

Former Particular Baptist Church

35 Rochdale Road, Manchester

Energy Statement



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Contents

1.0	Executive Summary	5
2.0	Introduction	6
3.0	Development Proposals	7
4.0	Policy & Legislation	8
4.1	Building Regulations Part L1 2021	8
4.2	Manchester Local Policies	10
4.2.1	<i>Places for Everyone Joint Development Plan.....</i>	<i>11</i>
5.0	Energy Strategy.....	13
5.1	Baseline Energy Assessment	13
5.2	Passive Building Services.....	13
5.2.1	<i>Fabric First Approach.....</i>	<i>13</i>
5.2.2	<i>Fabric U-Values</i>	<i>14</i>
5.2.3	<i>Glazing G-Values</i>	<i>15</i>
5.3	Active Building Services	15
5.3.1	<i>Non-Domestic Areas.....</i>	<i>15</i>
5.3.2	<i>Domestic Areas</i>	<i>15</i>
5.4	Low-Carbon Technologies	16
5.4.1	<i>Ground-Source Heat Pumps.....</i>	<i>16</i>
5.4.2	<i>Air-Source Heat Pumps.....</i>	<i>17</i>
5.4.3	<i>Solar Photovoltaic Panels</i>	<i>17</i>

5.4.4	<i>Combined Heat & Power</i>	18
5.4.5	<i>Solar Thermal Collectors</i>	18
5.4.6	<i>Wind Turbines</i>	19
5.4.7	<i>Biomass</i>	19
5.5	Summary of Technologies.....	20
5.6	Energy Generation & Distribution Systems.....	21
5.7	Carbon & Energy Performance Calculations	21
6.0	SAP Calculations	22
6.1	SAP Calculation Summary	23
7.0	Conclusion	24

1.0 Executive Summary

This Energy Statement addresses the planning requirements of Manchester City Council as set out in Manchester's Local Plan, in which the new development falls, adopted 12th July 2012 and Guide to Development in Manchester Supplementary Planning Document (April 2007). This statement also addresses the Places for Everyone Joint Development Plan. 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 L1 & L2. The policies advise that a carbon emissions reduction of 15% greater than Part L of the Building Regulations (2010) shall be achieved and 20% of the building total hot water energy demand will be provided by renewable or low/zero carbon technologies in line with places for everyone joint development plan. The baseline energy emissions have been developed, producing a preliminary SAP calculation for the building. The fabric first approach has been prioritised with these passive measures being adopted across the building including vast improvements to the thermal performance and air tightness.

The improvements made beyond current Building Regulations Part L1 are identified in the adjacent table indicating a 25-50% improvement on U-values and a 63% improvement on air permeability.

Construction Element	Part L 2021: Limiting U-Values	City Point Residences: Proposed U-Values	Percentage Improvement
External Walls	0.26 W/m ² .K	0.13 W/m ² .K	50%
Floor	0.18 W/m ² .K	0.12 W/m ² .K	33%
Roof	0.16 W/m ² .K	0.12 W/m ² .K	25%
Glazing	1.60 W/m ² .K	1.20 W/m ² .K	25%
Air Permeability	8 m ³ /(h.m ²)@50Pa	3 m ³ /(h.m ²)@50Pa	63%

In addition to the fabric first passive design measures, active building services are to be designed to minimise direct energy consumption and CO₂ emissions, with particular emphasis on the following;

- Increased Hot Water Generating Efficiencies and reduced standing losses.
- Energy Efficient LED Lighting.
- Low Energy Motors in Fans.
- Efficient Heat Recovery in relevant systems
- Combined natural and mechanical ventilation systems.

The carbon emissions on the proposed development have been calculated to be compliant with the 15% reduction below Part L 2010 inline with the Manchester energy policy (Supplementary Planning Document 2009) and 20% of the building total hot water energy demand will be provided by renewable or low/zero carbon technologies.

2.0 Introduction

Futureserv have been commissioned by City Point Developments Ltd to develop an Energy Statement for the new proposed residential-led mixed use scheme at the site of the Particular Baptist Church, Rochdale Road, M4 4HT.

This Energy Statement addresses the planning requirements of Manchester City Council as set out in Manchester's Core Strategy Development Plan, adopted 12th July 2012. This report also responds to requirements outlined within the Places for Everyone Joint Development Plan, applicable to new-build developments within Greater Manchester.

The strategy proposed for this development is to utilise 100% efficient electric panel heaters, a mix of electric cylinders for domestic hot water and low carbon electric and heat pump hot water cylinders. Mechanical ventilation with heat recovery (MVHR) and space allocation for a PV array to offset grid dependence.

The strategy is essentially based on the reduction of energy consumption by use of passive construction measures, fabric first approach alongside active energy efficient equipment in conjunction with low carbon technologies.

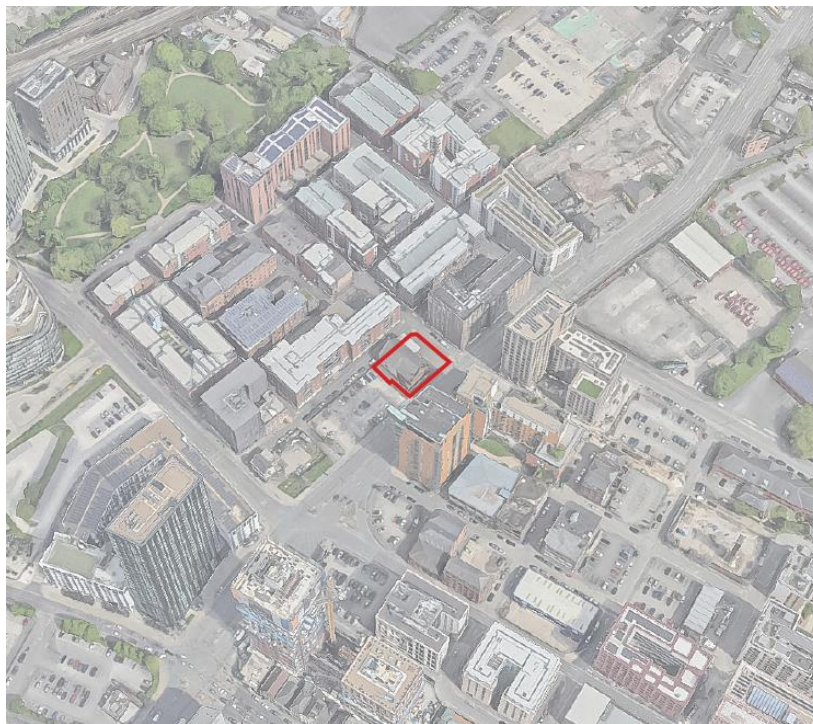


Fig. 2.1 – Aerial Site View

3.0 Development Proposals

The development consists of a partial demolition of the existing building, and erection of a 23-storey residential building comprising 133 modern dwelling. The ground floor also features a commercial unit (Class E) with associated works.



Fig. 3.1 – Typical Residential Floor Plan

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.

4.0 Policy & 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;

The planning system should support the transition to a low carbon future in a changing climate, taking full account of flood risk and coastal change. It should help to: shape places in ways that contribute to radical reductions in greenhouse gas emissions, minimise vulnerability and improve resilience; encourage the reuse of existing resources, including the conversion of existing buildings; and support renewable and low carbon energy and associated infrastructure.

4.1 Building Regulations Part L1 2021

For new build dwellings, compliance with Approved Document (AD) L1 England (2021) is required for Building Regulations approval. AD L1 England 2021 consists of 5 relevant sections:

- Section 1: Calculation of TPER, TER, TFEE
- Section 2: Calculation of DPER, DER, DFEE
- Section 3: Minimum building service efficiencies and controls
- Section 4: Limiting heat gains and losses
- Section 5: Air permeability and pressure testing

SAP 10 provides information that can demonstrate compliance with the following criterion:

Section 1: Calculation of TPER, TER, TFEE

- The Target Primary Emission Rate is the maximum allowable primary energy usage by a particular dwelling, expressed as kWh/m²/year.
- The Target Emission Rate (TER) is the maximum emissions allowed for a particular dwelling, expressed as kgCO₂/m²/year.
- The Target Fabric Energy Efficiency is the space heating and cooling requirements per m² of floor area and is an assessment to how well the fabric of a dwelling performs, presented as kWh/m²/year.

Section 2: Calculation of DPER, DER, DFEE

- DPER – This is calculated using the assessment data entered into Design SAP 10. To demonstrate compliance with Criterion 1 of AD L1 England 2021, the DPER needs to be equal to or lower than the TPER at both design stage and as built stage of construction.
- DER – Calculated using the assessment data entered into Design SAP 10. To demonstrate compliance with Criterion 1 of AD L1 England 2021, the DER needs to be equal to or lower than the TER at both design stage and as built stage of construction.

- DFEE – Calculated using the assessment data entered into Design SAP 10. To demonstrate compliance with Criterion 1 of AD L1 England 2021, the DFEE needs to be equal to or lower than the TFEE at both design stage and as built stage.

Section 3: Minimum Building Service Efficiencies and Controls

Minimum required space and water heating, lighting, ventilation, and cooling system efficiencies are set in AD Part L1 England 2021

Section 4: Limiting Heat Gains and Losses

For all new dwellings, the external envelope must meet the following minimum requirements:

Construction Element	Part L 2021: Limiting U-Values
Wall	0.26 W/m ² .K
Floor	0.18 W/m ² .K
Roof	0.16 W/m ² .K
Party Wall	0.20 W/m ² .K
Windows, Roof Lights, Curtain Walling	1.60 W/m ² .K
Air Permeability	8 m ³ /(h.m ²)@50Pa

Section 5: Air Permeability and Pressure Testing

Building Regulation 43 requires that once a dwelling is completed, an air permeability test is carried out. The measured air permeability should be entered into the calculation of DPER, DER and DFEE.

If this test is not completed, Part L1 places a penalty on all applicable dwellings of +2 m³/(h.m²) @ 50 Pa.

4.2 Manchester Local Policies

The development must comply with local policies : Policy EN4 and EN6.

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:*
 - o *To reduce the need for energy through design features that provide passive heating, natural lighting, and cooling*
 - o *To reduce the need for energy through energy efficient features such as improved insulation and glazing*
 - o *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 supplied to existing buildings*
- *Where possible new development and retrofit 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'.*

Policy EN6: Target Framework for CO₂ Reductions

'Applications for residential development of 10 or more units and all other developments over 1,000 sq. m will be expected as a minimum to meet the target shown in Tables 12.1 or 12.2 unless this can be shown not to be viable. This should be demonstrated through an energy statement, submitted as part of the Design and Access Statement. Such a statement will be expected to set out the projected regulated energy demand and associated CO₂ emissions for all phases of the development.

The target framework relates to three broad development locations and their potential low and zero carbon, decentralised energy'.

In summary, the development must:

- *Achieve carbon emissions reduction standards equal to or greater than 15% as specified within AD: Part L1a of the Building Regulations (2010), depending on the type and location of the scheme unless this can be shown not to be viable.*

Building Standards

New development should be designed and constructed to meet the relevant Building Regulations, as a minimum, with a view to:

- Maximising energy efficiency and the use of low carbon energy.
- In meeting the carbon reduction targets set out in Building Regulations, the Council will expect development to be designed in accordance with the following energy hierarchy:
 - o Reduce energy demand through energy efficiency measures
 - o Supply energy through efficient means (i.e. low carbon technologies)
 - o Utilise renewable energy generation

Renewable Energy Generation

Proposals for the installation of renewable and low-carbon energy technology, including both building-integrated and standalone schemes, should be promoted and encouraged providing that:

- *Any significant adverse impacts can be mitigated,*
- *Where biofuels are to be utilised, they should be obtained from sustainable sources and transportation distances are minimised,*
- *Any energy centre is suitable located and designed to a high quality such that it is integrated with its surroundings,*
- *All proposals are consistent with any relevant policies within the plan.*

Renewable energy can be supplied at a national level from sources such as large offshore wind farms, solar farms or hydroelectric schemes. Although not a source of renewable energy, nuclear power is a major low carbon source. Locally, smaller and on-site renewable energy schemes include solar photovoltaic, solar thermal, ground source and air source heat pumps and, where fuelled by biomass or biogas, district energy schemes and combined heat and power plants (CHP). Due to the lack of large areas of open space within the city, on-site and neighbourhood-scale renewable energy schemes are the most effective way for Manchester to contribute to renewable energy targets set out by the Government.

Although wind turbines are a good example of a renewable energy source, around 90% of Manchester is unsuitable for wind turbines due to the density of development.

The indications from the evidence base identify there will be a greater need to encourage and support a wider spectrum of renewable energy technologies to help deliver the energy supply that would be placed on the grid as a result of the levels of growth planned for the city. Therefore, as part of the strategic sites detailed in this Plan, any proposed development schemes will be expected to consider and incorporate, where viable, renewable energy generation technologies as part of the overall suite of energy supply.

4.2.1 Places for Everyone Joint Development Plan

Policy JP-S2: Carbon and Energy provides further support for the GMSF 2020 target of achieving a carbon neutral Greater Manchester by 2038. The document aims to provide a dramatic reduction in greenhouse gas emissions through a range of measures that promotes designers to consider



all aspects of a building's energy use and associated carbon emissions, current day and in the future.

The document further supports the importance of the energy and calls for the use of renewable energy generation technologies, with priority of PV installations where feasible equal to 20% of the ground floor-space, reducing space heat and hot water energy demands as outlined below:

Space Heat Demand	Hot Water Energy Demand	Renewable Energy Generation Target
25kWh/m2 target	20% produced by low carbon or renewable technologies	Photovoltaic installation 20% of ground floor space

However the policy also states that alternative technologies are applicable where the equivalent generation is evidenced:

'For renewable energy generation priority should be given to PV installation where technically feasible, alternative technologies will be appropriate where the equivalent generation is evidenced'.

In summary, the development must:

- Achieve a minimum of 20% of the total hot water energy demand sourced from renewable and/or low/zero carbon technologies.
- Have a space heating demand average of less than 25kWh/m2.
- Provide Photovoltaic installation of 20% of ground floor space were feasible.
- Aim to set reductions in carbon dioxide emissions that exceed those stated within Building Regulations.

5.0 Energy Strategy

5.1 Baseline Energy Assessment

Futureserv Ltd have conducted analysis for this stage of development, based on the proposed design of the building. The objective of this analysis is to demonstrate that compliance with Approved Document: Part L1 2021 is feasible and achievable, whilst concurrently outlining baseline energy emission rates. This is carried out to understand the building's carbon emission rates without CO2 mitigation measures.

The baseline energy assessment has been developed, producing preliminary SAP calculations. This baseline model has been created to calculate the Target Carbon Emission Rate (TER), Target Fabric Energy Efficiency Rate (TFEE), and Target Primary Energy Rate (TPER), which in turn correspond to the Dwelling Carbon Emission Rate (DER), Dwelling Fabric Energy Efficiency Rate (DFEE), and Dwelling Primary Energy Rate (DPER). The corresponding dwelling emission rates must not exceed their target figures, if this is conformed to, then the building will comply with AD: Part L1 2021.

SAP is Government acknowledged as the standard assessment method for the carbon emission rates of a building, and considers a building's fabric properties, the method of heating/cooling/ventilation/hot water production. Ultimately, producing an estimate of carbon emissions associated with these inputs.

If the building does not comply with any of the three Part L1 2021 parameters, then it is an iterative process to improve the passive and active building services within the building until all targets are met.

5.2 Passive Building Services

Following the completion of the SAP model, the dwelling energy rates are measured against their corresponding targets to determine whether AD: Part L1 2021 is achieved. If not, then passive design measures are considered first to adopt a 'fabric first' approach, mitigating further energy consumption and potentially reducing costs.

Passive design measures include improvements to the thermal performance of the building, such as improved fabric U-Values and increased air tightness above the recommended Part L targets. Effectively, this allows the building envelope to attenuate external conditions without recourse to active building services.

5.2.1 Fabric First Approach

A 'fabric first' approach to building design involves maximising the performance of the components and materials that make up the building fabric itself before considering the use of mechanical or electrical building services systems. This can help reduce capital and operational costs, improve energy efficiency, and reduce carbon emissions. A fabric first method can also reduce the requirement for maintenance during a building lifespan.

Buildings designed and constructed using the fabric first approach aim to minimise the need for energy consumption through methods such as:

- Maximising air-tightness
- Using super-high resistance insulation
- Optimising solar gain through the provision of openings and shading
- Optimising natural ventilation

Focusing on the building fabric first, is generally considered to be more sustainable than relying on energy saving technology, or renewable energy generation which can be expensive, have high embodied energy, and may or may not be used efficiently by the consumer. Having energy efficiency integrated into the building envelope provides opportunity that occupants have less responsibility to operate the building, without having to adjust their habits or learn new technologies. This can result in less reliance on the end user regarding a building's energy efficiency.

Fabric first buildings systems can be constructed off-site, resulting in higher quality, better performing systems whilst simultaneously providing reduced labour costs and an increased speed of construction.

5.2.2 Fabric U-Values

The following table states the proposed material specification that will be incorporated within the building design, to mitigate heat losses and ensure efficient operation of the proposed development.

An air permeability of $3.0 \text{ m}^3/\text{hr}/\text{m}^2$ @ 50Pa has been targeted for the new-build development in order to minimise uncontrolled ventilation. An improved air permeability also reduces heat losses and the energy demand of the development. The following figures comply with limiting AD: Part L1 2021 figures, achieving a betterment of 25-50% on fabric elements, and 63% on air permeability.

Construction Element	Part L 2021: Limiting U-Values	City Point Residences: Proposed U-Values	Percentage Improvement
External Walls	$0.26 \text{ W}/\text{m}^2.\text{K}$	$0.13 \text{ W}/\text{m}^2.\text{K}$	50%
Floor	$0.18 \text{ W}/\text{m}^2.\text{K}$	$0.12 \text{ W}/\text{m}^2.\text{K}$	33%
Roof	$0.16 \text{ W}/\text{m}^2.\text{K}$	$0.12 \text{ W}/\text{m}^2.\text{K}$	25%
Glazing	$1.60 \text{ W}/\text{m}^2.\text{K}$	$1.20 \text{ W}/\text{m}^2.\text{K}$	25%
Air Permeability	$8 \text{ m}^3/(\text{h}.\text{m}^2)\text{@}50\text{Pa}$	$3 \text{ m}^3/(\text{h}.\text{m}^2)\text{@}50\text{Pa}$	63%

5.2.3 Glazing G-Values

For the preliminary SAP calculations, glazing has been modelled in conjunction with the TM59 assessment:

- North-West: 0.63
- North-East: 0.40
- South-East: 0.40
- South-West: 0.40

5.3 Active Building Services

In addition to passive design measures outlined within Section 5.2, active building services should be designed to minimise direct energy consumption and carbon dioxide emissions, with particular emphasis on the following:

- Increased Hot Water Generating Efficiencies and reduced standing losses.
- Energy Efficient LED Lighting.
- Low Energy Motors in Fans.
- Efficient Heat Recovery in relevant systems.
- Combined natural and mechanical ventilation systems.

5.3.1 Non-Domestic Areas

Circulation corridors adjacent to apartments are proposed to be heated via electric panel heaters. This has been reflected within the model, and is a necessity to provide compliance with all applicable legislation with the proposed specification. Amenity spaces will be heated by DX Heat pump systems.

5.3.2 Domestic Areas

The proposed specification, as included within the SAP calculations within this report, calls for space heating to be provided via electric panel heaters equipped with programmer and appliance thermostats.

Ventilation shall be provided via mechanical ventilation heat recovery units (MVHR) in 100% of apartments. These units provide extract ventilation to kitchens and bathrooms, and a balanced supply to all occupied areas, i.e. living, kitchen, dining rooms, and bedrooms. Purge ventilation shall be provided via openable windows/purge panels providing occupants with final control over the internal environment of their homes.

The current specification proposes all apartments to feature electric hot water cylinders installed in each apartment with capacity based on the occupancy per dwelling, catering to DHW demand.

This specification is a holistic and feasible approach to satisfying all legislation required by both national and local guidance.

Active Building Service	Specification
Space Heating	Electric Panel Heaters
Lighting	100% Low Energy Fittings
Ventilation	MVHR Units
Water Heating	Mix Electric Hot Water Cylinders and Heat Pump Hot Water Cylinders

5.4 Low-Carbon Technologies

To comply with Approved Document: Part L 2021 and Manchester's Core Strategy Framework, which aims to utilise renewable or low-carbon technologies, there are several options to consider. All low-carbon and renewable technologies acknowledged in modern building design have been considered and assessed to determine feasibility and applicability to the development, with concluding comments summarised in the following section.

5.4.1 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.



Fig. 5.1 – Ground-Source Heat Pump Installation

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, due to this as well as the likely yield, peak load demand, and cost feasibility, Ground Source Heat Pumps have been discounted from this development in favour of better performing, more suitable technologies.

5.4.2 Air-Source Heat Pumps

Air-source heat pumps are acknowledged to provide an achievable solution by using renewable energy extracted from ambient air to provide heat for heating or hot water. A hot-water heat pump cylinder is similar to an electric hot-water cylinder; it heats up and stores the hot-water for use within each apartment and includes an electric immersion, but also incorporates a heat pump built into the unit. The installation of a hot-water heat pump includes a supply and exhaust duct connected directly to the unit, utilising external openings similar to an MVHR inlet and exhaust. The heat pump collects energy within the air and converts this to heat using refrigerant, which is then transferred to the water stored within the cylinder.

Introduction of Air Source Heat Pump hot water cylinders are an effective option to reduce the hot water energy consumption and improve apartment EPC ratings.



Fig. 5.2 – Typical Air-Source Heat Pump Cylinder

5.4.3 Solar Photovoltaic Panels

The option to utilise roof mounted Photovoltaic panels to generate electrical energy is a common, renewable energy method of generating carbon-free electrical power. This system allows for the reduction in carbon emissions from grid supplied electricity, and is capable of exporting back into the grid during low-demand periods. The installation of PV either connects to the landlord areas or is directly supplied to apartments which would improve the apartment EPC ratings and reduce grid electrical consumption. Space has been allocated at roof level for possible introduction.

5.4.4 Combined Heat & Power

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 Combined Heat & Power (CHP) tends to require a steady and continuous heat demand, therefore considering the large quantity of domestic hot-water demand associated with residential accommodation, this requirement would be satisfied.

However, the integration of CHP has been discounted for this project due to the city centre location and the detrimental clean air act implications.

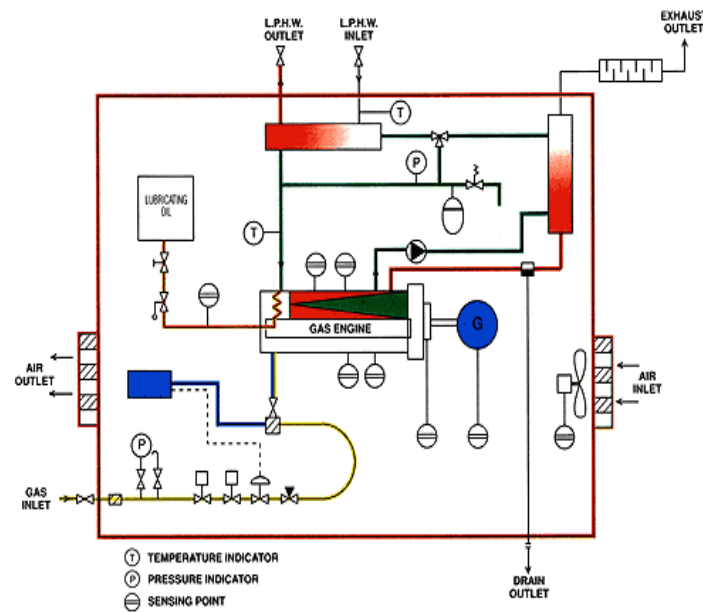


Fig. 5.3 – Diagrammatic Layout of a CHP Unit.

5.4.5 Solar Thermal Collectors

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

However, considering the proposed active building service design of the use of local independent hot-water heaters installed within each apartment, there is a conflict that deems this technology as being inefficient due to extended distribution losses. Therefore, without being able to offer a considerable contribution of renewable energy alongside the logistic and strategy issues, the installation of solar thermal panels has been discounted from the development.

5.4.6 Wind Turbines

Wind energy can be a cost-effective method of renewable power generation, with turbines capable of producing carbon neutral electricity with outputs ranging from watts to megawatts. The most common design is for three blades mounted on a horizontal axis, which is free to rotate into the wind on a tall tower. The blades drive a generator either directly or via a gearbox (generally for larger machines) to produce electricity.

The electricity can either link to the grid or charge batteries. An inverter is required to convert the electricity from direct current (DC) to alternating current (AC) for feeding into the grid. There are a variety of wind turbines on the market ranging from smaller turbines that can be attached directly to a buildings structure to larger stand-alone turbines. 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.

Due to this, and considering the noise and visual impacts in an environment with sleeping accommodation, the use of wind turbines has been discounted from this development.



Fig. 5.4 – Typical Wind Turbine Installation.

5.4.7 Biomass

Some success on other projects has been made with the implementation of wood fuelled energy equipment forming a carbon neutral heat source however these projects have tended to be light density Sub-Urban or even rural in their location. The relatively constrained nature of this site, together with limited storage space and potential delivery issues, due to the city centre location, reduces the opportunity to take advantage of a Biomass solution for this development.

This in addition to the flue emissions in a city centre location, contribute towards the reasons as to why this technology has been discounted for this scheme.

5.5 Summary of Technologies

The following table provides an overview of the systems considered for the City Point Residential development, considering their feasibility, suitability, and performance:

Proposed Technology	Status	Comments
Air Source Heat Pumps (DHW)	Selected	Hot water heat pump cylinders have been selected for further consideration. Not only does this provide significant improvement to the EPC of each dwelling installed, but greatly reduces grid supplied energy demand and therefore, associated carbon emissions. Remaining apartments not featuring hot water heat pumps will utilise standard hot water cylinders.
Solar Photovoltaic Panels	Considered	Photovoltaic array will be considered with the aim to achieve 20% of the new build ground floor area subject to space allocation.
Ground Source Heat Pumps	Discounted	Due to the footprint and location of the scheme, this technology has been discounted from the scheme. GSHP installations are expensive, and requires an excavation of surrounding groundworks.
Solar Thermal Collection	Discounted	Considering the current proposal of apartments served via individual water heaters, the proposal of solar thermal collectors would not be feasible for the scheme due to large distribution losses considering the height of the building. It has been considered that if there was scope for the installation of a technology for the roof space, then a PV system would be more efficient.
Biomass Boilers	Discounted	Biomass boiler solutions have been discounted at this location due to potential clean air issues, deliverability logistics and the lack of available storage space for the required quantity of fuel.
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.
Combined Heat & Power	Discounted	The proposal of CHP technology has been discounted due to the city centre location of the scheme, and the more favourable movement to utilise decarbonised grid electricity over traditional fossil fuels.

5.6 Energy Generation & Distribution Systems

As a consultant, Futureserv has an over-arching philosophy of delivering design of a truly sustainable nature, employing widely recognised methods.

- Be Lean, Fabric First Approach – 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 via an all-electric heating and hot water solution throughout all residential and non-domestic areas utilising the ever-increasing clean electricity supply from the UK grid. Mechanical Ventilation systems will incorporate heat recovery with low energy motors. The development will also utilise sanitary appliances with low-water flow devices.

5.7 Carbon & Energy Performance Calculations

To demonstrate the environmental benefits associated with the energy hierarchy, Government approved Standard Assessment Procedure (SAP) software has been used to calculate the proposed carbon dioxide reductions for the development. Under the current 2021 Building Regulations, it is a requirement for new dwellings to deliver a 31% reduction in carbon emissions (compared to Approved Document L 2013) through technologies and fabric upgrades.

Preliminary SAP calculations have been performed for the proposed planning stage development using Government approved Elmhurst Energy SAP 10 software. The results indicate that with an all-electric system, the scheme achieves a 50.0% improvement over the calculated carbon dioxide emission target. This reduction will improve further over time as the UK electricity grid continuously decarbonises in the future.

6.0 SAP Calculations

To demonstrate the environmental benefits associated with the considered energy hierarchy approach to energy demand and carbon emission reduction for the development, the Government approved Elmhurst SAP 10 software has been used. Block compliance (multi-dwelling) weighted average has been targeted in accordance with Approved Document: Part L1 2021 England. These calculations are applicable to all the apartment units within the proposed development.

The following table presents the baseline energy demand and emissions in the form of Target Emission Rates (TER), Target Fabric Energy Efficiency (TFEE), and Target Primary Energy Rate (TPER). These correspond to the actual energy demand and emissions of all apartments, in the form of Dwelling Emission Rates (DER), Dwelling Fabric Energy Efficiency (DFEE), and Dwelling Primary Energy Rate (DPER). The dwelling emission rates/energy demand must not exceed that of the corresponding target.

Planning Stage		Run 01
		Design - SAP 10
Average TER		12.77
Average DER		6.27
% improvement over Part L		50.90
Average TFEE		21.40
Average DFEE		20.68
% improvement over Part L		3.36
Average TPER		70.67
Average DPER		67.05
% improvement over Part L		5.12
Air Tightness	Designed AP50	3
U Values	External Walls	0.13
	Insulated Party Wall (Where applicable)	0.13
	Roof	0.12
	Exposed Floor	0.12
	Windows	1.20
		80% Frame Factor
	G-Value	North-West = 0.63
		North-East = 0.40
		South-East = 0.40
		South-West = 0.40
	Heated Corridors	Y
	Thermal Bridging	Accredited/Default Ψ Values
		Thermal Bridging Calculation Required
Ventilation	Whole House Vent?	Yes, MVHR (Windows Fully Open)
	SFP/ HR Eff.	Kitchen + 1 Wet Room = SFP: 0.55, 90% HR
		Kitchen + 2 Wet Room = SFP: 0.65, 89% HR
	Installation	Approved Installation - YES
	Duct Insulation	MVHR Duct Insulated - YES
Lighting	Power	8 W
	Efficiency	100 lm/W
Elec. Tariff	Economy / Standard / Other?	Standard
Heating System	Emitter Type	Electric Panel Heaters
	Type	Electric
	Efficiency	100%
	Control	Programmer and Appliance Thermostat
DHW	Type	Mix of Electric Unvented Hot Water Cylinder and Heat Pump Cylinders
	Storage	Hot water Cylinder
	Storage Losses	1.13kWh/24h (1 Bed) (Heat Pump 1.45kWh/24h)
		1.23kWh/24h (2 Bed) (Heat Pump 1.45kWh/24h)
	Less than 125L/person/day	Y
	Bath Count	Y - Refer to Floor Plan Layouts
	Shower	Unvented Hot Water System
	Flow Rate	6 l/min
Renewable Technology Detail	PV?	(Potential to be added subject to space)
	Wind?	N
	ASHP?	Y
	Solar Thermal?	N

6.1 SAP Calculation Summary

The following specification has been used to develop the energy demand and carbon emission rates as per the SAP calculations in Section 6.0:

- All apartments feature electric panel heaters
- All apartments feature mechanical ventilation heat recovery units (MVHR)
- Apartments have a mix of electric hot water cylinders and heat pump hot water cylinders

Summarised SAP calculations, extracted from Section 6.0:

Value	Target Rate	Dwelling Rate	Percentage Improvement
Carbon Emissions Rate	12.77 kg.CO2/m ²	6.27 kg.CO2/m ²	50.90%
Fabric Energy Emissions	21.40 kg.CO2/m ²	20.68 kg.CO2/m ²	3.36%
Primary Energy Rate	70.67 kg.CO2/m ²	67.05 kg.CO2/m ²	5.12%
Space Heating Demand	<25 kWh/m2	15 kWh/m2	60.0%

The Places for Everyone Joint Development targets at least 20% of the total residential hot water demand to be sourced from renewable or low/zero carbon technologies. This contribution is solely via heat pump hot water cylinders as stated in the specification. PV will be considered subject to available roof space with the aim to achieve 20% of the new build ground floor space, were this is not available due to site constraints a minimum carbon emission reduction of 20% over Part L 2021 shall be achieved in lieu of carbon offset payments.

7.0 Conclusion

This energy statement has summarised the design proposal for the development, outlining technologies that were considered for the scheme and weighing benefits against practicality. The purpose of this analysis was to identify the carbon and energy targets of the development and provide evidence that with the proposal outlined in this report, the building can achieve compliance with Approved Document: Part L1 2021, Places for everyone joint development plan and Greater Manchester Planning Policies.

The proposed development will incorporate a fabric first approach through passive energy techniques available in modern construction industry to reduce the ongoing requirement to consume energy to heat, ventilate, and light the building. This is achieved via highly efficient fabric design in excess of the thermal properties outlined within the Building Regulations. In addition to passive energy measures, the development will employ energy efficient Building Services to minimise the carbon footprint of the site below the passive improvement stage. As stated in the report, this is achieved through the use of electric heating systems, heat recovery ventilation units, electric hot-water cylinders, and efficient lighting systems and controls.

As outlined, the approach for the development is to implement energy saving options which reduce the requirement for regulated energy, such as a more efficient building envelope, and utilising those high efficiency low carbon technologies which are suitable and feasible for a building of this type. Undertaking the 'lean, clean, and green' approach allows for the design of a building that achieves a significant reduction in carbon emissions compared against Building Regulations standards, this is accomplished by means of both passive and active measures in terms of highly improved U-Values, reduced air permeability, and energy efficient MEP systems.

Overall, the calculated emissions for the scheme developed through Elmhurst SAP 10 modelling and simulation demonstrate potential a weighed block compliance average carbon dioxide reduction of 50.00% over the Part L1 2021 calculated notional target. This figure is in excess of the 15% improvement over Approved Document: Part L1a 2010 required by the planning policy documents with a commitment of achieving a minimum of at least 20% reduction over Part L 2021 were it is not feasible to provide PV accounting for 20% of the new build ground floor space. Additionally, the 20% LZC technology contribution to hot water demand has been satisfied, along with the average space heating demand off <25 kWh/m².

The strategy improves on the fundamental principles of the English Building Regulations, and will make a significant contribution to reduce the annual carbon dioxide emissions of the proposed development.