

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 595.6 mt of CO₂eq per year* and, of this 27% is due to the housing stock²; 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 built³. 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. This project is to go beyond this.



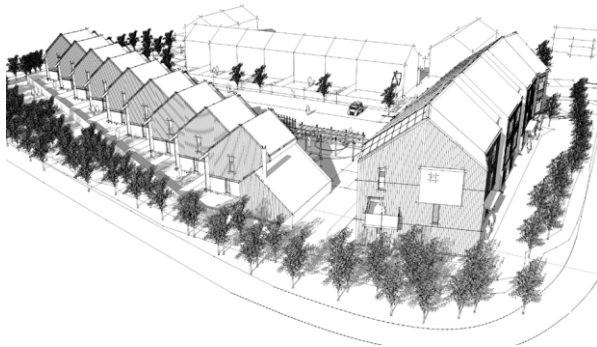
*CO₂eq means carbon dioxide equivalent, so all greenhouse gasses summed as if they were purely CO₂

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

PROJECT: The Reed Street Project involves the construction of 21 carbon negative homes. The project is 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.



The design of the homes is being carried out by Fitz Architects, CK21 and RNJ Partnership Construction Consultants. The contractors are Galliford Try, whilst the Code Assessment is being carried out by Ian Lanarch Associates Ltd. Narec 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 Reed Street, 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 being 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, microwind, large scale wind, biomass boilers and CHP. These were sized according to the plans for Reed Street available at the time, and outputs calculated from demands and local weather conditions.

Finally, Narec considered the smart metering technologies to be implemented in Reed Street. These will 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.

This project will allow the Reed Street Development to produce negative carbon emissions net over the period of a year. When coupled with the sustainable building techniques and materials used in the construction, this will allow Reed Street to successfully back up the claim that it is truly a Carbon Negative Development.

