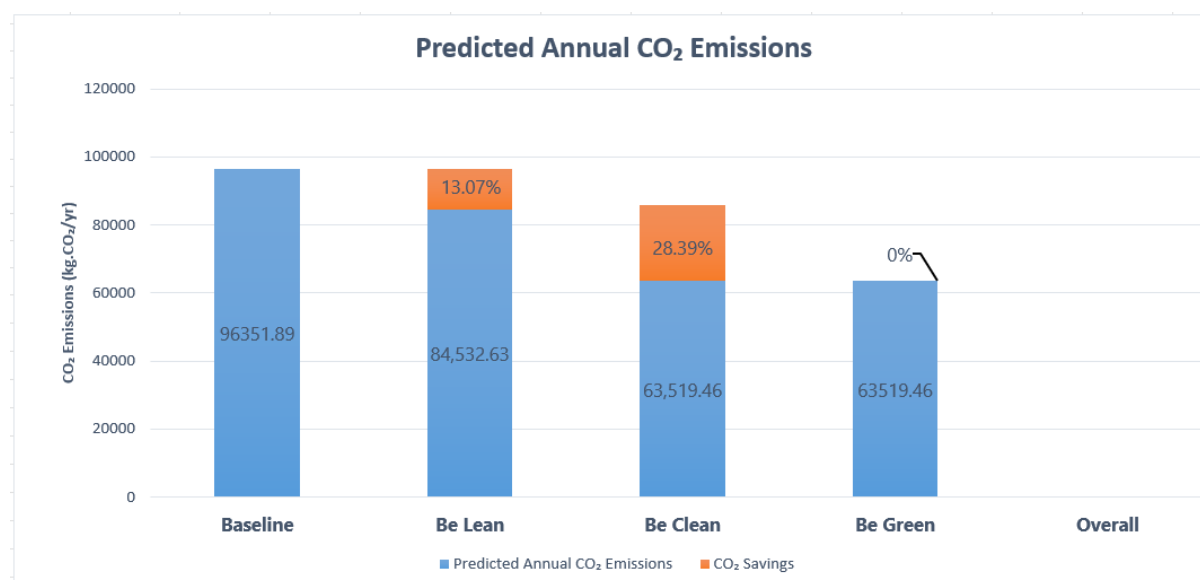
- WC – Dual Flush – 6/3 Litre Flush capacity
- Wash hand basin taps – 5 L/min
- Kitchen sink taps – 7L/min
- Shower – 7L/min

4.6 CHOSEN RENEWABLE SOLUTION

Following the above review of various LZC technology no renewable technologies are feasible due to the proposed development being Grade II listed and many of the options would affect the historical characteristics of a heritage asset as set out in Policy EN3. The decision to use a local communal gas specification is the most viable strategy to reduce energy consumption, ensure compliance with Part L 2021 and support policies EN3 and EN4 of the Manchester Core Strategy.

Therefore no CO₂ reduction is achieved at the Be Green stage of the Energy Hierarchy as is displayed below.

Figure 16: Be Green Carbon Emissions Estimated SAP 10 Results



5 ENVIRONMENTAL STANDARDS STATEMENT

It is best practice to incorporate Environmental Standards within the design of such a development. Being mindful of the design standard issues often compliments the Energy Strategy and the Sustainability aspects of the design and this planning report.

Some elements described within the environmental standards section fall outside the remit of NOVO Integration Ltd and as such will be incorporated within other parties' appointments. This report will however summarise and reference other third-party reports where applicable to aid with addressing all applicable elements of the Environmental Standards.

The various topics covered within the environmental standards sections are as follows:

- Energy Efficiency
- Renewable Energy
- Environmental Design
- Water Management and Weather Resilience
- Waste Management
- Construction Management
- Waterways

Each element will be summarised how the development will achieve this, and any relevant third-party reports referenced accordingly.

Please note that where assumptions have been made of specific reports being carried out, confirmation of these reports from the developer will be required. Reference only is made within this report.

Any reports referenced within this section does not confirm that these reports are either required or have been or will be carried out and are assumptions of such only.

5.1 ENERGY EFFICIENCY

The Manchester Core Strategy states that in summary, proposals which enable the re-use of heritage assets will be encouraged and should endeavour to reduce their CO₂ emissions whilst preserving the character and historic environment as discussed previously in this report.

However, the principals highlighted within the section are carried through into the design.

Section 4 Energy Strategy of this report details specifically how the proposed design of the development including the fabric, mechanical and electrical services will use passive, energy efficient and low carbon technologies throughout with emphasis on a fabric first approach to minimise the CO₂ emissions and meet the targets set in the Manchester Core Strategy.

The Energy Strategy describes how the development follows the Energy Hierarchy approach which many local authorities advocate the use of.

5.2 RENEWABLE ENERGY

The Manchester Core Strategy encourages the use of Low Zero Carbon technologies, this again follows the Hierarchical approach.

This is to encourage opportunities to reduce the energy demand via the use of onsite renewable technologies to improve energy security for occupants of the site and export of surplus energy back to the grid.

Various opportunities and different technologies should be investigated to determine the most viable and appropriate technology for the site in question.

Again section 4 of this report deals with the Energy Hierarchical approach to Energy and the use of renewable technology. Many different technology opportunities have been investigated and discounted where applicable.

5.3 ENVIRONMENTAL DESIGN

This element encourages developers to use the Building Research Establishment Assessment Method (BREEAM) to assess environmental performance or Code for Sustainable homes depending on whether the development is residential or non-residential in nature. Code for Sustainable Homes is no longer applicable following the Housing Standards Review. Were this standard still in operation however, the CO₂ reduction results identified in this report would equate to Code Level 4.

5.4 WATER MANAGEMENT AND WEATHER RESILIENCE

Thoughtful design to reduce the levels of pollution within the city's watercourses, as well as mitigating the effects of flooding should significant storms present themselves in the future should be considered.

As such a Flood Risk Assessment and Drainage Strategy Report will be produced to demonstrate the methodology as to how the development will manage excessive water in times of storms etc to minimise the risk of flooding to the development and surrounding areas.

It is anticipated that any excessive rainwater will be dealt with through the use of attenuation other methodologies falling line with SUDs techniques to improve flows and quality of the surface water run-off.

Water Usage has been covered earlier within this report under section 4.6 and describes how the development will utilise low flow / volume sanitaryware to reduce the amount of water consumed and comply with the Building Regulations Part G but also aspires to achieve the target metrics described in the RIBA 2030 Climate Challenge.

5.5 WASTE MANAGEMENT

It is understood that the Construction Waste Management Plan will be prepared to ensure that all aspects of waste production, deliveries, noise, dust pollution etc are all accounted for and reasonably mitigated.

There is potential for the Waste Management Strategy to be reviewed by Building Management during the lifetime of the building for opportunities to improve the procedures and will also review areas where

reductions in waste, or an increase in recycling waste can be made. This will form part of a Construction Management Plan which will likely be required by a condition attached to any planning permission. The design of designated areas for waste and recyclable waste once construction has been completed for the use of the occupants has and will be carefully considered, not only in terms of capacity but allowances made for access for collections.

These areas will have designated areas for recyclable waste which will encourage further responsibility to be taken by the occupiers to separate their own waste accordingly.

5.6 CONSTRUCTION MANAGEMENT

Best practices encourage environmentally friendly construction methods and materials which in effect reduces energy consumption.

This standard also encourages best practices during construction to prevent or limit damage to the environment and to make sure these measures are not being abused during the full construction phase.

It is assumed that the contractor will be responsible for providing a comprehensive construction management plan containing all procedures on site and methodologies for a safe, environmentally conscious, and efficient construction period.

6 CONCLUSIONS

The Energy Strategy for the proposed development at 8 Minshull Street, Manchester has adopted a hierarchical approach of using passive and low energy design technologies to reduce the baseline energy demand and hence CO₂ emissions followed by the feasibility of low and zero carbon technologies as appropriate. This is supported by the SAP Calculations to provide compliance in England with the Building Regulations Part L Vol 1: 2021.

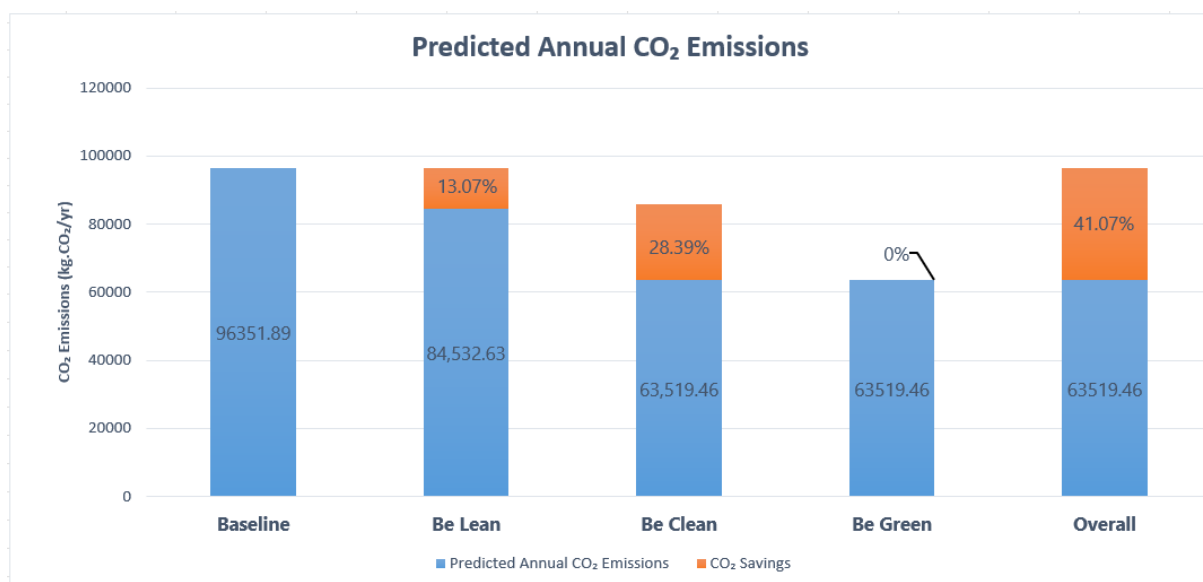
The analysis has shown that by incorporating the required passive and low energy design measures, there is a reduction of 41.07% over the developments annual CO₂ baseline emissions. The proposed strategy achieves Part L 2021 compliance and complies with policies EN3 and EN4 of the Manchester Core Strategy.

This is achieved by incorporation of the following elements:

- Improved thermal transmittance U-values as depicted.
- Low energy lighting to achieve efficacies of 80+lm/w for each fitting type
- Low flow aerated showerheads and basin tap inserts to reduce water consumption
- Reducing mains/potable water via water efficient devices and equipment

A 'Fabric First' approach has been used in this strategy then, following the stages of the Energy Hierarchy, CHP and district heating has been assessed followed by a study of various low and zero carbon technologies. The graph below demonstrates the results for each stage of the Energy Hierarchy.

Figure 18: Overall CO₂ Emissions Reduction SAP 10 Results



To summarise, the present 41.07% reduction in CO₂ has been achieved through the improved building fabric u-values, high performance glazing, a local communal boiler system serving heating and hot water via heat interface units. Energy efficient lighting will be used throughout; low flow rate fixtures and fittings will be used to reduce water consumption. It is therefore the conclusion of this report that the requirements of Part L Vol 1: 2021 have been met and policies EN3 and EN4 of the Manchester Core Strategy have been complied with.

7 APPENDICES

Appendix A – PEA Reports

Appendix A

SAP PEA Reports (issued separately)