Renewable Energy Statement

North Road,
Glossop, Derbyshire

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Project Manager	Rebecca May	**Gladman Developments**	
Author	Sarah Kennard	**Gladman Homes**	

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1. INTRODUCTION

1.1 Introduction

1.1.1 This Renewable Energy Statement relates to the proposed development at North Road, Glossop which is to comprise of up to 150 dwellings.

1.1.2 The development is subject to the planning requirements of High Peak Borough Council. This report addresses policies relevant to sustainability and energy strategy as set out in National, Regional and Local policy.

1.1.3 This report also provides additional detail on the proposed approach to meet specific targets relating to the Code for Sustainable Homes and energy use on site.

2. PLANNING POLICY

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

2.1 National Policy

2.1.1 The new national 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.

2.1.2 The Code for Sustainable Homes ("The Code") is the Governments adopted approach for assessing the sustainability of new residential developments. It is based on a scoring system to achieve ratings between level zero and level 6 (the highest).

2.2 Regional Policy & Local Policy

2.2.1 High Peak Borough Council do not currently have any adopted policies, SPD's or DPD's relating to renewable generation. The councils web site does state it;

- ‘‘*expects 10% of the predicted energy demand of major developments to be generated on site by renewable means. Maximising the energy efficiency of new buildings will mean that less investment in renewable energy will be needed, in order to meet the target"*

2.2.2 The council have just finished consulting on their 'High Peak Local Plan Preferred Options' (February 2013) which proposed the following policy:

- **Policy EQ1 – Climate Change** – *The council will adopt strategies to mitigate climate change. In addressing the move to a low carbon future for High*

Peak, the Council will plan for new development in locations and ways that reduce greenhouse gas emissions and adopt the principals set out in the energy hierarchy.

The Council intends to meet part of its future energy needs through renewable or low carbon energy sources and will therefore encourage and support the provision of renewable and low carbon technologies, including both standalone installations, and micro-renewables integrated within new or existing developments.

This is to be achieved in part by;

- *Requiring new homes in residential developments of five or more dwellings achieve the highest viable Code for Sustainable Homes rating which would at least meet or exceed the requirements of the current Building Regulations.*

2.3 Code for Sustainable Homes

2.3.1 The Code for Sustainable Homes (the Code) is an environmental assessment method for rating and certifying the performance of new homes. It is a national standard for use in the design and construction of new homes with a view to encouraging continuous improvement in sustainable home building. The Code measures the sustainability of a new home against nine categories of sustainable design. Two of these categories, CO_2 emissions and water consumption, have mandatory standards. The Code uses a one to six star rating system to communicate the overall sustainability performance of a new home. The Code sets minimum standards for energy and water use at each level in addition to some mandatory elements that need to be met before any rating can be achieved. Within England and Wales the Code replaced the EcoHomes scheme, developed by the Building Research Establishment (BRE). The Code supports the government target that all new homes will be zero carbon from 2016 and the step changes in Building Regulations Part L leading to this.

2.3.2 The table below summarises the minimum energy standards at Level 1, 3 and 4 which exist under the Code;

Table 1: Minimum standards for Dwelling Emissions Rate (estimated carbon dioxide emissions in kg/m2 per annum arising from energy use from heating, hot water & lighting for the dwelling) at CSH1, CSH3 & CSH4

	Code Level 1	Code Level 3	Code Level 4
Energy	10% improvement over Target Emission Rate (TER)	25% improvement over Target Emission Rate (TER)	44% improvement over Target Emission Rate (TER)

Source: Code for Sustainable Homes: A step-change in sustainable home building practice, CLG, 2006

2.3.3 The Code became operational in April 2007 and was updated Nov 2010 and a rating against the Code has been mandatory since 1 May 2008. Whilst it's true to say that it's mandatory, new developments don't actually need to reach any of the six levels as whilst all new homes must be supplied with a Code rating, this can be a rating of 0. Achieving a particular level, such as Code Level 4, is not mandatory at the national level, nor is it planned to be so unless specified by planning policy. The confusion on this issue stems from the Buildings Regulations Part L, which addresses the conservation of fuel and power in dwellings and is used to calculate carbon efficiency. In the Government's consultation paper 'Building a Greener Future: Towards Zero Carbon Development' and subsequently 'Proposed Changes to Part L and Part F of the Building Regulations: a Consultation Paper' it proposed revised building regulations aimed at improving energy efficiency standards by 25% for all new homes in 2010, effectively making Code 3 mandatory.

2.3.4 The Building Regulations were updated in 2010 and further updates are due in 2013 and 2016 and it is expected that the energy performance requirements will be made equivalent to the existing Code Levels 4 and 6 respectively. Some people have taken this as meaning that the Code levels *themselves* will be mandatory but this is not the case, it's just the CO_2 emission requirements of each Code level that will effectively be made mandatory through the Buildings Regulations

2.3.5 Any new homes constructed from 2013 are likely to need to achieve Code Level 4 CO_2 emissions level as a minimum when the Building Regulations change.

2.3.6 Consultation documents for the next version of the Building Regulations were released at the end of January 2012 with proposals to increase the energy

efficiency of buildings further to take the next step towards 'zero carbon' standards. The overall impacts of the proposed changes are expected to;

- Strengthen new-build standards to pave the way towards zero carbon
- Introduce a separate fabric efficiency (FEE) target for new dwellings (kWh/m2.year)
- Propose changes to the calculation tools, Standard Assessment Procedure (SAP)
- Introduce measures to incentivise improved compliance and as built performance

2.3.7 The preferred approach for new homes is to meet the standards with improvements to the building fabric with the targets tailored to the size and shape of the actual building.

2.3.8 Final regulations have yet to be released but given the timescales for this development it is likely that the proposed scheme at Glossop will have to be constructed in line with the new tighter carbon dioxide emissions standards.

2.4 Conclusions

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

- To be compliant with Level 3 of the Code for Sustainable Homes.
- Meet Building Regulations Part L 2013
- The scheme will look to incorporate renewable energy options that could provide up to 10% of the expected energy demand of the site to meet the targets for Code for Sustainable Homes and current Building Regulations.

3. ENERGY STRATEGY & RENEWABLE ENERGY OPTIONS

3.1 Energy Demand

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. This chapter looks at the baseline energy demand of what is proposed and then provides a strategy to address the requirement for production of a nominal target of 10% of the predicted energy requirements from renewable sources.

3.1.1 At the outline design stage there is not enough design information available (i.e. dimensions, layout, fabric type etc) to precisely predict the baseline energy demand for the dwellings or other units. For the purpose of estimating the energy demands for residential properties, the Energy Saving Trust's (EST) guide "Meeting the 10 Per Cent Target for Renewable Energy in Housing, 2006" has been used. These figures have been adjusted to incorporate a 25% CO_2 reduction in line with the changes to Building Regulations introduced in October 2010. The estimated energy demand calculations and associated carbon emissions are shown in Tables 2, 3 & 4.

3.1.2 The final strategy for the site will be based on the following information but may 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.

3.2 Energy Demand for Domestic Properties

Table 2: Proposed Housing Mix

Total Housing		**150**
2 Bed		31
3 Bed		63
4/5 Bed		56

Table 3: Estimated Energy Demands per Dwelling Type (kWh/yr) adjusted for 25% reduction in line with 2010 Building Regs

Dwelling Type		2 Bed	3 Bed	4/5 Bed
Floor Area m2		78.8	88.8	104
Energy Requirement kWh/yr	Space Heating	2170	2567	3338
	Water	2421	2559	2822
	L&A	2039	2293	2726
	Cooking	948	986	1040
	Total	7578	8405	9926

(Original information from Energy Saving Trust - Meeting the 10% target for renewable energy housing)

Table 4: Total Estimated Energy Demand per Dwelling Type (MWh/yr) North Road, Glossop

Dwelling Type		2 Bed	3 Bed	4/5 Bed	Whole Site
No. of dwellings		31	63	56	150
Floor Area m2		2442.8	5594.4	5824	13861
Energy Requirement MWh/yr	Space Heating	67	162	187	416
	Water	75	161	158	394
	L&A	63	144	153	360
	Cooking	29	62	58	150
	Total	235	530	556	1320
Carbon emissions kg/yr		16243	36732	38620	91595

3.2.1 Total predicted energy consumption for the site is 1320MWh/yr. Therefore 132MWh/yr will need to be sourced from renewable energy technology to meet a 10% onsite generation target.

3.3 Low and zero carbon technologies - Domestic Properties

3.3.1 This section reviews the feasibility of a range of Low and Zero Carbon (LZC) technologies that could be used to achieve a provision of 10% onsite generation.

3.3.2 The LZC technologies considered for use at Glossop are:

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

3.3.3 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.

3.3.4 Small scale, roof mounted turbines are not proposed for a number of reasons. The visual impact of up to 150 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.

3.3.5 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 only 4.8m/s. For this type of technology to be effective, an average wind speed of at least 6.0m/s is required. It would therefore not appear a possible solution. It is proposed therefore that the energy targets for these domestic properties be met through the use of less intrusive technology.

3.4 Photovoltaics

3.4.1 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.

3.4.2 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.

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

3.4.4 The Glossop scheme has been modelled with PV panels rated at 2.1kWp with an area of 12.8m², consisting of 10x 210Wp modules per property and assumes there would be sufficient number of properties with suitable south facing roofs on which to mount the panels. The expected annual generation from each system is 1890kWh. To achieve the 10% target of 132MWh/yr, the development would require 70 PV systems of this scale, a total roof area of 896m². This would save approx 14,950kgC per annum, equivalent to 16% of total emissions from the development. (Assumes space and water heating, and cooking fuel is mains gas for all dwellings)

3.5 Solar Thermal

3.5.1 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.

3.5.2 A typical solar thermal panel can provide approximately 900kWh per year and will require around 2.5m² of roof area. In order to meet the 10% target the Glossop development would need to incorporate 147 solar thermal panels. Effectively, either every house in the development will need to have a suitable south facing roof which could be fitted with a solar thermal panel, or half the properties would require two panels each, requiring a total roof area of 368m². The practicalities of this proposal would need to be reviewed at the detailed design stage.

3.5.3 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). The

system proposed above would save an estimated 7,012kgC per annum, equivalent to approximately 7.7% of total emissions from the development.

3.6 Ground source heat pumps

3.6.1 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.

3.6.2 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.

3.7 Air Source Heat Pumps

3.7.2 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.

3.7.3 Although this site cannot be fed a mains gas supply and it would therefore appear that air source heat pumps could be a viable solution, due to the availability of less costly options, at this stage it is not proposed that heat

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

3.8 Biomass Boilers

3.8.2 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.

3.8.3 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.

3.8.4 Given that the other technologies present fewer operational, environmental and practical concerns, the use of biomass heating has not been considered further.

3.9 Summary of LZC Feasibility for Domestic Properties

3.9.2 At this stage of the design process there are two viable renewable energy options available to the developers of the Glossop site for the domestic properties that will allow them to reach a nominal 10% renewable energy target.

3.9.3 The most suitable at this stage would be a solar photovoltaic system installed on 70 houses within the development. This would not only meet the targets

but also provide significant carbon emission reduction. 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.

3.9.4 Alternatively, installation of a solar thermal panel on every dwelling, or two panels on 74 properties, would potentially be a more cost effective option but would not result in the same level of carbon emission reduction. Again cost implications would need to be reviewed at detailed design stage together with an assessment of the orientation of the properties.

4. CONCLUSIONS

4.1 The proposed development of up to 150 dwellings at North Road, Glossop is subject to the planning requirements of High Peak Borough Council. This report has addressed National, Regional and Local policies relevant to the energy strategy for proposed new developments.

4.2 In addition, an energy strategy for the site has been proposed which could meet a nominal target of 10% of the energy demand on site to be supplied via Low and Zero Carbon technologies together with a reduction in Carbon emission level of up to 16%.

4.3 The proposed strategy is based on an initial improvement in standard energy efficiency which meets Level 3 of the Code for Sustainable Homes and Part L of the Building Regulations. Full details of how the scheme will fully achieve Level 3 and any Part L Building Regulation targets can only be confirmed at detailed design stage.

4.4 The overall energy strategy for the site will be developed in more detail as further design information becomes available.