

Sustainable Construction
&
Energy Statement
Land off Dukes Park
Woodbridge



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CONTENTS

1	INTRODUCTION.....	5
1.1	Introduction	5
2	PLANNING POLICY	6
2.1	Background.....	6
2.2	National Policy	6
2.3	Local Policy	6
2.4	Building Regulations	7
2.5	Conclusions	7
3	ENERGY STRATEGY	8
3.1	Proposals	8
3.2	Fabric First Techniques.....	8
3.3	Walls	8
3.4	Roof	8
3.5	Floors	8
3.6	Windows & Doors.....	8
3.7	Thermal Bridging	9
3.8	Air Tightness	9
3.9	Ventilation	9
3.10	Energy Demand, Additional CO ₂ Reduction & On Site Energy Generation.....	9
3.11	Low and zero carbon technologies	9
3.12	Photovoltaics	10
3.13	Solar Thermal.....	10
3.14	Ground Source Heat Pump	11
3.15	Air Source Heat Pump	11
3.16	Biomass Boilers	11
3.17	Summary of LZC Feasibility.....	12
4	CONCLUSIONS	13

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1 INTRODUCTION

1.1 Introduction

- 1.1.1 This Sustainable Construction and Energy Statement relates to the proposed development on land off Dukes Park, Woodbridge which is to comprise of up to 215 dwellings and a convenience store.
- 1.1.2 The development is subject to the planning requirements of Suffolk Coastal District Council. This report addresses policies relevant to the energy strategy as set out in National and Local policy. All information relating to the new utility supplies for the proposed development are covered within the Utilities Statement.
- 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

2.1 Background

- 2.1.1 The strategy for the proposed development at Woodbridge has been developed in line with the following relevant planning policy.

2.2 National Policy

- 2.2.1 The National Planning Policy Framework, achieving sustainable development, 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.

- 2.2.2 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"

2.3 Local Policy

- 2.3.1 Development Management Policy DM24 states that the council expects all new developments to use energy, water, minerals, materials and other natural resources appropriately, efficiently and with care in order to reduce emissions linked to changes to the climate and take into account the effects of climate change. It also states that residential developments should achieve Code for Sustainable Homes once successive updates of Part L to the Building Regulations have come into force.

- 2.3.2 Following the publication of the Written Ministerial Statement in March 2015, setting out the conclusion of the Housing Standards Review, the Government has elected to remove the Code for Sustainable Homes from October 2015 and incorporate new additional optional Building Regulations on water and access, and a new national space standard. It is therefore proposed that the scheme at Woodbridge will achieve the most current Building Regulation Part L requirements at the time of site registration.

- 2.3.3 Consideration has also been given to the details included within the Suffolk Coastal Renewable & Low Carbon Technical Study (2010) which reviewed the potential low carbon technologies available to developers together with offering advice on policy setting in line with the guidance at the time.

2.4 Building Regulations

- 2.4.1 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 CO₂ 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 CO₂ 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.

2.5 Conclusions

- 2.5.1 Following consideration of the National and Local policies that relate to the proposed scheme, the targets for the development at Woodbridge are;
- Meet Building Regulations Part L 2013
 - Consider potential options for low and zero carbon technologies that could reduce the predicted onsite CO₂ emissions in line with Part L regulations 2013.

3 ENERGY STRATEGY

3.1 Proposals

3.1.1 Essentially the proposed scheme will follow the latest guidance to reduce CO₂ emissions by providing a “fabric first” approach. The following techniques will be considered;

- Increase insulation
- Reduce the effects of thermal bridging
- Effective air tightness
- Mechanical controlled ventilation with the consideration to heat recovery input 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 CO₂ emissions as required for Regulations Part L 2010.

3.1.3 To achieve the additional 6% reduction in CO₂ emissions to meet the 2013 Part L Regulations further improvements in fabric first insulation performances, window and door U values, and increased air tightness can achieve this requirement, however there may also be a consideration for on-site renewable or low carbon technology as an alternative approach.

3.2 Fabric First Techniques

3.2.1 To achieve a reduction in CO₂ emissions the following techniques will be used, however, the total reduction in CO₂ 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, or alternatively through the use of timber framed construction with the use of high levels of insulation with the timber studwork.

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 Passive house principles air leakage rates can be significantly improved.

3.9 Ventilation

- 3.9.1 With excellent air tightness principles used appropriate ventilation will need to be installed in line with Building Regulations to provide fresh tempered air.

3.10 Energy Demand & Additional CO₂ Reduction

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 CO₂ emissions. It is therefore proposed that this element is determined at detailed design stage.

- 3.10.1 The final strategy for the site may well 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

- 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 CO₂ emissions' and on-site energy generation.

- 3.11.2 The LZC technologies that could be considered for use at Woodbridge 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 215 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 at domestic scale.
- 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 for the site indicates an average wind speed at 10m above ground level of 4.7m/s. This would realistically be the height for domestic scale turbines and for this type of technology to be effective, an average wind speed of at least 6.0m/s is required. It would not therefore appear to be a possible solution. For this to be a viable option a location for a larger scale turbine would need to be identified so at this stage it is proposed that the energy targets for these domestic properties be met through the use of less intrusive technology.

3.12 Photovoltaics

- 3.12.1 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 don't 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 Woodbridge scheme can only be completed at detailed design stage, but this type of technology would be suitable to assist in reducing the CO₂ emissions across the site.

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 $\pm 40^\circ$ of south.
- 3.13.2 Again full modelling of the Woodbridge 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 Pump

- 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.
- 3.14.2 In addition, although relatively low, the density of the proposed layout is unlikely to allow for pipework to be laid in trenches, and would require the more costly approach of using boreholes. Feasibility work would be required to determine whether the site is suitable for the use of the boreholes, and whether the ground conditions would be adversely affected by the number of boreholes required.

3.15 Air Source Heat Pump

- 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 Woodbridge 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 fuelled 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

- 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 amount of renewable energy generation technology that may need to be installed to reduce the CO₂ emissions. 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 CO₂ emissions 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 energy generation required.
- 3.17.4 There is the potential to install a wind turbine on the site, but a full viability study would need to be undertaken to find a suitable location and assess the costs involved.

4 CONCLUSIONS

- 4.1.1 The proposed development is for up to 215 dwellings and a convenience store on land off Dukes Park, Woodbridge. This report has addressed National and Local policies relevant to the energy strategy for the proposed development.
- 4.1.2 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
- 4.1.3 Additional renewable energy generation technology may need to be installed within the development to achieve the required CO₂ emissions targets to meet the Building Regulations targets and the Councils desire to achieve a reduction in CO₂ emissions. This can only be developed in more detail as further design and layout information becomes available.