

Energy Statement

Project: Wembley Works, Hemingfield Road, Hemingfield, Barnsley, S73 0LY
Client: Zul Akram - Resource Medical (UK) Ltd
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Executive Summary

- This energy statement has followed guidance and will discuss policies as stipulated in the Barnsley Local Plan (Adopted January 2019);
 - Policy CC2 Sustainable Design and Construction
 - Policy RE1 Low Carbon and Renewable Energy (and Housing Strategy 2014-2033)
 - This development involves the construction of 17 dwellinghouses
 - The dwellings will be constructed inline with such policies and follow the theory of the energy hierarchy:
 - Reduce the need for energy (i.e. construct and insulate above and beyond Building Regulations target values)
 - Use energy more efficiently (i.e. install efficient heating, ventilation and lighting systems)
 - Supply energy from renewable sources (i.e. install and implement renewable and/or low carbon technologies)
 - The Housing Strategy 2014-2033 includes the key ambition “to achieve 15% renewable energy on new build developments”.
 - To achieve the 15% target, renewable energy will need to be installed. The most feasible would be Solar Thermal or Solar Photovoltaic panels (or a combination of both)
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1. General

This energy statement has been prepared by Energytest Ltd. in support of the following outline planning application:

DESCRIPTION:	Outline application with all matters reserved for residential development of site following demolition of existing building
LOCATION:	Wembley Works, Hemingfield Road, Hemingfield, Barnsley, S73 0LY

This is inline with Table 3 - Local Validation Requirements (Barnsley Metropolitan Borough Council) which stipulates an Energy/Sustainability Statement is required for residential schemes of 10+ units.

This statement will demonstrate how the proposed development will minimise resource and energy consumption compared to the minimum required under current Building Regulations legislation and how it is located and designed to withstand the longer term impacts of climate change. It will also detail how the proposed development will incorporate decentralised, renewable or low carbon energy sources.

2. Development

The proposed development involves the demolition and clearance of the current site, and the erection of 17 dwelling houses and associated access and landscaping.

Proposed Accommodation Specification

17 no. dwellings in total. Consisting of:

- 11 no. 2 / 3 bed semi detached and terraced townhouse properties over 3 storey. Some with garages (marked with G)
- 6 no. 4 / 5 bed semi detached 2.5 / 3 storey houses with garages (marked with G)

The site plan below, shows the proposed configuration:

2.1 Proposed Site Plan



3. Barnsley Local Plan

The Barnsley Local Plan (Adopted January 2019) includes two policies that are applicable:

3.1 Policy CC2 Sustainable Design and Construction

“Development will be expected to minimise resource and energy consumption through the inclusion of sustainable design and construction features, where this is technically feasible and viable.”

- Encourage energy efficiency that exceeds the minimum standard set out by Part L of the Building Regulations

3.2 Policy RE1 Low Carbon and Renewable Energy

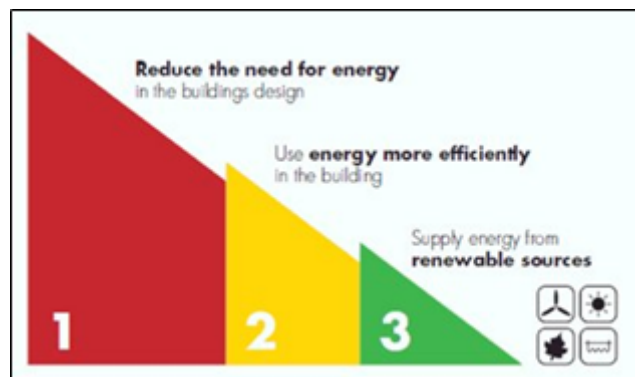
“All developments will be expected to seek to incorporate initially appropriate design measures, and thereafter decentralised, renewable or low carbon energy sources in order to reduce carbon dioxide emissions”

- Encourage renewable or low carbon energy sources (as long as there is no material harm) in the development, after implementing appropriate design measures to be inline with the theory of the energy hierarchy.

Policy RE1 also refers to the Housing Strategy 2014-2033 which includes the Strategic Objective “to ensure the design and delivery of new high quality, desirable and sustainable homes”, and includes the key ambition “to achieve 15% renewable energy on new build developments”.

4. The Energy Hierarchy

The principle of the energy hierarchy is demonstrated by the diagram below:



Research by the Building Research Establishment (BRE) has found improvement to building fabric and services to be the most cost effective way of reducing energy consumption.

Results of the study indicated that:

- The cost per tonne of achieving a 1% reduction in CO₂ emissions with renewables was approximately 4 times higher than building fabric improvement; and
- Combining improvements to building fabric and services to achieve approximately a 20% reduction in energy use was cheaper per tonne of CO₂ emissions reduced than by achieving a 10% reduction by using renewables alone.

Following this research BRE have concluded that improvements to building fabric and services should be implemented first with additional renewable energy installations to follow.

Enhancing the thermal performance of the building envelope helps to future-proof the structure and yields the greatest CO₂ savings. Adding renewable technologies will then yield maximum emissions reductions with lower long-term costs for the developer.

4.1 Reduce the need for energy

The proposed development will incorporate levels of insulation above those required by Approved Document L1A of the Building Regulations, as well as good levels of air tightness. Below is a table on the target U Values as stipulated in the Regulations, and an example of how that U Value could be met with standard construction methods.

Thermal Element	Building Regulations U Values (W/m ² K)	<u>EXAMPLE</u> Specification
Ground Floor	0.13	Screed on 140mm PIR insulation on suspended beam and block floor
Cavity Walls	0.18	100mm facing brick, 100mm full fill PIR insulation, 100mm lightweight block inner leaf. Plasterboard on dabs
Roof	0.13	Joisted Roof - 300mm loft roll Rafter (sloping) Roof - 150mm PIR insulation between rafters, 50mm PIR insulation fixed under rafters
Openings	1.40	Double glazed, low E units
Air Leakage	5.00 m ³ /h.m ²	An air pressure test is required upon completion
Thermal Bridging	Accredited Construction Details	Care should be taken to ensure the continuity of insulation in all details / junctions

5.2 Use energy more efficiently

5.2.1 Space heating and domestic hot water

It is assumed the most likely heating system to be used on this development will be from mains gas boilers. Although there are other options available (see renewable / low carbon feasibility study below), gas boilers are still the most common systems on new build developments.

- The heating systems installed will exceed the requirements as stipulated in the “Domestic Building Services Compliance Guide: 2013 edition incorporating 2018 amendments”.
 - Boiler efficiencies in excess of 89% (SEDBUK 2009)
 - Controls to include independent time / temperature zone control
- Cylinders (if installed) to be efficient so to limit standing heat loss

5.2.2 Ventilation

It is assumed that the dwellings will incorporate intermittent extract fans in kitchens and each wet room. These should be efficient models, perhaps with automatic opening/closing so as to limit heat loss.

However, if the dwellings are going to have particularly good levels of air tightnesses, then Mechanical Ventilation with Heat Recovery (MVHR) could feasibly be utilised. Such systems provide fresh filtered air into the dwelling whilst recovering the heat of the extracted air, that will normally be lost by using traditional ventilation systems. MVHR units are increasingly efficient and work best in airtight buildings.

5.2.3 Lighting

All lighting within the development (internal and external) will be low energy, such as LEDs.

5.3 Supply energy from renewable sources

There are many options for renewable / low carbon energy sources that could feasibly be installed on this development. Please refer to to the renewable / low carbon feasibility study below:

6. Renewable / low carbon feasibility study

This section considers the use of high efficiency alternative systems in the proposed development at Wembley Works, Hemingfield Road, Hemingfield, Barnsley, S73 0LY.

Renewable energy technologies can generally be divided into two areas, those that generate electricity and those that generate heat for space heating and domestic hot water. These will be examined separately.

6.1 Heat Generating Technologies

6.1.1 Heat Pumps

Air Source Heat Pumps absorb heat from the outside air by drawing large volumes of air over a heat exchanger.

Ground Source Heat Pumps use underground pipes, circulating a fluid, to extract heat from the ground. This collected heat energy is then fed through the heat pump and by using refrigerant technology, the temperature is raised to a useable level in order to provide heat for space heating or hot water.

It is generally considered that to run heat pumps efficiently, the required 'temperature lift' should not be too great, thus low temperature emitters such as under floor heating or warm air convectors are best suited and not standard radiators.

Maintenance - Heat pumps, like standard gas boilers, if regularly maintained can be expected to operate for 10 to 20 years. Simple yearly inspections and a more detailed check every 5 years can be expected. Issues with underground collector loops or boreholes can be extremely expensive to resolve but are rare in modern installations. As with any technology using electric pumps, it is possible that the pumps may need replacing after 10 years or so.

Land Use - A typical 8kW heat pump requires around 400m² of ground area if underground 'slinky' coils are used. It is apparent that there is simply not the land available at the proposed site for a Ground Source heat pump. Boreholes can also be used but can be very expensive to drill. Their success depends upon the nature of the ground which can only be assessed using expensive test drilling, therefore it is unlikely to be a viable option.

Air Source Heat Pumps require an external heat exchanger unit to be mounted somewhere outside the property and also somewhere internally for the heat pump itself. Space for a hot water cylinder is also needed.

Local Planning Issues - It is unlikely that there will be issues with local planning requirements.

Applicability to Wembley Works - It is apparent that there is no space available at the site for Ground Source Heat Pump and the cost of a borehole is prohibitive.

Air Source Heat Pumps could feasibly be installed, however, consideration as to where to install the unit externally and a cylinder internally is needed.

6.1.2 Solar Thermal Panels

Solar thermal panels harness the energy of the sun to heat domestic hot water within a dwelling. They are not generally suitable for space heating requirements since the highest demand is during the winter months when the solar resource is lowest.

There are currently two types of panel which are readily available, these are evacuated tube and flat plate collectors. In order to make best use of solar thermal energy, it needs to be collected when it is available i.e. when the sun is shining (mid day) and stored until it is needed (evening). In practice this means a large water storage cylinder or thermal store.

Maintenance - Solar thermal panels or tubes require little or no maintenance. The anti freeze solution circulating should occasionally be checked to prevent freezing in the winter. The electric pump is the only component that may require replacement after 10 years but this is relatively cheap at a current cost of around £90.

Land Use - The panels are fitted to the roofs however space must be found for a suitable sized cylinder or thermal store within the dwelling.

Local Planning Issues - Unless the area falls into a Local Heritage or Conservation Area or National Park then Solar Thermal Panels fall under the Permitted Development rights.

Applicability to Wembley Works - Most of the dwellings are South West facing (plots 1-15), with plots 16 & 17 having South East facing roofs. Solar thermal panels could feasibly be installed on these dwellings. Space would need to be found within the properties for an appropriate sized cylinder.

6.1.3 Biomass

Biomass is the collective term for a variety of technologies. Biomass is considered to be a renewable, low carbon energy source due to the fact that providing it has been responsibly sourced, the carbon released when biomass fuel is burnt will be re-absorbed as new biomass product is grown.

The most common and widely available type of Biomass fuel is wood which can be burnt in various forms i.e. logs/chips/pellets in boilers to provide energy for space heating and or hot water.

Maintenance - Wood fuel appliances need regular cleaning to remove ash, at the minimum once a week. Flues should be swept at least once a year to prevent soot build up and reduce the risk of chimney fires.

Land Use - This will vary depending on the size of hopper or storage space required. A hopper suitable for 'blown' pellet deliveries will be in the region of 8m³.

Local Planning Issues - It is unlikely that pellet boilers will be subject to any planning restraints unless there is an issue with lorry deliveries for blown pellet hoppers

Applicability to Wembley Works - Due to the space required for such units, it can be deemed that they are not feasible for this site.

6.2 Electricity Generating Technologies

Onsite electrical generation is generally less involved to install than heat generation since it is relatively straightforward and common practice to connect the generator to the consumer unit within a dwelling and thus have 'Grid Connected' supply. This allows excess generation to be fed back to the grid and allows for the continued supply of grid electricity when there is no onsite generation occurring.

6.2.1 Wind Turbines

Micro scale wind turbines, i.e. household sized turbines in urban locations simply do not generate meaningful amounts of energy. Wind turbines work most efficiently when provided with 'clean' i.e. non-turbulent wind and the amount of energy generated is proportion to the size of the 'swept area' of the blades. In-order to achieve this they have to be mounted much higher than the surrounding canopy level. This has implications within densely populated urban areas as there is not usually sufficient space to provide safe areas around the wind turbine.

Applicability to Wembley Works - Due to the fact that the site is in a densely populated, urban area resulting in a low wind resource, coupled with potential planning permission, space and noise issues, a wind turbine is not considered a feasible option.

6.2.2 Photovoltaic Solar Panels

Photovoltaic panels (PV) produce electricity from the sun's energy. They are easily fitted to a roof and can be wired into the consumer unit of a property. That way, any excess electricity that is generated and not used by the property is fed back into the National Grid and can be used elsewhere.

Whilst due South is the optimum angle, they will feasibly work at any angle between South West and South East, albeit generating less electricity. The optimum pitch is generally considered to be ~33 degrees.

Maintenance - Solar PV systems require no regular maintenance or checks. The panels should last in excess of 20 years, however the inverter will most likely need replacing within 10 years

Land Use - The panels are fitted to the roof and therefore require no additional land.

Local Planning Issues - Unless the area falls into a Local Heritage or Conservation Area or National Park then Solar PV falls under the Permitted Development rights.

Applicability to Wembley Works - Most of the dwellings are South West facing (plots 1-15), with plots 16 & 17 having South East facing roofs. PV could feasibly be installed on these dwellings.

6.3 Co-Generation

Cogeneration is also known as Combined Heat and Power. In domestic scale units, gas is burnt to drive an engine such as a Stirling engine. This generates electricity which is either used on site when there is a demand or fed back into the grid when there is no demand. The waste heat from the engine is then used to provide heat and hot water for the properties.

Micro CHP is not commonly installed in the UK though the numbers of units on the market is increasing.

Applicability to Wembley Works - Micro CHP units could be installed although space for the units and associated water cylinders could be an issue.

6.4 District Heating

District Heating is a system whereby heat is distributed over a wide area from a central generating source (such as a power station) through well insulated underground hot water pipes. Properties can be connected to the distribution system via a heat exchanger and are usually charged for heat via a 'Heat Meter'.

Applicability to Wembley Works - There is no known District Heating system in the vicinity.

7. Conclusion

This development will adhere to the guidance set out in Policies CC2 and RE1 of The Barnsley Local Plan.

The construction/insulation methods to be implemented will achieve and exceed the minimum target values as stipulated in Approved Document L1A of The Building Regulations.

The heating, ventilation and lighting systems will exceed the requirements of the Domestic Building Services Compliance Guide.

The following matrix, shows the feasibility of renewable / low carbon energy sources for this site:

Feasibility?	Technology							
	ASHP	GSHP	Solar Thermal	Biomass	Wind	PV	Co-Gen	District Heating
No								
Maybe								
Yes								

Ground source heat pumps, biomass, wind and district heating are not feasible for this site.

Air source heat pumps and co generation could be feasible for this site but will require further investigation should these be considered.

Solar thermal and PV panels are very feasible for this site due to there being South East and South West facing roofs on every plot. Space for the hot water cylinder would need to be sought should solar thermal panels be considered.

Solar thermal or PV panels will also help to meet Barnsley's "The Housing Strategy 2014-2033" which includes the key ambition "to achieve 15% renewable energy on new build developments".