Sinclair Meadows Carbon Negative Community

Background: In order to combat the threat of dangerous anthropogenic climate change, the UK government has a target of 80% CO2 emission reduction by the year 2050 against 1990 levels. The UK emits 595.6mt of CO2eq per year* and, of this 27% is due to the housing stock [1][2]; hence a major reduction must be made in housing emissions, both operating and embodied.

By the year 2016, all new build in the UK will legally be required to be zero carbon. This will be assessed by the Code for Sustainable Homes and SAP.

However, the introduction of zero carbon homes is not enough; 66% of the housing stock to be occupied in the year 2050 is already built [3]. In order to offset some of these emissions new homes should be Carbon Negative.

Although this task seems rife with complexity, it is important to remember that on mainland Europe the Passivhaus standard has been delivering low carbon homes for 19 years. The Sinclair Meadows project has gone beyond this.

Original design drawing – © Fitz Architects

* CO2eq means carbon dioxide equivalent, so all greenhouse gasses summed as if they were purely CO2

[1] "Europe's Energy Portal", http://www.energy.eu, accessed 14/08/09
[2] "Definition of zero carbon homes and non-domestic buildings – consultation", HM Government, 2008
[3] "40% House", Environmental Change Institute, 2005

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PROJECT: The Sinclair Meadows Project has involved the construction of 21 carbon negative homes. The project was headed by the housing association, Four Housing Group, and the environmental charity Groundwork South Tyneside & Newcastle. Funds for part of the development were provided by the Regional Development Agency for the North East of England, One North East, and the Homes and Communities Agency

The design of the homes was carried out by Fitz Architects, CK21 and RNJ Partnership Construction Consultants. The contractors were Galliford Try, whilst the Code Assessment was being carried out by Ian Larnach Associates Ltd. Narec Distributed Energy was employed by Groundwork South Tyneside & Newcastle to produce an energy strategy for this development, the object of which was to meet the ambitious target of delivering a Carbon Negative development.

Thermal modelling of Sinclair Meadows was undertaken using the industry standard software, Virtual Environment from Integrated Environmental Solutions (IES<VE>), and the Passive House Planning Package (PHPP), as produced by the highly respected PassivHaus Institute in Germany.

Electricity demands from appliances and cooking were based on a mixture of recommendations from Code Level 6 and real world data from both peer reviewed literature, actual developments and UK government statistics. Based upon the above energy demands, feasibility studies for all relevant technologies were undertaken. The aim was to find how this specific site would lend itself to a range of renewable and low carbon electrical and thermal generators.

The technologies investigated were solar thermal, air source heat pumps, ground source heat pumps, photovoltaic, micro wind, large scale wind, biomass boilers and CHP. These were sized according to the plans for Sinclair Meadows available at the time, and outputs calculated from demands and local weather conditions. The eventual decisions for energy sources were a large photovoltaic system, with heating from a biomass boiler connected to a small district heating system.

Finally, Narec Distributed Energy considered the smart metering technologies to be implemented in Sinclair Meadows. These were to allow for future monitoring the development, to ensure that the claims of Carbon Negativity can be verified, and so that any mistakes can be traced, allowing for future developments to be improvements of this project.

With the large renewable energy generation systems, coupled with the sustainable building techniques and materials used in the construction, Sinclair Meadows can justifiably claim to be a truly Carbon Negative Development.

Sinclair Meadows is now a successfully completed development, with residents having moved in. Narec Distributed Energy are extremely proud of the part that they played in Four Housing Group's impressive project, which both gives warm homes to social housing residents, and reduces carbon emissions.