

Our Ref: D2107

18th February 2021

Energy Statement
29 Berry Brow, Manchester

Site Address: Proposed new dwellings
Rear of 29 Berry Brow
Manchester
M40 1GR

Applicant: Mr. G Stelfox

Assessor: Neil Unsworth
Bridgewater Energy Ltd
Accreditation ref EES/004187

ENERGY STATEMENT

This statement has been prepared by Bridgewater Energy on behalf of the applicant in support of the following proposed development:

Application number: 125555/FO/2019
Proposal: Erection of two storey, detached dwelling house (Class C3) with parking, landscaping and boundary treatment
Address: Land to the rear of 29 Berry Brow, Manchester, M40 1GR
Floorspace: 115 m²

In particular this statement addresses Policy EN6 of Manchester City Council's Core Strategy 2012 to 2027. This policy states that developments involving the erection of a building will be expected as a minimum to meet the target shown in Table 12.1 for domestic buildings.

The relevant target in Table 12.1 is Target 3 which states that non-domestic buildings should achieve a minimum 15% reduction of CO₂ emissions compared to Building Regulations Part L 2010.

Proposal summary

Proposed CO₂ emissions reduction : 15.52%

It has been calculated that the proposed design and specifications of the dwelling will reduce the CO₂ emissions by 15.52%.

This will be achieved by means of improving the thermal performance of the buildings beyond the levels required to comply with the current regulations. This will include a highly insulated building envelope, high specification windows and doors and excellent levels of air tightness. This 'fabric first' approach reduces emissions by lowering the demand for heating.

The dwelling will also include high efficiency heating systems with enhanced control systems.

Technology Feasibility Study

In this section we will look at the various strategies available that could be utilised to reduce the CO₂ emissions from the proposed dwelling. These will include renewable technologies and passive measures.

Wind Turbines

Small scale on-site wind turbines can have the potential to make a contribution to on-site renewables targets. However barriers such as noise, and visual impact (planning issues), can severely restrict their use.

The space available for locating wind turbines on this development is very limited and restricted to the use of roof mounted units. The performance of roof mounted turbines is considerably reduced when compared with freestanding models. Recent studies have also found that wind speeds actually seen in urban environments are considerably less than given in meteorological data.

In light of the visual impact, turbulence problems caused by the urban environment, and the low contribution to the renewables requirements, wind turbines are not viable for this development.

Ground Source Heat Pumps

Ground source heating takes advantage of the stable ground temperature of 12°C to heat either air or water to provide energy efficient heating (and optional comfort cooling) to a building.

The system involves the installation of underground pipework laid in a horizontal or vertical pattern in land adjacent to the dwelling, usually underneath the garden or driveway.

The size of the rear garden means a that ground source heat pump system is technically feasible on this site. However the installation costs are very high therefore we would not recommend ground source heat pumps for this development.

Air Source Heat Pumps

Air source heat pumps work in the same manner as ground source heat pumps, but instead of extracting low temperature heat from the ground, they extract it from the air. They can do this even when the outside temperature is -15°C.

Whilst the installation costs of these systems are not as high as with ground source heat pumps, they are still significant.

An air source heat pump system would be suitable for this development however the cost implications would need careful consideration.

Biomass

The use of biomass systems to provide heating and hot water often lends itself towards a district heating approach whereby a central system is provided which distributes low temperature hot water to each unit. Smaller units are available for installation in individual dwellings but, despite their continual development, these are still quite large and require a dedicated plant room equivalent to the size of a typical utility room.

One of the key downsides of the use of biomass in development of this nature is the space required for the storage and delivery of fuel for both the district and individual systems. The costs of the systems is also very high when compared to traditional mains gas heating.

Therefore we do not feel that a biomass scheme is suitable for use in this development.

Combined Heat and Power

Combined Heat and Power (CHP) is the simultaneous production of heat and electricity. Using a reliable internal combustion engine fed from a single source of fuel, such as natural gas or LPG, a CHP system can produce usable amounts of both heat and electricity.

The Government's Micro-generation Strategy has identified Micro-CHP as one of the key technologies which offers a realistic alternative to centrally generated electricity.

Previously, CHP systems have only been suitable for large developments due to the size and complexity of the systems available. Small scale CHP systems are now on the market for individual dwellings. These systems are not much larger than a typical gas boiler, and have a built-in turbine to produce electricity for the home.

However it is recommended that CHP is not installed in newly built dwellings. The system only produces electricity when the boiler is producing heat. In a new build the heating demand will be considerably less due to a tighter build quality and better U-Values of heat loss elements. The system would not be able to generate enough power to be considered financially viable.

We would therefore consider that combined heat and power is not viable for this development.

Enhanced Efficiency Heating Systems

The heating system is usually the main generator of CO₂ emissions of a dwelling. Traditional mains gas boilers produce significantly lower emissions when compared to electric, oil and LPG systems.

The addition of flue gas heat recovery systems and improved heating controls are proven to bring effective reductions in emissions. They also have the advantage that most house holders would not consider this an unfamiliar technology when compared to other renewable options.

The costs of these options are not significant therefore this option is suitable for this development.

Photovoltaics

The cost of producing electricity by photovoltaic's was once seen as being prohibitive. However, with improved efficiencies and reduced costs, the use of PV is now a viable renewable technology for many projects.

To achieve maximum output from photovoltaic's they should ideally be located on south facing surfaces, with clear, unobstructed views of the sky. The proposed dwelling does have suitable roof orientations although the surrounding trees may compromise performance.

The installation of PV is technically feasible and could lead to considerable CO₂ reductions for the dwelling however the cost of the installations are high.

We would consider that PV is suitable for this development but the cost implications would need careful consideration.

Solar Water Heating

Solar water heating systems use the energy from the sun to heat water for domestic hot water needs. Solar water heating systems use a heat collector that is usually mounted on a roof in which a fluid is heated by the sun, this fluid being used to heat water that is stored in a hot water cylinder.

Domestic installations usually comprise of 4m² collection area, which can provide 50%-70% of the hot water requirement for a typical home if provided on south facing roofs at the optimum 30° pitch. As with PV, the roof orientation would lead to reasonable performance.

However the CO₂ savings are not as great as those achieved through PV and additional measures would need to be adopted to achieve the required reduction. We would therefore consider that solar water heating is not suitable for this development.

Enhanced Construction

The use of enhanced insulating materials, high specification glazing, composite insulated doors and improved air tightness can significantly reduce the energy demand of dwellings. Indeed, the current Building Regulations Approved Document L1A has introduced a target fabric energy efficiency that must be achieved in addition to the target emissions rate.

Using this method alone will have cost implications. However the use of improved construction in combination with other options will achieve the required emissions reductions and therefore is suitable for this development.

Proposed Energy Strategy

It is proposed that the dwelling will incorporate enhanced construction and enhanced efficiency heating systems to reduce CO₂ emissions.

The dwelling will adopt a 'fabric first' approach to energy efficiency following the principle that the demand for energy should first be minimised before addressing how the energy is produced. The building fabrics will be highly insulated and have an airtight building envelope. This will mean that energy efficiency will be embedded within the dwelling throughout their lifetime rather than placing over reliance upon renewable technologies with a restricted working life.

The following U-values and air tightness rates are proposed. These improve upon those required for Building Regulations Part L1A 2010, and therefore will provide high levels of energy efficiency.

Thermal Transmittance (U-Values):	Wall: 0.20 W/m ² K Roof: 0.11 W/m ² K Floor: 0.12 W/m ² K Glazing: 1.40 W/m ² K Doors: 1.00 W/m ² K
Design air tightness:	6.00 m ³ /hr.m ²

The dwelling will also incorporate building materials that have been independently assessed for thermal bridging leading to reduced heat loss at construction junctions. This detailed analysis of the construction details is often overlooked in energy assessments but it gives significant reductions in CO₂ emissions.

The building services within the dwelling will use proven efficient technologies.

The heating and hot water will be by means of a high efficiency mains gas combination boiler which has a built in flue gas heat recovery system. This simple technology extracts heat from the hot waste flue gases to reduce the heating demand of the gas burner.

The heating controls will be fully zoned so that the timing of the heating and the temperature settings can be changed in the various rooms of the house. This will mean that the heating will not operate in at a time when the room is not used. Delayed start thermostats will also be incorporated that will further reduce the time when the heating is operating.

All internal and external light fittings will have low energy lamps. The external lighting will also have controls that restrict operation to 'dusk to dawn' periods.

Comfort cooling will not be installed. Good design of the glazing system and the ability to naturally cross ventilate the dwelling means that comfort cooling will not be required.

Energy Assessment Method

A full design stage SAP calculation has been carried out on the dwelling using SAP 2009 which is the assessment stipulated in Building Regulations Approved Document L1A 2010.

The SAP method assesses the energy demand of particular dwelling design. It then calculates the resulting CO₂ emissions based upon the proposed building services technologies, mainly the heating system.

For each dwelling it calculates a target emissions rate of CO₂ which is referred to as the TER and a predicted as designed dwelling emission rate CO₂ which is referred to as the DER. To comply with building regulations the DER must be no greater than the TER.

The proposed energy strategy of this development will reduce the designed dwelling CO₂ emissions below the building regulations target emissions rates as shown below.

Calculated CO₂ Reduction

The Target Emissions Rate compliant with AD L1A is **18.43** kgCO₂/year/m².

The calculated Dwelling Emissions Rate is **15.57** kgCO₂/year/m².

The proposed reduction in CO₂ emissions is calculated as follows:

$$\text{Proposed CO}_2 \text{ reduction} = \left(1 - \frac{15.57}{18.43} \right) \times 100 = \mathbf{15.52\%}$$

Supporting documents

A copy of the SAP 2009 Building Regulations Compliance document for the proposed new dwelling to rear of 29 Berry Brow is attached to this report.

Please note that an additional SAP 2012 calculation that is compliant with the current Building Regulations Approved Document L1A 2013 will be required to be carried out on the proposed dwelling prior to commencement of construction.

Building Regulation Compliance

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Property Reference: D2107

Issued on Date: 18.Feb.2021

Survey Reference: Planning design stage

Prop Type Ref:
Property: Land to rear of 29, Berry Brow, Clayton Bridge, Manchester, M40 1GR

SAP Rating: 85 B	CO2 Emissions (t/year): 1.62	DER: 15.57 Pass	Reduction: 15.5%	FEE: 49.4	ZC8: 0.00
Environmental: 87 B	General Requirements Compliance: Pass	TER: 18.43		HLP: 1.18	Energy cost: £ 463

CfSH Results	Version:	ENE1 Credits: N/A	ENE2 Credits: N/A	ENE7 Credits: N/A	CfSH Level: N/A
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Surveyor: Neil Unsworth, Tel: 01942 888092

Surveyor ID: 5906-0001

Address: Ellenor Drive, Astley, Manchester, M29 7NN

Client:
Software Version: Elmhurst Energy Systems SAP2009 Calculator (Design System) version 4.04r04

SAP version: SAP 2009, Regs Region: England and Wales (Part L1A 2010), Calculation Type: New Dwelling As Designed

SUMMARY FOR INPUT DATA FOR New Build (As Designed)

1 TER and DER

Fuel for main heating:	Mains gas	
Fuel factor:	1.00 (mains gas)	
Target Carbon Dioxide Emission Rate (TER)	18.43 kg/m ²	
Dwelling Carbon Dioxide Emission Rate (DER)	15.57 kg/m ²	OK

2 Fabric U-values

Element	Average	Highest	
External wall	0.20 (max. 0.30)	0.20 (max. 0.70)	OK
Floor	0.12 (max. 0.25)	0.12 (max. 0.70)	OK
Roof	0.12 (max. 0.20)	0.16 (max. 0.35)	OK
Openings	1.34 (max. 2.00)	1.40 (max. 3.30)	OK

2a Thermal bridging

Thermal bridging calculated from linear thermal transmittances for each junction

3 Air permeability

Air permeability at 50 pascals:	5.50 (design value)	
Maximum	10.0	OK

4 Heating efficiency

Main heating system:	Boiler system with radiators or underfloor - Mains gas Data from database Vaillant ecoTEC exclusive 835 VUW 356/5-7 (H-GB) Combi boiler Efficiency: 89.7% SEDBUK2009 Minimum: 88.0%	OK
Secondary heating system:	None	

5 Cylinder insulation

Hot water storage	No cylinder
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6 Controls

Space heating controls:	Time and temperature zone control	OK
Hot water controls:	No cylinder	
Boiler interlock	Yes	OK

7 Low energy lights

Percentage of fixed lights with low-energy fittings:	100%	
Minimum	75%	OK

8 Mechanical ventilation

Not applicable

9 Summertime temperature

Overheating risk (West Pennines):	Not significant	OK
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Based On:	
Overshading:	Average
Windows facing North:	16.84 m ² , No overhang
Windows facing South:	7.81 m ² , No overhang
Ventilation rate:	4.00
Blinds/curtains:	None

10 Key features

Roof U-value	0.11 W/m ² K
Floor U-value	0.12 W/m ² K
Door U-value	1.00 W/m ² K
Window U-value	1.40 W/m ² K
Window U-value	1.40 W/m ² K