



DESIGN ENGINEER SUSTAIN

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Land South of Darton Lane

Darton, Staincross

Energy Statement

QA

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Section 1 – Executive Summary

This Energy Statement addresses the planning requirements of Barnsley Metropolitan Borough Council, as set out in Barnsley's Local Plan, adopted in January 2019.

This report relates to the proposed housing development for the Land South of Darton Lane, in Darton, Staincross.

This Energy Statement has been prepared to illustrate the environmental aspects of the proposed development and assess the options available for reducing energy consumption and associated CO₂ emissions in accordance with Barnsley 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 L1A. SAP calculations will be done as part of the detailed design to show compliance with the Part L1A requirements.

Passive measures, such as increasing the insulating and solar properties of the building fabric and the air tightness, will be considered to increase the energy efficiency of the building above Part L requirements of the Building Regulations.

In addition to the Passive design measures, Active Building Services are to be designed to minimise direct energy consumption and CO₂ emissions, with particular emphasis and consideration given to the following:

- Improved Boiler Efficiencies;
- Reduced Standing Losses from Pipes and Cylinders;
- Increased Hot Water Generating Efficiencies;
- Energy Efficient LED Lighting;
- Low Energy Motors in Pumps and Fans;
- Including on site renewable energy technology

Renewable and Low Carbon technologies will be considered and of the available solutions, it is recommended that the proposed development either connects into an existing district heating system or, more likely, utilises on site renewable power in the form of roof mounted solar photovoltaic panels.

An Energy Model will be produced during the next stage of development to calculate the exact requirements to achieve both Building Regulations compliance, and the requirements of the Barnsley Local Plan.

Section 2 – Introduction

Futureserv Ltd have been appointed to produce an Energy Statement to support the planning application for a proposed housing development on the Land South of Darton Lane, in Darton, Staincross. The proposed development shall consist of up to 73 dwellings with a range of sizes.

This Energy Statement addresses the planning requirements of Barnsley Metropolitan Borough Council as set out in the Local Plan, adopted in January 2019.

The strategy proposed for this development will include the use of on-site renewable energy sources, or connection to an existing district heating system, if one is available.

The strategy will be essentially based on the reduction of energy consumption by use of passive construction measures, active energy efficient equipment and decentralised low carbon energy generation.



Section 3 – Development Proposals

Futureserv Ltd have been appointed by Deloitte to produce an Energy Statement in support of a planning application for the construction of a new high quality housing development on the Land South of Darton Lane.

The development shall consist of up to 73 residential houses with a range of sizes and configurations.



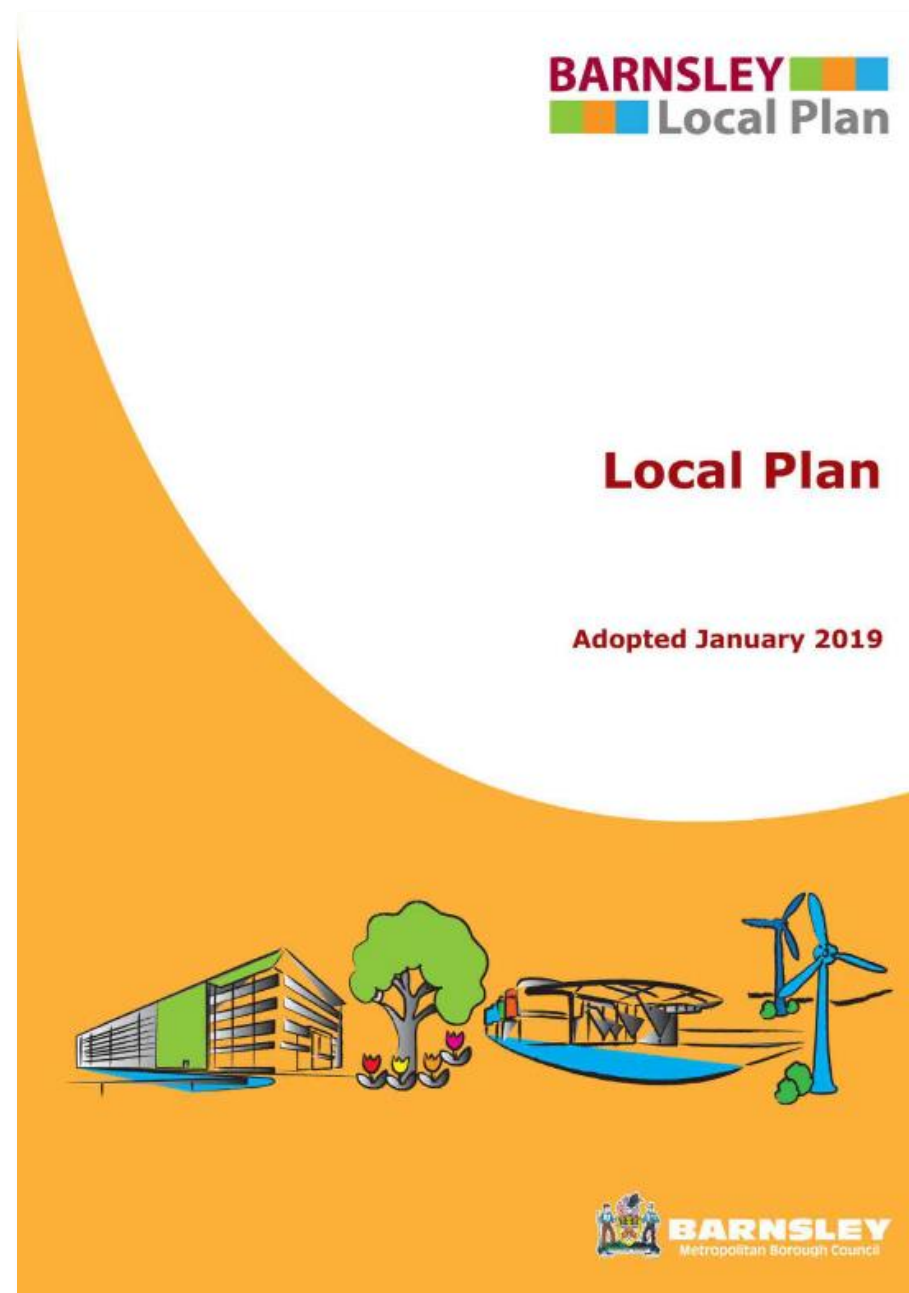
This Energy Statement has been prepared to illustrate the environmental aspects of the proposed development, highlighting the energy efficiency measures to be taken and assess the options available for reducing energy consumption and associated CO₂ emissions in accordance with Barnsley Metropolitan Borough Council's policies and guidelines.

Futureserv Consulting Engineers will collaborate with the design team in order to provide a holistic solution for the development that will contain more sustainable energy sources and efficient building services, reducing the environmental impact of the development, whilst providing comfortable living accommodation.

The site is situated between an existing housing area to the north, farmland to the south, and a primary school to the west, as shown in the images below.



Section 4 – Policy and 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:

Planning authorities should ensure that development plans contribute to global sustainability by addressing the causes and effects of climate change through policies which reduce energy use and emissions, promote development of renewable energy resources, and take climate change impacts into account in the location and design of development.

Local Policies

The proposed development is located on land south of Darton, Mapplewell, with the local policies adopted by Barnsley Metropolitan Borough Council outlined within the Barnsley Local Plan, adopted in January 2019.

Within this document, specific policies highlight the impacts of climate change and sustainable design and construction. These are as follows;

Policy CC1 Climate Change

We will seek to reduce the causes of and adapt to the future impacts of climate change by:

- Giving preference to development of previously developed land in sustainable locations;
- Promoting the reduction of greenhouse gas emissions through sustainable design and construction techniques;
- Locating and designing development to reduce the risk of flooding;
- Promoting the use of Sustainable Drainage Systems (SuDS);

- Promoting and supporting the delivery of renewable and low carbon energy; and
- Promoting investment in Green Infrastructure to promote and encourage biodiversity gain.

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

19.3 Development proposals will be expected to consider energy efficiency and sustainable design from the outset and will be required to include details of their sustainability within their Design and Access Statement.

19.4 For housing development energy efficiency is regulated by Building Regulations. We will encourage energy efficiency that exceeds those minimum standards set out in national standards and take that into account where proposed in support of a planning application.

19.6 We will encourage and plan for sustainable decentralised zero or low carbon energy generation, such as biomass-fuelled district heating or combined heat and power (CHP) schemes. Where a heat network is not available or viable, a contribution ensuring connection to a future district heating scheme is required on suitable developments. Developments not connected and unsuitable for future connection to a heat network will rely on energy generated from renewables, like solar panels, photovoltaics and heat pumps.

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 and should at least achieve the appropriate carbon compliance targets as defined in the Building Regulations.

We will allow development that produces renewable energy as long as there is no material harm upon:

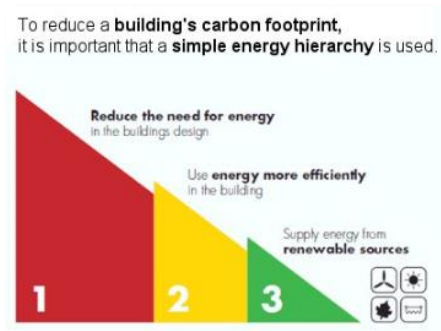
- The character of the landscape and appearance of the area;
- Living conditions;
- Biodiversity, Geodiversity and water quality;
- Heritage assets, their settings and cultural features and areas;
- Key views of, from or to scenic landmarks or landscape features;
- Highway safety, or
- Infrastructure including radar.

In assessing effect, we will consider appropriate mitigation which would reduce harm to an acceptable level.

Proposals will be expected to include information regarding their efficiency.

Proposal must be accompanied by information that shows how the local environment will be protected, and that the site will be restored when production ends.

20.3 Taking into account the energy hierarchy, new buildings and conversions should in the first instance be designed and constructed to be energy efficient in particular through using the principles of passive design, including high insulation levels, solar heating, natural lighting and ventilation, thermal mass and passive cooling. Thereafter, decentralised, renewable or low carbon energy sources should be considered for use in order to reduce carbon dioxide emissions.



20.4 The domestic and industrial sectors are responsible for a majority of Barnsley's total emissions and this policy aims to create a framework that promotes and encourages a reduction in emissions.

20.5 Proposals for development that produces renewable energy will be assessed against this policy. Such developments can include wind turbines, biomass heating systems, roof mounted wind turbines, photovoltaic cell, ground source heating and cooling systems and hydroelectric power. The policy does not apply to wind turbines, which will be considered against government policy as set out in the written ministerial statement of 18 June 2015 and clarified in Planning Practice Guidance. Given Barnsley's coal mining history, the potential for water at or near to the surface of flooded redundant mineworkings may form a sustainable local means to power ground source heat pumps. We encourage consideration of the use of this technology in commercial properties and in the future, as technology advances, in domestic properties.

20.6 We will support proposals for renewable energy unless there are significant harmful effects which cannot be prevented or mitigated. Proposals should be accompanied by information setting out the effects of the proposal and any proposals to reduce or mitigate the effect. We will refuse planning permission for proposals that are not accompanied by enough supporting information.

20.7 The Council's energy strategy 2015-2025 sets out the low carbon goals for the borough. The wider use of renewable energy is a key component of the strategy which contains an ambition for 20% of the energy consumed by the borough to be derived from renewable sources by 2025.

20.8 In addition our Housing Strategy 2014-2033 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'.

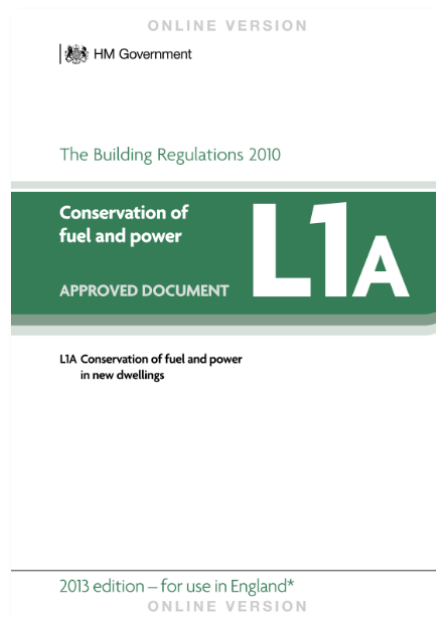
20.9 Inevitably some proposals for renewable energy will have significant effects on the local area. For example, large scale renewable energy

developments will be prominent in the landscape. In these cases we will carefully weigh up the environmental, social and economic benefits of the proposals against effects on the local area including any effects on the National Park, the Green Belt and European Natura 2000 designations (presently the South Pennines Moors Special Area for Conservation and Special Protection Area which abut the borough's western boundary).

20.10 It is important to assess the efficiency of devices, particularly large scale installations such as wind turbines, in order to balance the benefits and impacts.

Building Regulations Part L1A (2013)

The proposed development will be designed to comply with the Building regulations approved document Part L1A, 2013 edition. This approved document came into effect from 6th April 2014.



The main changes in this approved document from the previous revision are that:

- A new requirement has been introduced that requires new dwellings to achieve or better a fabric energy efficiency target in addition to the carbon dioxide target.
- The notional dwelling used to determine carbon dioxide and fabric energy efficiency targets is the same size and shape as the actual dwelling, constructed to a concurrent specification. The Part L 2013 specifications have been strengthened to deliver 9 per cent carbon dioxide savings relative to part L 2010.

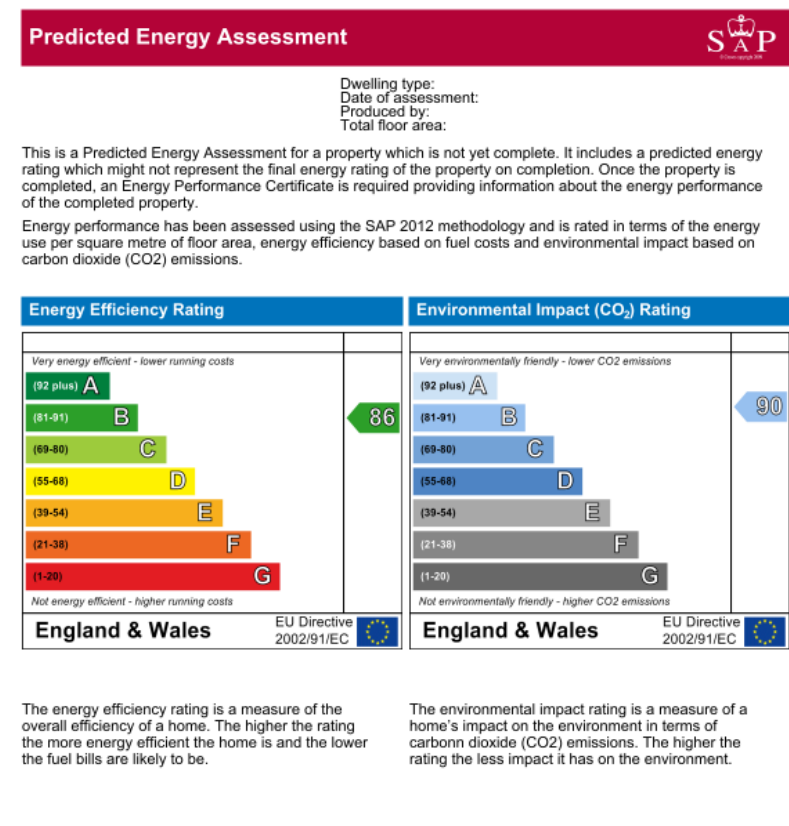
Section 5 – Energy Strategy

5.1 Baseline Energy Assessment

Futureserv Consultant Engineers will conduct analysis on all dwellings during the next stage of the development, to show compliance with the Building Regulations Part L1A:2013 therefore setting a reference baseline. This will be carried out in order to understand the development's Carbon emissions without any Carbon Emission mitigation measures.

The government's method for calculating the energy aspects of a dwelling is the Standard Assessment Procedure (SAP) calculation will be used to assess compliance against Part L1A. The baseline model has been created to provide Target Emission rates (TER). The SAP calculations then in turn produce Dwelling Emission rates (DER) which are equal to or lower than that of the TER.

SAP is a measure of fuel costs for heating, hot water and lighting for a dwelling generated by the SAP engine within the software. An example output for this is shown opposite.



5.2 Passive Design Improvements

On the completion of the model and establishment of the Target Emission rates (TER), the dwelling emissions will be reduced through judicious passive design. This will involve an assessment of non-energy consuming design decisions to create a fabric first approach to energy efficiency. This is through;

- Improved air permeability performance
- Better thermal insulation

Passive fabric measures across all buildings include improvements to the thermal performance and air tightness above Part L requirements of the Building Regulations. This effectively allows the building envelope to attenuate external conditions without recourse to active Building Services.

The table to the right presents the minimum material properties as defined in the Building Regulations Part L1A:2013. The new housing development will aim to better these in all aspects. The airtightness for the new houses will be expected to better the figure quoted in the table opposite and this will also decrease the heat losses and consequently, energy demands of the building.

Table 2 Limiting fabric parameters

Roof	0.20 W/(m ² ·K)
Wall	0.30 W/(m ² ·K)
Floor	0.25 W/(m ² ·K)
Party wall	0.20 W/(m ² ·K)
Swimming pool basin ¹	0.25 W/(m ² ·K)
Windows, roof windows, glazed roof-lights ² , curtain walling and pedestrian doors	2.00 W/(m ² ·K)
Air permeability	10.0 m ³ /(h·m ²) at 50 Pa

5.3 Energy Efficiency Improvements

In addition to the Passive design measures described in the preceding Section to improve the building envelope performance, the Active Building Services are to be designed to minimise direct energy consumption and CO₂ emissions, with particular emphasis on the following;

- Improved Boiler Efficiencies;
- Reduced Standing Losses from Pipes and Cylinders;
- Increased Hot Water Generating Efficiencies;
- Energy Efficient LED Lighting;
- Low Energy Motors in Pumps and Fans;

It is proposed for the development to utilise the latest in energy efficient gas boilers, which can now achieve efficiencies of over 90%. Hot water generation will also achieve similar efficiencies. Any hot water cylinders necessary will be insulated to a high standard, and standing heat losses from these will be very minimal. All pipework services will also be insulated to similar high standards.

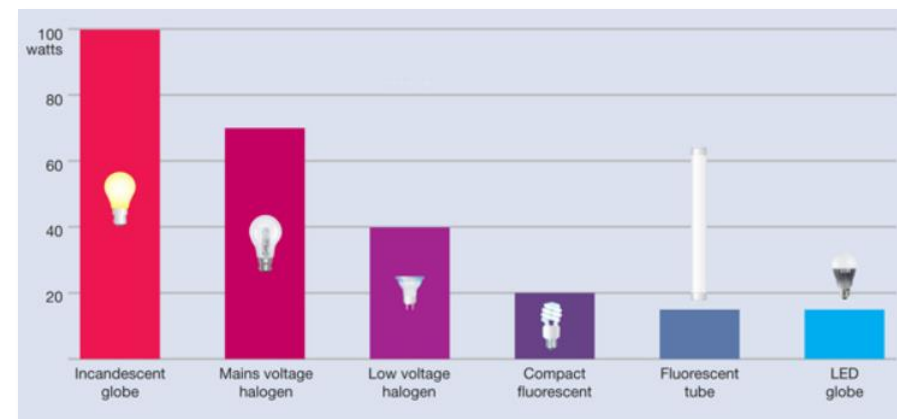
Dwellings will be provided with sophisticated, but simple to use, timer and temperature based control for the heating systems. This will prevent wasted energy by overheating or heating when houses are not occupied.

Local extract ventilation will be provided where required, namely bathrooms and kitchens. These will be complete with timer facilities, to allow an overrun to sufficiently extract odours/moisture from the areas, but to not run continuously and unnecessarily remove heat from the building.

All dwellings will make use of 100% low energy lighting provision. LED lighting is over 5 times more efficient than older methods of lighting and should also need less frequent replacement bulbs. This makes it an all round improvement in both energy and cost saving.

All fans, motors and pumps shall be specified to incorporate ECA accredited technology and appropriate controls.

SEDBUK Rating Guide



5.4 Renewable Energy Improvements

In order to comply with the Barnsley Local Plan, there is an ambition that 15% of the energy used by a new build development should be from renewable sources. There is also an ambition for 20% of the energy used in the borough to be from renewable sources by 2025.

To achieve these ambitions for this new housing development, some of the renewable energy will be the electricity from the grid. Depending on the proportion of renewable sources in the electricity grid at the time of construction, it is an ambition of this development to include some on site renewable energy sources.

All currently acknowledged and commercially available technologies have been considered and assessed with the conclusions summarised below;

Combined Heat and Power (CHP)

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 CHP tends to require a steady and continuous heat demand therefore the fluctuating and often very low demands for a housing development of this type would not be the most suitable.

Connection to a CHP would satisfy clause 19.6 from the Barnsley Local Plan. However, as well as the lack of suitability of a housing development for a CHP solution, there is also no available existing system to connect to in the vicinity.

Solar Thermal Collectors

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

The recent introduction of the renewable Heat Incentive may further improve the financial viability for the technology.



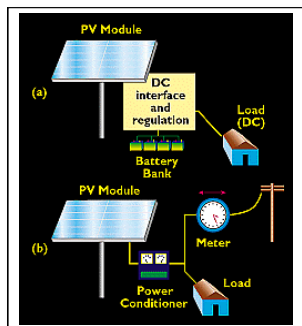
Example of Solar Thermal unit

However, although there is extensive roof space available, the complexity and cost of installation and ongoing maintenance makes this option unlikely to be viable for a development of this nature.

Solar Photovoltaic Panels

The option to utilise roof mounted or Building Integrated Photovoltaic panels to generate electrical energy is a renewable energy method of generating Carbon free electrical power.

This electricity generated can be used in the houses, when it is required, and there are government schemes in place for the grid to 'buy back' any excess electricity generated by Solar PV. The buy back schemes would need to be further assessed at the time of construction, but due to the relatively large roof area available in a housing development, it is a viable option.



PV System components

Solar Photovoltaic Panels may be an appropriate form of renewable/low carbon energy for a development of this type, and so, if required to achieve the ambitions of the Barnsley Local Plan at the reserved matters stage, provide an avenue for consideration.

Wind Turbines

Wind energy can be a cost effective method of renewable power generation and turbines can produce Carbon neutral electricity with outputs ranging from watts to megawatts.

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. Also taking into account the visual impact and unwanted noise in an environment with sleeping accommodation the use of wind turbines is discounted from inclusion at this development.

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.



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 and the likely yield, peak load demand and cost feasibility, we have discounted Ground Source Heat Pumps at this development in favour of better performing technologies.

Air Source Heat Pumps

Air source heat pumps provide an accepted solution for using renewable energy taken from ambient air to heat a building in the winter and discharge heat from cooling in the summer.



Typical External Condenser Unit

If air source heat pumps were to be used, it would add additional complexity and cost, both up front and long term maintenance. There will also be no requirement for cooling in a housing development of this nature, so for these reasons, air source heat pumps are unlikely to be considered at the present time.

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, and with a larger constant heat demand.

In addition, flue emissions and the requirements the Clean Air Act has led to a dismissal of this technology for this scheme.

Total Assessments

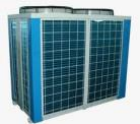
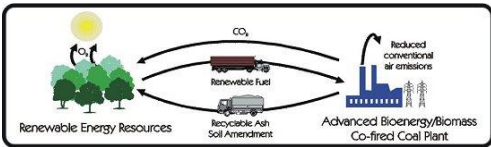
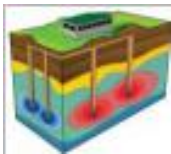
The central Building Services Systems will be likely to be supplemented by Renewable and/or Low Carbon technologies to further reduce the associated Carbon emissions and achieve the ambitions of the Barnsley Local Plan.

Of the available solutions considered, if on site renewable energy is required to meet the Barnsley Local Plan ambitions, it is recommended that the proposed scheme considers implementing the following renewable energy technology:

- Solar Photovoltaic Panels

The inclusion of renewable energy will not only help to achieve the ambitions set out by the Barnsley Local Plan, but also towards the governments long term aims to reduce carbon emissions, and combat climate change.

The inclusion of renewable or low carbon technology will be further addressed as part of the detailed design stage of the development.

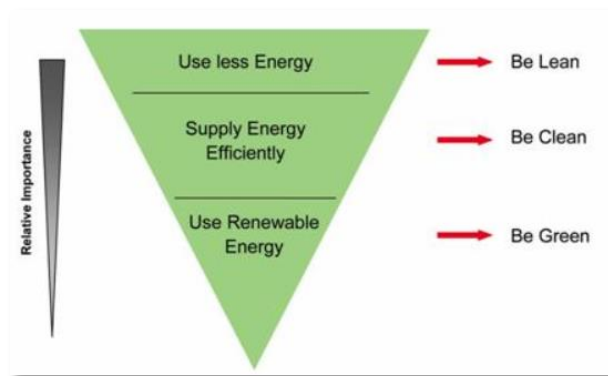
Renewable Technology	Image	Comments
Combined Heat and Power DISCOUNTED		The integration of Combined Heat and Power technology is a potential option, only if there is an existing system nearby that could be extended to serve the new development.
Solar Photovoltaic PREFERRED OPTION		The roof area on a housing development is fairly extensive, lending itself to this option. This would be the preferred option, if required to meet the renewable energy ambitions of the Barnsley Local Plan.
Air Source Heat Pumps DISCOUNTED		The use of Air Source Heat Pumps is discounted due to the additional complexity and cost involved in the installation and maintenance of these systems.
Solar Thermal DISCOUNTED		There is potential to include solar thermal collector panels located on individual roofs serving the domestic hot water systems. However, due to the complexity and cost involved in the installation and maintenance, there would be other viable options preferred before this one.
Biomass Boilers DISCOUNTED		Biomass boiler solutions have been discounted at this location due to potential clean air issues, and if a district heating system was utilised, CHP would be the preferred option.
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.
Ground Source Heat Pump DISCOUNTED		The inclusion of Ground Source Heat Pumps has been discounted within this development due to the conflict with the selected CHP technology, system cost viability and also the site constraints.

5.5 Energy Generation and Distribution Systems

The case for renewable energy systems is clear and it is understood that Barnsley Metropolitan Borough Council's current energy policy requires developments to make the fullest contribution to the mitigation of climate change, and to minimise Carbon Dioxide emissions.

As a consultant, Futureserv has an over-arching philosophy delivering design of truly sustainable energy systems, employing the widely recognised hierarchy;

- Be Lean - 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 overall detail of the design is yet to be decided at this stage, but it is likely that some on site renewables will be required to achieve the ambitions of 15% of the energy from renewable sources for a housing development, and 20% from renewable energy sources across the borough by 2025. The most likely source of this will be roof mounted solar photovoltaic panels, producing clean electricity for the houses, which can be sold back to the grid, depending on what government schemes are available for this at the time.

It is likely that each dwelling will have its own standalone heating and domestic hot water systems, fed from high efficiency gas powered combination boilers. Pipework and any hot water cylinders required will be insulated to a high standard to reduce energy wastage.

All plant and equipment would be equipped with energy control measures incorporating variable speed drives, with low energy motors provided on ventilation fans and hydraulic pumps. The lighting design will incorporate modern LED fittings.

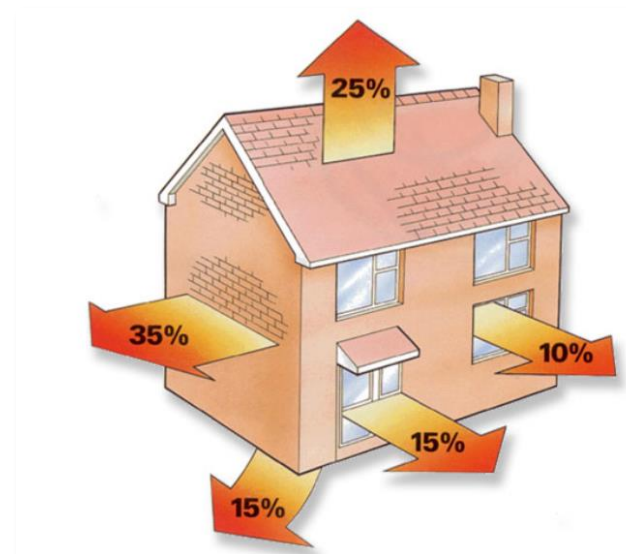
5.6 Energy Performance Calculations

To enable demonstration that the environmental benefits associated with our energy hierarchy approach to energy demand and emission reductions on the land south of Darton, approved SAP software will be used to generate energy demand calculations for all dwellings within the development.

There are a number of different building configurations proposed for the site, with a multitude of orientations. This will produce a different energy profile for each dwelling, and the detail of this will determine what passive and active efficiency measures will be required to comply with the requirements of the Barnsley Local Plan and the approved document Part L1A.

At this stage of the development, an assessment cannot yet be made until the detail of the development is designed.

A comparison will be made between the Target Emission Rates and Dwelling Emission Rates (Kg CO₂/m²/annum) and Target Fabric Energy Efficiency and Dwelling Fabric Energy Efficiency (Kwh/m²/annum).



Section 6 - Conclusions

This energy statement has summarised the energy hierarchy requirements for the land south of Darton, Mapplewell, to respond to emission reduction targets set out within the Barnsley Local Plan policies CC1, CC2 and RE1.

The proposed development will incorporate passive energy techniques available in the construction industry to reduce its ongoing requirement to consume energy to heat, ventilate and light the building, this is achieved by improved efficient fabric design in excess of the thermal properties set out within the Building Regulations.

The proposed development will incorporate energy efficiency measures in its Building Services to reduce the carbon footprint of the site below the passive improvement stage, using highly efficient and controllable heat generation plant, and energy efficient lighting.

The proposed development will consider making use of renewable and Low Carbon energy techniques, if these are required to meet the ambitions of the Local Plan. Solar photovoltaic panels mounted on the house roofs are the preferred option.

Overall, the Carbon emissions from the proposed development will be lower than what is required by the approved document Part L1A, with an ambition to include on site renewable energy, and an increase on the values required for building fabric insulating properties.