energycounsel
engineering sustainable buildings

Energy Statement
Ref: Z59969

Proposed 36No. New Build Dwellings

at

Egmont Street, Mossley
OL5 9NB
for

Bridgewater Land and Developments Ltd



DESIGNER CERTIFIED PASSIVE HOUSE DESIGNER
BREEAM ACCREDITED PROFESSIONAL
LOW CARBON ENERGY ASSESSORS
CIBSE Certification Ltd.
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Document Status – Final

Ref: Z59316			**Date**
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Disclaimer

Contents

Executive Summary

This Energy Statement has been developed in support of the planning application for the proposed development of 36No 1B2P Apartments at Egmont Road, Mossley. The development is required to achieve compliance under Building Regulations Approved Document Part L1A (2021). The statement will evaluate the technical and economic feasibility of using both passive and low and zero carbon technologies and will assess the practical levels of CO_2 reduction possible for this development to comply with the following planning requirements:

- National Planning Policy Framework (2021)
- Tameside Unitary Development Plan (2004)

The following low and zero carbon technologies have been evaluated:

- Biomass
- Wind
- Biogas
- Air Source Heat Pumps & Exhaust Air Heat Pumps
- Geothermal
- Combined Heat & Power (CHP)
- Solar Hot Water
- Solar Photovoltaic

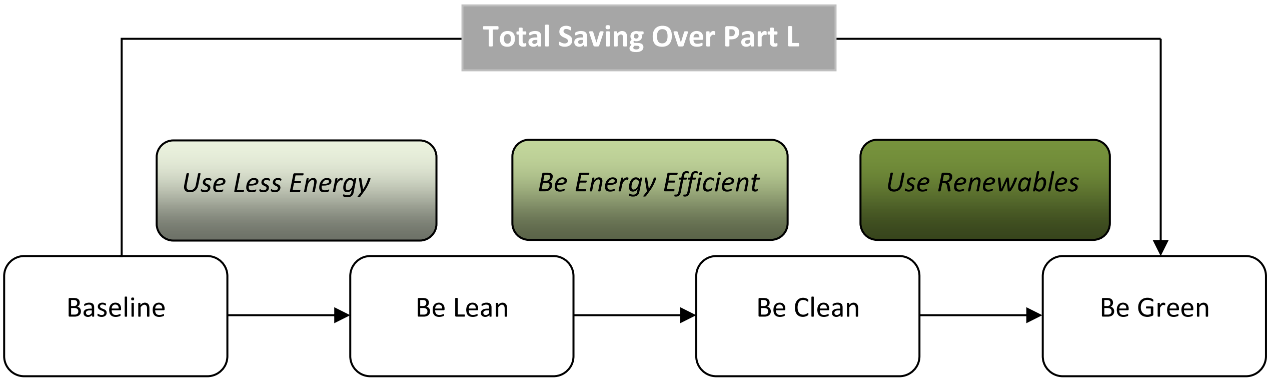
The approach for the Egmont Street, Mossley residential development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

1. Enhanced building fabric to meet the new Building Regulations ADL1 2021 (15/06/2022)
2. Enhanced air tightness and thermal bridging
3. Efficient System 3 Mechanical Extract ventilation
4. Heating to the apartments will be provided by electric panel heaters
5. Hot water will be provided by highly efficient heat pump
6. Efficient lighting strategy primarily using LED type fittings

For the purpose of the assessment, we have evaluated a selection of dwelling types in SAP 10 Standard Assessment Procedure to provide an accurate estimate of predicted energy/ CO2 emissions. We have completed SAP calculations based on a representative dwelling type to provide an estimation of the worst-case total energy/emissions on site.

Summary

The development has been provided with energy savings using passive improvement measures such as improved energy efficiency. This passive approach to compliance will complement the integrated approach to the sustainable energy objectives of the national and local policies. The use of heat pumps for hot water in the dwellings achieves the necessary levels of carbon reduction.



The principles of a Be Lean, Be Clean, Be Green philosophy have been applied, resulting in a **59%** carbon emissions improvement and a 20**%** primary energy improvement over Building Regulations Part L1 2021, as indicated in Table 1. A full design specification that confirms inputs used within the SAP calculations is provided within the appendices of this report.

Table 1 - Proposed development CO_2 emissions against Building Regulations Part L1 2021

	Total CO_2 Emissions ($kgCO_2/yr$)	Total Primary Energy (kWh/yr)
Target Dwelling Performance	**23,778**	**126,238**
Proposed Dwelling Performance	**9,671**	**100,609**
Total Reduction	**14,107**	**35,167**
Percentage Improvement (above ADL1 2021)	**59.33%**	**20.30%**

A fabric-first approach to meeting Tameside Unitary Development Plan (2004) has been undertaken for the Egmont Street, Mossley residential development, defined within the 'Be Lean, Be Clean, Be Green' energy hierarchy. The proposed design provides compliance with Building Regulations ADL1 2021, and with the application of heat pumps for heating and hot water ensures reductions which exceed Tameside Council's Core Strategy.

1. Introduction

The proposed development consists of 36No. 1B2P Apartments located at Egmont Street, Mossley. The development is required to achieve compliance under Building Regulations Approved Document Part L1 (2021).

Supporting information is provided within this report for the proposed energy strategy to be considered on site in accordance with the following planning policies:

- Tameside Unitary Development Plan (2004)
- National Planning Policy Framework (2021)

Throughout this report, passive design techniques, energy efficient equipment and appropriate low carbon technologies will be appraised in line with the 'Be Lean, Be Clean, Be Green' philosophy of relevant planning documents and the Energy Hierarchy.

An assessment of CO_2 emissions will be made based on the calculation methodology dictated by the Standard Assessment Procedure (SAP) and in line with the requirements of Tameside Metropolitan Borough Council planning policy.

1.1. Location

The proposed development Egmont Street, Mossley is highlighted by the red line boundary shown in Figure 1.

Figure 1 - Location of proposed Egmont Street, Mossley residential development

The site will be accessed off Egmont Street, Mossley. Existing commercial development exists on all sides of the development.

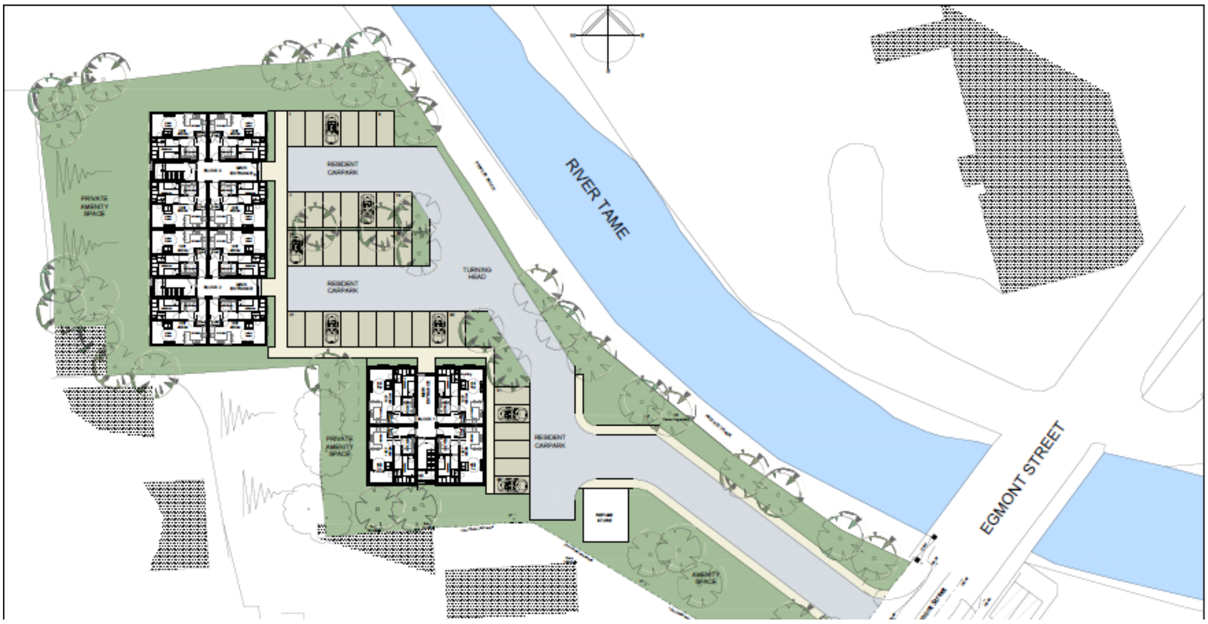


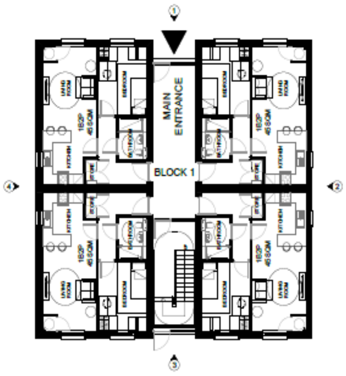
Figure 2 – Site plan for the proposed Egmont Street, Mossley residential development

The proposed development consists of 36No. dwellings, as indicated in Figure 2 above. Plot types and numbers are defined across the site as shown below:

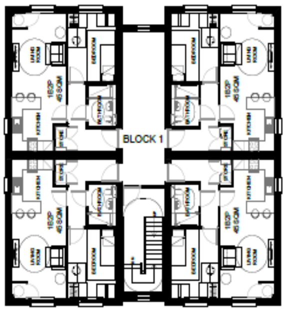
Dwelling Type	Description	Number of Units
1B2P Apartment	1B2P End Apartment	24
1B2P Apartment	1B2P Mid Apartment	12
		36

Figure 3 – Floor Plans and Elevations

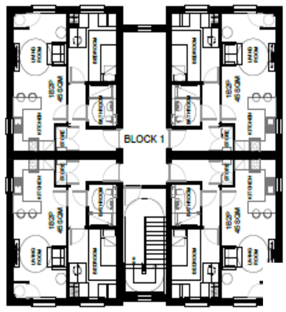
Block 1 – 1B2P Apartments



PROPOSED GROUND FLOOR PLAN



PROPOSED FIRST FLOOR PLAN



PROPOSED SECOND FLOOR PLAN

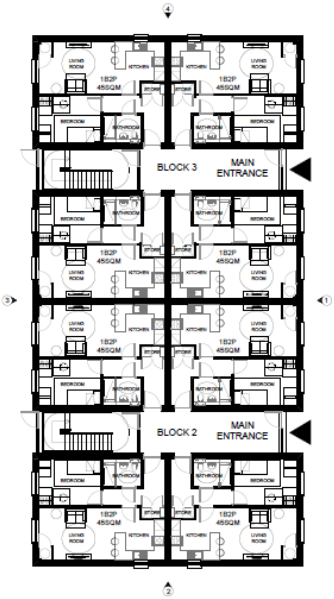
1. PROPOSED FRONT ELEVATION

2. PROPOSED SIDE ELEVATION

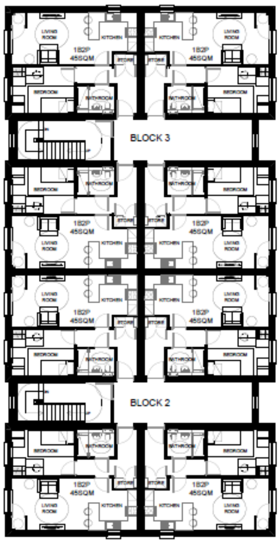
3. PROPOSED REAR ELEVATION

4. PROPOSED SIDE ELEVATION

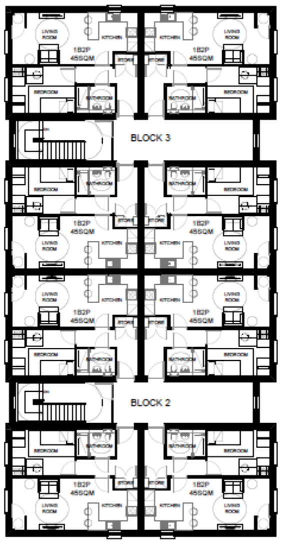
Block 2 and 3 – 1B2P Apartments



PROPOSED GROUND FLOOR PLAN



PROPOSED FIRST FLOOR PLAN



PROPOSED SECOND FLOOR PLAN

1. PROPOSED FRONT ELEVATION

3. PROPOSED REAR ELEVATION

2. Policy Drivers for Energy Efficiency and Renewable Energy

This section presents a range of planning policy that is applicable to the Egmont Street, Mossley residential development, at both a national and a local level.

2.1. National Policy

The National Planning Policy Framework was published in July 2021 and sets out the government's planning policies for England and they should be applied. Table 2 sets out the relevant energy standards for new developments and provides an indication of the design response to be provided.

Table 2 – Key National Planning Policy Requirements and Design Responses

Section	Policy Requirements	Design Response
10. Meeting the challenge of climate change, flooding and coastal change	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.	This development will follow the principles set out in the Tameside Unitary Development Plan (2004), using a 'Be Lean, Be Clean, Be Green' approach in reducing operational carbon emissions. An overview of current decentralised energy schemes around the Audenshaw area and an assessment on the potential for future schemes in relation to this development is provided in Section **Error! Reference source not found.** of this report. This energy statement appraises site specific information to determine the most appropriate approach to minimise energy consumption.

2.2. Local Policy

The adopted Tameside Unitary Development Plan (2004) provides a set of guidelines for new development. All relevant energy policy within this document is provided within this section together with a design response.

Table 3 – Key Local Planning Policy Requirements and Design Responses

Tameside Unitary Development Plan (2004)		
Section	**Policy Requirements**	**Design Response**
U5 Energy Efficiency	The Council will encourage all development to incorporate energy efficiency within the proposal, so far as is appropriate, and will permit developments which include measures to improve or promote energy efficiency, as a means both of conserving resources and contributing to the reduction of emission of greenhouse gases, subject to assessment of any possible local impact.	The Egmont Street, Mossley development will minimise energy demand through fabric efficiency and efficient building systems, prior to applying renewable technologies.
U6 Renewable Energy	The Council will permit the development of renewable energy schemes, subject to consideration of local environmental implications balanced against the benefits to the national economy and global environment. In considering such proposals, the Council will take into account the extent to which the development meets the criteria set out in policy MW9 (a) to (l) wherever relevant and will also wish to be satisfied that no unacceptable damage will be caused to the appearance of the area by electricity lines between the development and their point of connection to the electricity supply network. In the case of wind energy schemes, the Council will also wish to be satisfied that: a. the development is not likely to result in unacceptable intrusion on the intrinsic landscape qualities of the surrounding area, and b. access for construction traffic can be provided both without damage to highway safety and without permanent and significant damage to the environment, and	The Egmont Street, Mossley development will utilise renewable technology in the form of a rooftop photovoltaic array. This will be used in conjunction with an electric heating and hot water system to ensure that the use of grid electricity is minimised, where possible. This results in savings over ADL1A 2021 and compliance with the Tameside Unitary Development Plan (2004).

	c. the amenities of neighbouring occupiers will not be unacceptably affected by visual dominance, shadow flicker or reflected light, and d. no electromagnetic disturbance is likely to be caused to any existing transmitting or receiving systems, or that adequate measures will be taken to remedy or mitigate any such disturbance which may be caused.	

3. Methodology

The first step of the full energy strategy assessment has been to undertake a baseline energy assessment. The baseline energy assessment consists of calculating the total CO_2 emissions of the development to meet Building Regulations and then compare the proposed improvement measures against this baseline. Building Regulations Part L1 2021 (SAP) applies to each of the 36No. dwellings and provides carbon emissions from regulated energy.

The building can then be benchmarked/ thermally modelled using the energy hierarchy:

1. Be Lean *A reduction in energy use as a result of passive design and energy efficiency*
Thermal performance of envelope (U values) Glazing design Airtight construction Efficient mechanical ventilation Variable speed fans and pumps Efficient lighting
2. Be Clean *A focus on supplying energy to the development through efficient means*
Connect to low carbon heat networks Develop site wide heat network from single energy centre On site district heating network Provide energy efficient individual heating
3. Be Green *The installation of renewable technologies to meet energy demand where possible*
Consider the feasibility of renewable energy technologies Assess the integration of renewable technologies based on the above measures

The development must be provided with energy savings through the use of thermal improvements to fabric (a 'fabric first' approach), followed by other clean energy solutions (energy efficiency improvements, district heating, etc.) and finally the use of renewable energy technologies, where practical. This hierarchy complements the integrated approach to the sustainable energy objectives of Tameside Councils planning policy.

The planning policies require a full review of the technical and economic feasibility of the following renewable technologies:

- Biomass heating
- Biomass combined heat and power
- Solar hot water
- Solar photovoltaic
- Ground source heat pumps
- Air source heat pumps / exhaust air heat pumps
- Wind power

To achieve the targets set the development must achieve a balance between fabric, heating and control, ventilation and air leakage improvements, the amount of zero or low carbon technology installed and the capital, life cycle and running costs, maintenance, and operation, etc.

Feasible renewable energy technologies have been considered during the assessment to ensure the most suitable renewable energy is chosen for the demands of this scheme. The pros and cons of each technology with respect to this site are considered as part of this statement.

4. Baseline Energy Assessment

Energy Counsel have based the analysis on current Building Regulations ADL1 2021 (SAP 10), considering solutions that must not only be energy efficient but also practical, reliable and user friendly. Energy Counsel have carried out preliminary SAP 10 calculations for the dwellings. Under Building Regulations Part L1 2021, dwellings must comply with all three metrics set by the notional building shown below.

- Dwelling Emissions Rate (DER) must be lower than or equal to the Target Emissions Rate (TER)
- Dwelling Primary Energy Rate (DPER) must be lower than or equal to the Target Primary Energy Rate (TPER)
- Dwelling Fabric Energy Efficiency Rate (DFEE) must be lower or equal to the Target Fabric Energy Efficiency Rate (TFEE)

SAP 10 is the Governments Standard Assessment Procedure (SAP) for calculating the energy aspects of a dwelling. SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling. SAP 10 can also be used to ascertain the energy requirements of a development.

To assess the baseline carbon emissions, we must make an estimation of the energy demands through Building Regulations to set a target upon which the actual development can be compared.

4.1. Predicted Baseline Energy Requirements

The predicted baseline CO_2 emission and primary energy demands for the development:

Table 4 - Baseline dwelling carbon emissions and primary energy

Our Ref	Dwelling Type	No. of Type	Floor Area m^2	TER (Kg CO_2/ yr/m^2)	TPER (kWh/yr/m^2)	Total Target Carbon Emissions (Kg CO_2/yr)	Total Target Primary Energy (kWh/yr)
Z59985	1B2P GF MID	4	45.00	14.77	78.48	2,659	14,126
Z59987	1B2P GF END	8	45.00	15.82	84.04	5,695	30,254
Z59993	1B2P FF MID	4	45.00	12.94	68.62	2,329	12,352
Z59995	1B2P FF END	8	45.00	13.98	74.14	5,033	26,690
Z60001	1B2P SF MID	4	45.00	14.39	76.40	2,590	13,752
Z60003	1B2P SF END	8	45.00	15.20	80.73	5,472	29,063
Total		**36**				**23,778**	**126,238**

The baseline carbon emissions rate for the development is **23,778KgCO_2/yr** and the baseline primary energy rate is **126,238kWh/yr.**

5. Passive Design and Energy Efficiency

The approach of the development is to embed sustainability into the heart of the design from the outset of the project design process. The design will be developed with sustainable solutions, taking into account the relevant policies and strategies of Tameside Council. The development will seek to consider all aspects and principles of sustainable development, considering environmental, social and economic impacts.

5.1. Passive Design Measures

The philosophy for the site is to achieve as much of the necessary reduction in carbon emissions using passive design techniques and energy efficient measures as possible, before resorting to the use of LZCs. This ensures that the highest standards of building fabric and energy efficiency are achieved, rather than offsetting a poorer performance with LZC contributions.

This will be undertaken through a fabric first energy efficient design approach with high levels of thermal efficiency and a reduction in energy demand through efficient lighting design.

5.2. Energy Efficient Systems

Options have been reviewed for improving the energy efficiency of the development by installing an efficient hot water and heating system. The apartments will benefit from high efficiency air source heat pump to deliver hot water.

Dwellings will also be provided with a metering scheme based on their electricity usage.

A low energy high efficiency system 3 mechanical extract system will serve the kitchen and bathroom areas, with an overall specific fan power (SPF) of 0.18W/l/s, in line with the requirements of Building Regulations Part F (2021). This system operates constantly on low extract and provides a boost when the wet room is in use. Ventilation will be provided throughout the rest of the dwelling by openable windows in all other spaces.

6. District & Communal Heating Networks

This section outlines how consideration of energy supplied efficiently from a district heating network can be provided to the dwellings in line with the energy hierarchy.

6.1. Decentralised Heating Networks

The energy policy reaffirms the view that energy generated by centralised power stations and transmitted through the national grid is highly inefficient and wasteful.

One of priorities for reducing CO_2 emissions is to reduce the reliance on centralised power stations. This means increasing the use of local, low-carbon energy supplies through de-centralised energy systems.

Decentralised plant generally means any heating and hot water and/or electricity generation provided on a district wide (DHN) or site wide (CHN) basis. DHN and CHN can typically include combined heat and power equipment (CHP). CHP is an engine which, when running, generates electricity and heats water which can then be distributed around a development.

Several heat network opportunities across the region are at various stages of development. Benefits of district heating networks can include:

- Provision of low carbon / lower cost heat to domestic and commercial customers
- Diversification of the energy mix
- Reductions in region-wide carbon emissions
- Targeting and reduction of fuel poverty
- Potential long-term revenue streams for local authorities
- Alignment with regeneration programmes
- Driving the growth of the low carbon services sector

There are currently no existing district heating networks within proximity to the site.

6.2. New Heating Networks – Options

Consideration has been given to adopting a centralised or decentralised energy strategy. A de-centralised energy option would typically be an energy centre distributing heat, hot water and electricity to the development from a single source either as a DHN or CHN. This typically would include boilers and a CHP type unit or district heat pumps, sized to provide the whole development. Sometimes multiple energy centres are used to split the loads, provide resilience and to serve different buildings.

The proposed heating and hot water demand from the development of 36No. dwellings is not sufficient to justify a DHN or CHN. The existing site is spatially constrained, there is insufficient space to locate the equipment and associated plant, and connection to a DHN would be cost prohibitive.

7. Renewable Energy Technologies

Energy Counsel have reviewed options for the use of on-site renewable energy/ Low or Zero Carbon Technology (LZT) in line with Tameside Council policy aspirations.

This renewable energy statement/strategy reviews the technical and economic feasibility of the following technologies –

- Solar Photovoltaic
- Solar Hot Water
- Ground Source Heat Pumps
- Air Source Heat Pumps / Exhaust Air Heat Pumps
- Micro Wind Power
- Biomass

7.1. Photovoltaics (PV)

Photovoltaic panels convert sunlight into electricity to run lights and appliances. Photovoltaic panels use cells to convert light into electricity. A PV cell normally consists of 1 or 2 layers of a semi conducting material such as silicon. When light shines on a cell it generates energy causing electricity to flow, the higher the light intensity is, the more electricity flows.

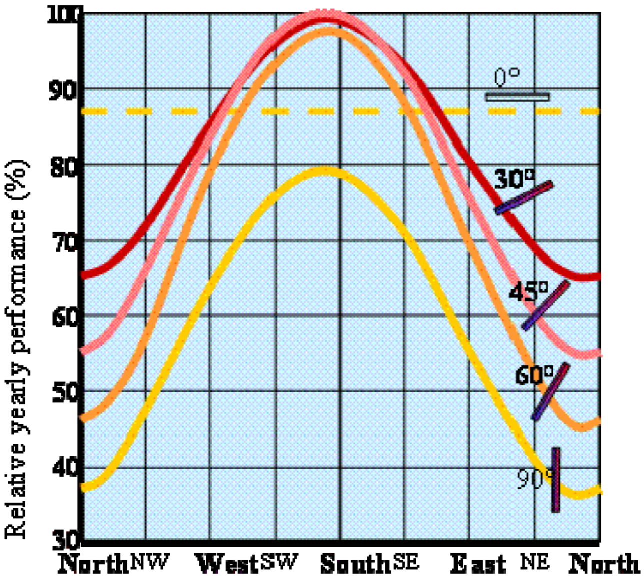


Figure 4 - Performance of photovoltaic panel orientation

The amount of energy PV cells generate is referred to as Kilowatt Peak (KWp). PV arrays now come in a variety of shapes and colours, ranging from grey 'solar tiles' that look like roof tiles to panels and transparent cells that you can use on conservatories and glass to provide shading as well as generating electricity. The roof must be strong enough to take the weight of the panels, especially if the panel is placed on top of existing tiles. For flat roofs the panels can be mounted on A-frames to give the optimum angle.

The optimum panel inclination for solar collection is 35°, oriented due south; however, panels that are inclined between 35° and 45° and oriented south of west or east are generally suitable. If solar collectors are oriented away from due south then a larger surface area will be required to generate a set amount of energy. The effect of non-optimal orientation is illustrated by the graph to the right:

The cost to install PV is typically £1,500 – 2,000 per kWp for 'on-roof' panel systems.

Although Photovoltaic panels are viable they have not been proposed on these dwellings. Reasons are set out in Section 9.2.

Figure 5 - Photovoltaic array on a pitched roof

7.2. Solar Thermal HW Panels

Solar panel heating uses the radiant energy from the sun to heat hot water, most commonly for domestic hot water needs. There are two types of collectors used for solar water heating – flat plate collectors and evacuated tubes collectors. The systems function successfully in all parts of the UK, as they can work in diffuse light conditions. The collector should be mounted on a 10-60 degrees pitch facing south, although other variations can be used, south is the most efficient.

The cost of installing the system is dependent on the distance between the solar collector and the hot water storage and therefore costs vary. The closer the collectors are to the hot water storage; the less pipe work is required.

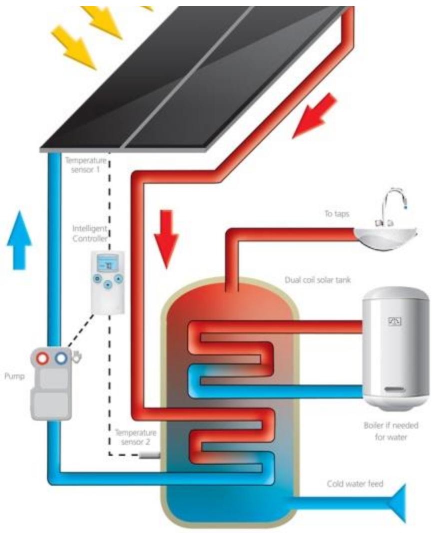


Figure 6 - The principles of a solar thermal system

Annual maintenance checks are recommended. The solar collectors are connected to a condensing boiler via a HW cylinder with twin coil.

A typical installation in the UK has a panel size of 3-5m^2 which is used in conjunction with a HW storage tank of 180-300litres, of which a minimum of 90-150 litres must be dedicated to solar hot water storage.

They are a 'simple' and guaranteed technology which will act as a pre-heat for the Hot Water and Heating usage. Payback between capital cost and energy saving can normally be achieved within 12 – 20 years, subject to usage and dwelling type.

The use of solar thermal panels is applied best in conjunction with individual heating systems for each dwelling. The orientation of the development is fine for the utilisation of solar water heating to provide domestic hot water however it will not achieve significant carbon savings. Carbon savings of approximately 4-5% are achievable with this technology. The dwellings are unlikely to require sufficient hot water storage to deem solar thermal a feasible technology for this site. For the reasons aforementioned, we do not consider this a viable option for this scheme.

7.3. Ground Source Heat Pump (GSHP)

GSHPs have been developed specifically for the housing market and are now considered to be an established reliable technology. The GSHP would be sized to cater for the heating and domestic hot water requirements. Typically, they are more suited to houses as a centralised system would be installed with multiple bore holes to a depth of up to 125 metres depending on the ground conditions. GSHPs use a heat exchanger to extract heat from the earth.

The efficiency of ground source heat pumps is measured by Co-efficient of Performance (CoP), this is the ratio of units of heat output for each unit of electricity used to drive the compressor and pump for the ground loop. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency. This means that for every unit of electricity used to pump the heat, 2-4 units of heat are produced, making it an efficient way of heating a building. If grid electricity is used for the compressor and pump, then there is the opportunity to consider a range of energy suppliers to benefit from the lowest running costs, for example by choosing an economy 10 or economy 7 tariff.

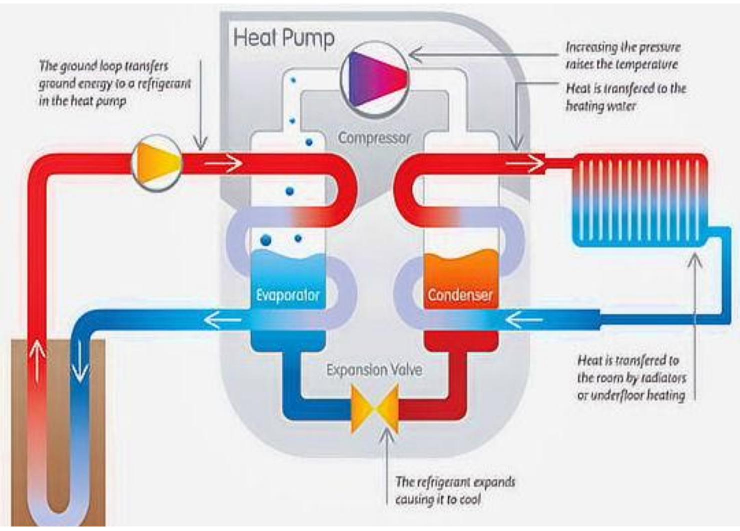


Figure 7 - Principles of a GSHP system

Due to the scale of these dwelling units, GSHPs are not considered an appropriate design solution.

7.4. Air Source Heat Pump/Exhaust Air Heat Pump

Air source heat pumps (ASHP) and exhaust air heat pumps (EAHP) work in a similar way to GSHP. Air source heat pumps can be fitted on the external façade or in the roof space. An air source heat pump uses small amounts of electricity to take in large quantities of air and extract heat. The efficiency of ASHP is measured by Coefficient of Performance (CoP); this is the ratio of units of heat output for each unit of electricity used to drive the system. Average CoP is around 2-4 although some systems may produce a greater rate of efficiency.

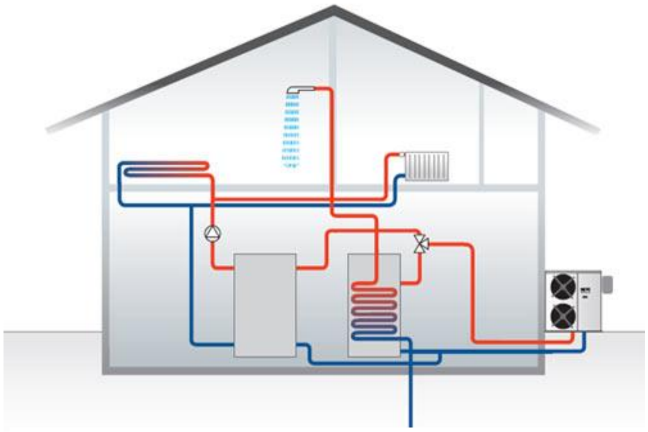


Figure 8 - Principles of an ASHP system

Exhaust air heat pumps such as the NIBE F370 work in a similar manner to ASHP units but have only indoor units (no outdoor compressors) and in addition they also recover heat from their integral exhaust air ventilation system. These units work well on apartment blocks and dwellings where mains gas is unavailable or unsuitable for a development. They are expensive in terms of capital cost of the equipment, installation, and the enhanced structural requirements.

Hot Water Heat Pumps are considered the most appropriate technology for this scheme and can be utilised to deliver efficient hot water throughout the dwellings. The introduction of this technology ensures that carbon emissions reductions can be provided in line with Tameside Council's Core Strategy.

7.5. Micro Wind Power

Wind power is one of the cleanest and safest methods of generating electricity. However, wind power is unfeasible due to the fact the development is in an urban area and local wind conditions would not be sufficient to provide enough power. Most small wind turbines generate Direct Current (DC) electricity. Systems that are not connected to the national grid require battery storage and an inverter to convert DC electricity into Alternating Current (AC) which is mains electricity.

There are two types of wind turbine available:

- Roof mounted – These are mounted on the roof of dwellings
- Mast mounted – Which are free standing

Important issues to consider when using wind turbines are:

- Wind speed increases with height so it's best to have the turbine high on a mast or tower.
- The ideal site is a smooth top hill with a flat, clear exposure, free from excessive turbulence and obstructions such as large trees, dwellings, or other buildings.
- Small scale wind power is particularly suitable for remote off grid locations where conventional methods of supply are expensive or impractical.
- Where the local annual average wind speed is 6 m/s or more.
- Where there are no significant nearby obstacles such as buildings, trees or hills that are likely to reduce the wind speed or increase turbulence.

Figure 9 - Mounted wind turbine

As this development is in an urban area there will be obstacles which reduce wind speed. The average wind speed in this area is 3.6m/s at a height of 10 metres, which is less than the 6 m/s required. Therefore, micro wind is not a viable technology for this development. Please refer to section 9.2 for more details.

7.6. Biomass

Biomass is a generic name for any fuel produced from organic sources and falls into mainly two categories:

- Woody biomass- forest products, untreated wood products, energy crops and wood pellets
- Non-wood biomass – liquid biofuels (such as biodiesel, bioethanol) or animal waste industrial municipal products and high energy crops such as rape seed, sugar cane and maize.

For domestic properties the fuel used is normally wood pellets, wood chips or wood logs. For larger applications, biomass boilers replace conventional fossil fuel boilers and come with an automated feed by screw drives from hoppers.

Biomass systems require more cleaning than gas or oil boilers and they must be capable of being taken out of service for cooling and cleaning whilst maintaining the building heating supply particularly in communal heating systems. Centralised gas boilers are therefore still required to support the biomass boiler, which would be the lead boiler. The size of the dedicated plant rooms is substantial. Fuel availability, delivery and storage are also important issues to consider.

Air quality issues re also an important factor when looking to install biomass. The cost of the fuel depends on the type, delivery distances and whether it is obtained as simple waste product or from another organisation. The cost of wood pellets is currently a little more expensive than mains gas, and woodchip is approx. 30% cheaper, however prices are fluctuating rapidly in the bio-fuel market at the present time creating uncertainty over their take up.

Figure 10 - Biomass boiler and hopper

Biomass CHP is still relatively new to the UK market and is more suitable to large developments where energy demand does not require significant modulation. There are technical issues with small scale Biomass CHP and until these can be resolved and proven the take up of these systems in the UK and Europe has been slow.

Overall carbon savings of 40%+ are achievable with biomass technology. Biomass is more suited to a communal heating system; there is insufficient space to accommodate the equipment and fuel storage to facilitate a biomass boiler. Furthermore, there are noise and air quality issues associated with this type of technology. For this reason, biomass is discounted.

8. Energy Assessment of Proposed Scheme

The Egmont Street, Mossley development has adopted the principles of the 'Be Lean, Be Clean, Be Green' approach. The most practical and economically feasible solution for the development is a good quality thermally insulated fabric, air-tight envelope, passive improvements, and the use of highly efficient heat pumps supported by efficient ventilation extract system.

Table 5 - Proposed carbon emissions from Egmont Street, Mossley development

Ref	Dwelling Type	No. of Type	TER	DER	TPER	DPER	Total Carbon Emissions (Kg CO_2/yr)	Total Primary Energy (kWh/yr)
Z59985	1B2P GF MID	4	14.77	6.04	78.48	62.82	1,087	11,308
			59.11%		19.95%			
Z59987	1B2P GF END	8	15.82	6.68	84.04	69.36	2,405	24,970
			57.77%		17.47%			
Z59993	1B2P FF MID	4	12.94	4.76	68.62	49.74	857	8,953
			63.21%		27.51%			
Z59995	1B2P FF END	8	13.98	5.42	74.14	56.46	1,915	20,326
			61.23%		23.85%			
Z60001	1B2P SF MID	4	14.39	5.81	76.40	60.52	1,046	10,894
			59.62%		20.79%			
Z60003	1B2P SF END	8	15.20	6.46	80.73	67.11	2,326	24,160
			57.50%		16.87%			
Total		**36**	**59.33%**		**20.30%**		**9,671**	**100,609**

The carbon emissions are 9,671**kgCO_2/yr**. This is a total carbon reduction of **14,107kgCO_2/yr** from the baseline emissions of **23,778kgCO_2/yr**. This equates to a **59%** carbon reduction.

The primary energy rate is **100,609Wh/yr**. This is a primary energy reduction of **25,628kWh/yr** from the baseline primary energy rate of **126,238kWh/yr**. This equates to an **20%** primary energy reduction.

The development proposal achieves carbon efficiency reductions through a highly efficient thermal fabric, energy efficient lighting and ventilation, improved thermal bridging, low air leakage and highly efficient heat pumps for domestic hot water heating to reduce emissions in line with Tameside Council's Core Strategy.

9. Conclusion

Following the 'Be Lean, Be Clean, Be Green' hierarchy, the proposed design solutions on the Egmont Street, Mossley development are predicted to:

1) Reduce the total carbon emissions by 59% compared to new building regulations ADL 2021. New building regs are a 31% improvement on 2013 regs, which in turn were a 6% improvement on 2010 regs upon which the energy policies are based. Therefore, the overall improvement of this project, based on 2006 standards is 90% betterment (59+31+6), which greatly exceeds the 15% required to meet the energy policy EN6.
2) The hot water heat pumps are the proposed renewables/ low carbon technology. Their contribution to the overall energy reduction under the 'be green' energy hierarchy is approx. 50%.
3) Reduce the total primary energy by 20% compared to new building regulations ADL 2021. This is a new metric under Part L 2021.

The approach for the Egmont Street, Mossley development is to embed sustainability into the heart of the development through a range of design measures based on the 'Be Lean, Be Clean, Be Green' design hierarchy. Measures will include:

1) Enhanced building fabric to meet the new Building Regulation ADL1 2021 (15/06/2021)
2) Enhanced air tightness and thermal bridging
3) Efficient System 3 Mechanical Extract ventilation system
4) Hot water will be provided by highly efficient heat pumps.
5) Efficient lighting strategy primarily using LED type fittings.

9.1. Low/ Zero Carbon Technologies (LZT) Chosen

Air source Heat Pumps (ASHP) are viable and are considered most suitable for this development for the following reasons:

- The ASHP achieves a 50%+ reduction in CO_2 emissions based on the SAP 10 ADL1 2021 standards.
- Every dwelling benefits directly from the Heat pump performance.
- Heat pumps require very little maintenance and have a long service life.

9.2. Low/ Zero Carbon Technologies (LZT) Discounted

a) Solar Thermal Hot Water is not a viable option as heat pumps are proposed and hot water demand will be heated and stored efficiently through this system.

- PV has not been included within the preliminary SAP calculations as heat pumps provide the necessary carbon emission reductions required by the Tameside Council Core Strategy.
- Biomass has been discounted as it poses problems in terms of air quality, delivery of fuel, storage, and transportation for deliveries etc. It would require a centralised larger plant space for storing fuel, which on this constrained site is not viable.
- Micro-wind turbines do not work on this type of development due to problems with wind turbulence and mounting of the units. The wind speeds in the area are not conducive to wind power electricity generation and there would be issues with turbulence, wind shading, noise, and air traffic.
- GSHPs are not viable for site because of spatial and financial costs. There is no room to accommodate a GSHP vertical bore and associated communal plant room, ground conditions are unknown, and systems are very costly.

A more detailed overview of LZT technologies is provided in the appendices of this report.

9.3. Summary Headlines

- A fabric-first approach to meeting Tameside Core Strategy energy policy has been undertaken for the Egmont Street, Mossley development, defined within the 'Be Lean, Be Clean, Be Green' energy hierarchy. The proposed design provides compliance with Building Regulations ADL1 2021, and with the application of heat pumps for heating and hot water ensures reductions which exceed Tameside Council's Core Strategy.
- The use of high-efficiency heat pumps reduces carbon emissions by 59.33% and provides a primary energy reduction of 20.30% when compared to new building regulations Part L 2021.
- Site constraints and viability for District Heating Network (DHN) and Communal Heating Network (CHN) have been reviewed. Existing DHN is not sufficiently close to connect into. In addition to this, the scheme's heating, and hot water (HW) demand is too small to justify connection to DHN or CHN.

An overall 59.33% improvement in CO_2 emissions and a 20.30% improvement in primary energy above the Building Regulations baseline is proposed to support our application and to meet policy requirements.

	Total CO_2 Emissions ($kgCO_2$/yr)	**Total Primary Energy (kWh/yr)**
Target Dwelling Performance	**23,778**	**126,238**
Proposed Dwelling Performance	**9,671**	**100,609**
Total Reduction	**14,107**	**25,628**
Percentage Improvement (above ADL1 2021)	**59.33%**	**20.30%**

10. Appendices

10.1. LZT Feasibility Table

Technology	Technical Feasibility	Carbon Savings	Estimated Costs	Financial Viability
Solar photovoltaics	A photovoltaic array is not required for the dwellings as carbon emissions reductions in line with BRegs Part L1 2021 are already achieved.	A 1kWp system could save around 213 kg of CO2 / year per dwelling	Average cost for such a system is around £1.5K per dwelling.	Current potential income generation is around £120 minimum per annum per dwelling with a fuel cost saving of around £40 / year per dwelling.
Wind	Average wind speeds on the site according to the NOABL Wind Speed Database are 4.4m/s. To be technically feasible a minimum of 6m/s is required, therefore this site is not considered feasible.	N/A	N/A	N/A
Micro Hydro	There is no capa for micro hydro on this site since there are no local water courses available.	N/A	N/A	N/A
District Heating	There are no existing or planned district heating networks to facilitate connection at this stage.	N/A	N/A	N/A
Solar Hot Water	This technology has been discounted as the level of hot water usage in each dwelling does not merit a storage system, which poses space issues.	Around 270 kg of CO2 / year per dwelling.	£3-5K per dwelling	Income generation from RHI in a 4-person household would be in the region of £340 / year (per dwelling) with a fuel saving of around £65 / year per dwelling
Heat Pumps	GSHP: Ground conditions on site are unknown, and installation of coils are likely not economically viable for this project. ASHP: Provided to all dwellings for heating and hot water. HWHP: Provided to all dwellings for hot water	GSHP: 2,100 to 3,300 kg CO2 / year per dwelling ASHP: 1,700 to 2,700 kg CO2 / year per dwelling. HWHP: 1,700 to 2,700 kg CO2 / year per dwelling.	GSHP @ £13-20K per dwelling ASHP: £7-11K / dwelling ASHP: £3K / dwelling	GSHP: £2,590 minimum annual RHI income generation per dwelling with fuel saving of £440 / year minimum per dwelling ASHP: RHI removed. Fixed £5000 grant fund per property. HWHP: N/A
Biomass	The small scale of this development would not facilitate the installation of biomass boilers due to the space required for pellet storage.	N/A	N/A	N/A

10.2. Specification for Energy Assessments (ADL1 2021 – SAP 10)

Item	Brief Description	Notes	Confirm
	The following information is required for the design submission (as per requirements of AD L1).	Please note submission is in two stages. A) **Design**, B) As installed	
1. Dwelling Type			
1.1	Building Regulations Part L1 2021 apply.	The Contractor is responsible for meeting Building Regs 2021 compliance including part L (energy), F (ventilation), O (overheating), G (water consumption), E (sound) and S (Elec Vehicle Charging)	
1.2	Post code of site is	OL5 9NB	
1.3	Electricity is supplied by standard tariff rather than economy 7, 10 or 24.	Assumed Standard tariff	
1.4	It is assumed that the dwellings have a low thermal mass parameter.	*Timber Framed Construction*	
2. Floor Construction Details			
2.1	Ground floor is insulated to achieve the U-value stated opposite.	U-Value = 0.12W/m²K	
3. Wall Construction Details			
3.1	Main external walls to achieve the U-value stated opposite.	U-Value = 0.15 W/m²K	
3.2	Party walls are fully filled and sealed to achieve the U-value opposite as RSD E-WT-20	U-Value = 0.00 W/m²K	
	Corridors are unheated. Corridor walls to achieve the U-value stated opposite.	U-Value = 0.20W/m²K. Unheated corridors	
4. Roof Construction Details			
4.1	Cold roofs are insulated to achieve the U-value indicated opposite.	U-Value = 0.09 W/m²K	
5. Openings			
5.1	External doors/Doors to cold corridors are installed to achieve the U-value stated opposite.	U-Value = 1.4 W/m²K	
5.2	All double-glazed windows, roof lights and patio type doors/windows with Low-e glass hard coating to achieve the U-Value stated opposite.	U-value=1.3 W/m²K frame and glazing **BFRC Required** G-Value=0.63 North G-Value=0.5 East G-Value=0.4 South G-Value=0.4 West 1x5000mm² trickle vent per habitable room (new part F regs standard for extract only vent systems).	
6. Ventilation			
6.1	Design stage SAP calculation presumes an air permeability of 4m³/m²/hr at 50pa will be achieved.	4m³/m²/hr at 50pa	
6.2	System 3 decentralised Mechanical extract ventilation is installed in wet areas.	Greenwood CV3 GIP DMEV (ref 500769) Every dwelling part F tested and certificated	

6.3	No open flues or fireplaces or flue-less gas fires are present anywhere.		
7. Space Heating			
7.1	There is only one main heating system installed to all dwelling types.	No secondary heating.	
7.2	The pump and cylinder are inside the dwelling.	Within the heated space	
7.3	There is an interlock to switch it off when there is no demand from room thermostat(s).		
7.4	Hot water is provided by Air Source Heat Pumps	Dimplex EDL200UK-630 within calculations (Ref 190006)	
7.5	Heating is provided by individual direct electric panel heaters with appliance stat and programmer		
8. Water Heating			
8.1	Showers – All showers will be supplied from the Hot Water cylinder via a pump. All showers to be flow regulated to <8litres/minute		
8.2	HW pre-plumbed cylinder coupled with the ASHP.	201l HW cylinder with stat HW heat loss 1.61kWh/24hrs Independent time control is provided to the hot water cylinder.	
8.3	Water usage per person per day is ≤105 Litres.	To meet this standard using Part G calculations pls allow for the following: All taps <4l/min flow regulated Baths <110litres to overflow Showers <8litres/min flow regulated WCs dual flush 4/2.6l No Dishwashers and washing machines.	
9. Renewables			
9.1	The HW heat pump is considered a low carbon technology under the 'Be Green' Energy Hierarchy. There are no renewable technologies on the development.		
10. Other			
10.1	The Contractor will be responsible for undertaking thermal bridging calculations for each detail to provide a comprehensive set of calculations to meet building regs compliance ADL1 2021. They will be responsible for meeting a overall Y value of 0.04W/mK (summation of all the junctions)	All info contained below 10.2-10.4 is to assist the Contractor in the development of their own detailing.	
10.2	Low energy (LE) lights are installed throughout.	All lighting to meet an min efficacy of 80lumens/circuit watt. The Contractor will provide a drawing and schedule of all proposed light fittings with efficacies detailed.	

10.3	Windows on upper floors can be half opened in summer to prevent overheating. Dwellings will require further analysis under part O	Part O overheating assessment required for flats.	
10.4	Provide all design and as built evidential requirements to meet building regulations compliance standards.	The evidence must be submitted to the OCDEA and Building Control at least 3 weeks before handover for their review and sign off	

10.3. Index of Tables and Figures