Energy Statement

Land West of White Post Road
Banbury

CHAPTER 1 – INTRODUCTION

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1. INTRODUCTION

1.1 Introduction

1.1.1 This Energy Statement relates to the proposed development at Land West of White Post Road, Banbury which is to comprise of up to 280 dwellings.

1.1.2 The development is located in an area under the control of Cherwell District Council. This report addresses policies relevant to the energy strategy as set out in National and Local policy.

1.1.3 This report also provides detail on the proposed approach to meet specific targets relating to those policies, Building Regulations and energy use on site.

2. PLANNING POLICY

The sustainability strategy for the proposed development at Banbury has been developed in line with the following relevant planning policy.

2.1 National Policy

2.1.1 The National Planning Policy Framework (NPPF), issued on 27th March 2012 has a section regarding sustainability in relation to energy and water consumption;

- **Section 10: Meeting the challenge of climate change, flooding and coastal change** places emphasis on, and sets out guidelines for local planning authorities, for local mitigation and adaptation measures for current and future climate change and for the support of the delivery of renewable and low carbon energy and associated infrastructure where viable.

2.2 Local Policy

2.2.1 The existing policies that need to be considered are as follows:

- **Policy ESD 1 - Mitigating and Adapting to Climate Change** - Measures will be taken to mitigate the impact of development within the district on climate change. At a strategic level, this will include:
- Distributing growth to the most sustainable locations as defined in this Local Plan
- Delivering development that seeks to reduce the need to travel and which encourages sustainable travel options including walking, cycling and public transport to reduce dependence on private cars
- Designing developments to reduce carbon emissions and use resources more efficiently, including water (see Policy ESD 3 Sustainable Construction)
- Promoting the use of decentralised and renewable or low carbon energy where appropriate. (see Policies ESD 4 Decentralised Energy Systems and ESD 5 Renewable Energy)
- The incorporation of suitable adaptation measures in new development to ensure that development is more resilient to climate change impacts will include consideration of the following:
- Taking into account the known physical and environmental constraints when identifying locations for development.

- Considering Demonstration of design approaches that are resilient to climate change impacts including the use of passive solar design for heating and cooling
- Minimising the risk of flooding and making use of sustainable drainage methods, and
- Reducing the effects of development on the microclimate (through the provision of green infrastructure including open space and water, planting, and green roofs).
- Adaptation through design approaches will be considered in more locally specific detail in the Sustainable Buildings in Cherwell Supplementary Planning Document (SPD).

- **Policy ESD 2: Energy Hierarchy and Allowable Solutions -** In seeking to achieve carbon emissions reductions, we will promote an 'energy hierarchy' as follows:
- Reducing energy use, in particular by the use of sustainable design and construction measures;
- Supplying energy efficiently and giving priority to decentralised energy supply;
- Making use of renewable energy;
- Making use of allowable solutions

- **Policy ESD 3: Sustainable Construction -** All new residential development will be expected to incorporate sustainable design and construction technology to achieve zero carbon development through a combination of fabric energy efficiency, carbon compliance and allowable solutions in line with Government policy.
- Cherwell District is in an area of water stress and as such the Council will seek a higher level of water efficiency than required in the Building Regulations, with developments achieving a limit of 110 litres/person/day.
- All new non-residential development will be expected to meet at least BREEAM ‘Very Good’ with immediate effect, subject to review over the plan period to ensure the target remains relevant. The demonstration of the achievement of this standard should be set out in the Energy Statement.
- The strategic site allocations identified in this Local Plan are expected to reflect exemplary contributions to carbon emissions reductions and to

wider sustainability.

- All development proposals will be encouraged to reflect high quality design and high environmental standards, demonstrating sustainable construction methods including but not limited to:
- Minimising both energy demands and energy loss
- Maximising passive solar lighting and natural ventilation
- Maximising resource efficiency
- Incorporating the use of recycled and energy efficient materials
- Incorporating the use of locally sourced building materials
- Reducing waste and pollution and making adequate provision for the recycling of waste
- Making use of sustainable drainage methods
- Reducing the impact on the external environment and maximising opportunities for cooling and shading (by the provision of open space and water, planting, and green roofs, for example); and
- Making use of the embodied energy within buildings wherever possible and re-using materials where proposals involve demolition or redevelopment.
- Should the promoters of development consider that individual proposals would be unviable with the above requirements, 'open-book' financial analysis of proposed developments will be expected so that an in house economic viability assessment can be undertaken. Where it is agreed that an external economic viability assessment is required, the cost shall be met by the promoter.

- **Policy ESD 4: Decentralised Energy Systems -** The use of decentralised energy systems, providing either heating (District Heating (DH)) or heating and power (Combined Heat and Power (CHP)) will be encouraged in all new developments.A feasibility assessment for DH/CHP, including consideration of biomass fuelled CHP, will be required for:
- All residential developments for 100 dwellings or more
- All residential developments in off-gas areas for 50 dwellings or more
- All applications for non-domestic developments above 1000m2 floorspace
- The feasibility assessment should be informed by the renewable energy map at Appendix 5 'Maps' and the national mapping of heat demand densities undertaken by the Department for Energy and Climate Change

(DECC) (see Appendix 3: Evidence Base).

- Where feasibility assessments demonstrate that decentralised energy systems are deliverable and viable, such systems will be required as part of the development unless an alternative solution would deliver the same or increased benefit.

- **Policy ESD 5: Renewable Energy** - The Council supports renewable and low carbon energy provision wherever any adverse impacts can be addressed satisfactorily. The potential local environmental, economic and community benefits of renewable energy schemes will be a material consideration in determining planning applications.

  Planning applications involving renewable energy development will be encouraged provided that there is no unacceptable adverse impact, including cumulative impact, on the following issues, which are considered to be of particular local significance in Cherwell:

- Landscape and biodiversity including designations, protected habitats and species, and Conservation Target Areas
- Visual impacts on local landscapes
- The historic environment including designated and non-designated assets and their settings
- The Green Belt, particularly visual impacts on openness
- Aviation activities
- Highways and access issues, and
- Residential amenity.
- A feasibility assessment of the potential for significant on site renewable energy provision (above any provision required to meet national building standards) will be required for:
- All residential developments for 100 dwellings or more
- All residential developments in off-gas areas for 50 dwellings or more
- All applications for non-domestic developments above 1000m2 floorspace
- Where feasibility assessments demonstrate that on site renewable energy provision is deliverable and viable, this will be required as part of the development unless an alternative solution would deliver the same or increased benefit. This may include consideration of ‘allowable solutions’ as Government Policy evolves.

2.3 Building Regulations

2.3.1 Building Regulation Part L 2013 Edition, Conservation of Fuel and Power, came into force on the 6th April 2014 in England with the next step forward to Zero Carbon in new buildings. New dwellings need to improve by a further 6% reduction in CO_2 emissions over the 2010 Target Emission Rate (TER). In addition, dwellings will have to meet a second mandatory target under Fabric Energy Efficiency Standard (FEES). FEES will give a value in terms of mass of CO_2 emitted per square metre of floor area per year. FEES have been included as a mechanism to ensure "fabric first" efficiencies are built into the main envelope of a dwelling.

2.4 Conclusions

2.4.1 Following consideration of the National and Local policies that relate to the proposed scheme, the targets for the development at Banbury are;

- Designing the development to reduce carbon emissions and use resources more efficiently, including water, by the incorporation of suitable adaptation measures in new development to ensure that the development is more resilient to climate change impacts. This will be done comprehensively at the detailed design stage.
- To use the Energy Hierarchy within the detailed design to reduce the amount of energy consumption on site.
- The developers will look to incorporate renewable energy technologies and sustainable construction methods on site to reduce the amount of carbon emissions in line with the current regulations. It is noteworthy that the latest update on Government Policy is the Government Productivity Plan issued on 10th July 2015, Chapter 9 "Planning freedoms and more houses to buy" states
    - *The Govt will "repeat its successful target from the previous Parliament to reduce net regulation on housebuilders. The government does not intend to proceed with the zero carbon Allowable Solutions carbon offsetting scheme, or the proposed 2016 increase in on-site energy efficiency standards, but will keep energy efficiency standards under review, recognising that existing measures to increase energy efficiency of new buildings should be allowed time to become established"*

- Meeting Building Regulations Part L 2013
- Consider the options available to reduce water consumption to the target level of 110 litres/person/day. This would include installation of low use water fittings, grey water recycling systems and rainwater collection.

3. ENERGY STRATEGY

3.1 Proposal

3.1.1 Essentially the proposed scheme will follow the latest guidance to reduce CO_2 emissions by providing a “fabric first” approach. The following techniques will be considered;

- Increase insulation
- Reduce the effects of thermal bridging
- Effective air tightness
- Improved controlled ventilation

3.1.2 As per the Energy Savings Trust Guide “Fabric First”, October 2010, these methods alone can achieve the target 25% reduction in CO_2 emissions as required for Regulations Part L 2010.

3.1.3 To achieve the additional 6% reduction in CO_2 emissions to meet the 2013 Part L Regulations there may be a need for additional on-site renewable or low carbon technology

3.2 Fabric First Techniques

3.2.1 To achieve a reduction in CO_2 emissions the following techniques will be used, however, the total reduction in CO_2 emissions that will be possible cannot be calculated until detailed design stage.

3.3 Walls

3.3.1 Enhanced U Values to be achieved by increasing the size of the cavity walls and increasing the insulation thickness.

3.4 Roof

3.4.1 Enhanced U Values to be achieved through increasing the thickness of the insulation.

3.5 Floors

3.5.1 Installation of high performance insulated ground floors will provide enhanced U values.

3.6 Windows & Doors

3.6.1 Utilisation of high performance glazing will provide improved U values.

3.7 Thermal Bridging

3.7.1 By employing enhanced construction details heat losses can be reduced.

3.8 Air Tightness

3.8.1 By following Passivehouse principles air leakage rates can be significantly improved.

3.9 Ventilation

3.9.1 With excellent air tightness principles used appropriate ventilation will be installed in line with Building Regulations.

3.10 Energy Demand & Additional CO_2 Reduction

3.10.1 The most cost effective solution is always specific to the development in question, i.e. the energy profile of what is being built and its location. At the outline design stage there is not enough design information available (i.e. dimensions, layout, orientation, fabric type etc) to precisely predict the baseline energy demand for the dwellings and therefore the CO_2 emissions. It is therefore proposed that this element is determined at detailed design stage. This can be secured via condition.

3.10.2 The final strategy for the site will be based on a combination of fabric first techniques and the installation of renewable energy technologies and will be required to be amended slightly to suit individual building design. This would involve the inclusion or exclusion of energy efficient measures, or an

increased or decreased capacity of renewable energy technologies, as applicable.

3.11 Low and zero carbon technologies - Domestic Properties

3.11.1 This section reviews the feasibility of a range of Low and Zero Carbon (LZC) technologies that could be used to achieve a reduction in CO_2 emissions'.

3.11.2 The LZC technologies that could be considered for use at Banbury are:

- Photovoltaics
- Solar thermal panels
- Ground & air source heat pumps
- Biomass Boiler

3.11.3 This development would not be suitable for a Combined Heat and Power (CHP) plant. This type of technology is best suited to developments which have a high and constant demand for thermal energy allowing the CHP engines to operate at maximum efficiency for as long as possible throughout the year. Ideal situations include mixed development sites with over 400 domestic dwellings and those including leisure centres with swimming pools, hospitals or hotels.

3.11.4 Small scale, roof mounted turbines are not proposed for a number of reasons. The visual impact of up to 280 turbines across the development would be significant and unlikely to be acceptable. More significantly, studies by independent bodies such as Energy Saving Trust have shown that these turbines are not effective in generating power.

3.11.5 An alternative solution could be the installation of a single, medium to large scale turbine. Wind speed from the DTI Wind Speed Database (www.berr.gov.uk) for the site indicates an average wind speed at 45m above ground level of 6m/s. For this type of technology to be effective, an average wind speed of at least 6.0m/s is required. It would therefore appear to be a possible solution, however, a suitable location for a wind turbine would need to be found on site, so it is proposed that the energy targets for these domestic properties be met through the use of other technology. This could be investigated further at detailed design stage by the developer.

3.12 Photovoltaics

3.13.1 Photovoltaic (PV) panels use sunlight to produce electricity; the cells convert the sunlight into electricity which can be used to run household appliances and lighting. PV cells do not need direct sunlight to work and some electricity will be generated on a cloudy day.

3.12.2 Historically a hindrance to the use of PV was the cost. Although it is still relatively expensive to install panels initially, this has been helped with the introduction of the Feed in Tariff (FiT) which provides a payment to building owners for the generation of renewable electricity where applicable. Although the level of FiT payments has recently been reduced it may still prove to be a financially viable option for this scheme.

3.12.3 Further advantages of PV systems are in their low maintenance requirements and reliability.

3.12.4 Full modelling of the Banbury scheme can only be completed at detailed design stage, but this type of technology would be suitable to assist in reducing the CO_2 emissions across the site and producing renewable energy.

3.13 Solar Thermal

3.13.1 An alternative use of solar energy would be the installation of solar thermal panels for the generation of hot water; solar water heating systems use heat from the sun to warm domestic hot water. A conventional boiler or immersion heater is then used to make the water hotter or to provide hot water when solar energy is unavailable. Solar thermal panels are a tried and tested technology that offers good paybacks. However for optimum performance they need to be located on roofs with an orientation of ±40° of south.

3.13.2 Again full modelling of the Banbury scheme can only be completed at detailed design stage and the practicalities of this proposal would need to be

reviewed given the number of systems required and the orientation of the houses.

3.13.3 The downside of this technology is that their contribution to carbon reduction can be less than other LZC technologies as they negate a gas demand instead of an electrical one (The carbon emissions from gas are approximately 3 times lower than those associated with electricity).

3.14 Ground Source heat pumps

3.14.1 Ground source heat pumps (GSHP) circulate a mixture of water and antifreeze around a loop of a pipe which is buried externally. Heat from the ground is absorbed into this fluid and is pumped through a heat exchanger in the heat pump. Low grade heat passes through the heat pump compressor and is concentrated into a higher temperature; this useful heat is capable of heating water for the heating and hot water circuits of the house. However the pumps do use electricity to distribute this heat around the home; therefore they can result in higher carbon emissions than the use of gas heating in an efficiently designed home.

3.15 Air Source Heat Pumps

3.15.1 Air source heat pumps reclaim the heat available in ambient air and convert it to higher temperatures to heat the home. As with ground source heat pumps, they use electricity to distribute heat. Air source systems do not require ground works and are therefore less costly than ground source systems; however this also means they are less efficient as the temperature of the air varies significantly more than the temperature of the ground throughout the year. Although this system is an efficient way of providing heating and hot water using electricity, the carbon emissions will still be significantly higher than if gas were used.

3.15.2 The Energy Saving Trust does not recommend heat pumps for properties supplied by an existing gas network. Given that the Banbury scheme can be fed by a connection to a mains gas network, and due to the availability of less costly options, at this stage it is not proposed that heat pumps are

used at this development. The developers may reconsider this option at the detailed design phase of the project.

3.16 Biomass Boilers

3.16.1 Biomass fueled heating systems generally burn wood pellets, chips or logs to power central heating and hot water boilers or to provide warmth in a single room. Other fuel types are available but the energy density of wood chips or pellets means it is typically the most appropriate solution for applications within the built environment. Although savings on carbon emissions are significant, other implications need to be considered, especially the requirement for regular deliveries of fuel which would result in unacceptable volumes of traffic around the site. Also for most urban UK dwellings built with a high thermal performance level, the output of even the smallest high performance boiler on the market (5-10kW) is completely excessive, making both the capital costs and ongoing running costs uneconomic.

3.16.2 An alternative approach would be the provision of a centralised boiler system with a district heating system, linked to each home via a network of underground pipework providing space and water heating. However similar disadvantages with regard to traffic requirements would need to be considered together with on site plant and storage capacity and location, and issues relating to ownership and stewardship of a communal system.

3.16.3 Given that the other technologies present fewer operational, environmental and practical concerns, the use of biomass heating has not been considered further. However, the developers may reconsider this option at the detailed design phase of the project.

3.17 Summary of LZC Feasibility for Domestic Properties

3.17.1 At this stage of the design process it is not possible to determine the energy demand for the site and therefore the CO_2 emissions level for the proposed development or the amount of renewable energy generation technology that may need to be installed. However, consideration has been given to the options available to the developer that will be investigated further at detailed

design stage to meet the required CO_2 emissions and renewable energy generation targets.

3.17.2 The most suitable at this stage would appear to be the installation of some solar photovoltaic systems within the development. However, there may be a considerable cost implication which would need to be reviewed at detailed design stage together with a review of the Feed in Tariff levels available at the time of the development.

3.17.3 Alternatively, installation of solar thermal panels could potentially be a more cost effective option but the practicalities of this proposal would need to be reviewed at detailed design stage with an assessment of the orientation of the properties and the level of CO_2 emissions reduction and renewable energy generation required.

3.17.4 The developer could also consider a combination of technologies that will best suit the development and meet the CO_2 reduction targets.

4. CONCLUSIONS

4.1 The proposed development is for up to 280 dwellings at Banbury. This report has addressed National and Local policies relevant to the energy strategy for the proposed development.

4.2 The proposed strategy is based on an improvement in standard energy efficiency to meet Part L of the Building Regulations 2013. Full details of how the scheme will fully achieve any Part L Building Regulation targets can only be confirmed at detailed design stage but will encompass a 'Fabric First' approach and will include the following;

- Increase insulation
- Reduce the effects of thermal bridging
- Effective air tightness
- Improved controlled ventilation
- Energy efficient lighting

4.3 Additional renewable energy generation technology may need to be installed within the development to achieve the required CO_2 emissions targets. This can only be developed in more detail as further design, phasing and layout information becomes available.

4.4 The developer would also consider the options available to reduce water consumption to the target level of 110 litres/person/day. This would include installation of low use water fittings, grey water recycling systems and rainwater collection.

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