



Helpu Cymru i leihau  
ei Hôl Troed Carbon  
Help Wales reduce  
its Carbon Footprint

## Case Study 08

# Mendip Place



Llywodraeth Cymru  
Welsh Government

[www.cymru.gov.uk](http://www.cymru.gov.uk)

### Client:

Chelmer Housing  
Partnership

### Developer:

McCann Homes

### Architect:

Ingleton Wood LLP

### Location:

Chelmsford, Essex

### Building Types:

Residential

### Project Description

Mendip Place is a development of 6 houses and 4 flats built to Level 6 of the Code for Sustainable Homes (CSH). Chelmer Housing Partnership (CHP) commissioned the scheme of ten affordable homes to explore new methods of construction and the possibilities for integration of renewable and low carbon technologies.

### Key Drivers

As a developer of affordable homes, CHP were keen to accumulate knowledge of alternative, innovative build strategies which comply with the UK Government target to achieve zero regulated carbon in all new homes by 2016. Consequently, a key project objective was to deliver affordable, contemporary homes which minimised energy costs for tenants and attained "zero carbon" status, as defined by CSH Level 6.

### Key Features

- Photovoltaic (PV) Panels: 4 kWp for houses, 2.5 kWp for apartments;
- Biomass District Heating including two communal 60 kW biomass boiler; and
- Mechanical Ventilation with Heat Recovery (MVHR).

The development includes other sustainable features, such as:

- highly insulated building envelopes;
- green roof area for biodiversity;
- bat, bird and insect boxes; and
- rainwater collection system and low flow sanitary fittings.



Dwellings at Mendip Place  
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### Renewable and Low Carbon Technologies:

Photovoltaic Array

Biomass District  
Heating

### Procurement

The development was procured under a design and build contract. The contract period extended from 2008 to 2010 whilst the build took just over a year to complete.

‘Predicted energy costs for heating, power and lighting are less than half that of a typical house built to current Building Regulations standards’

Jon Boon  
Ingleton Wood LLP

Structural Insulated Panels used in the timber frame construction of the dwellings were procured from Kingspan TEK.

The PV panels were procured from Solartech Limited, who acted as renewable energy partner for the development. The biomass boilers were sourced from an Italian manufacturer, D’Alessandro Termomeccanica.

Mendip Place was the first affordable housing development to be constructed to the Code for Sustainable Homes Level 6.

### Scheme costs and finance

The project cost in the region of £1.6 million; approximately 40% more than a standard CSH Level 3 development of the same size.

While the majority of the scheme was funded by CHP, financial support was secured through a number of grants and funding schemes, including the Homes and Communities Agency, Chelmsford Borough Council, and the Department of Energy and Climate Change (DECC) Low Carbon Buildings Programme. It should be noted that the Low Carbon Buildings Programme is now closed.

A proportion of the electricity generated by the PV array is exported to the grid. There is the potential to claim income generated under the Government Feed-In-Tariff (FIT) scheme; in the first year of operation, potential revenue and savings of approximately £12,000 could be generated, with a 25 year ‘whole life’ benefit of up to £390,000.

The cost of running the biomass boilers could also be offset by the Renewable Heat Incentive (RHI) scheme, a government financial support initiative available for sustainable heating systems.

### Technology selection process

The primary project aim of minimising energy costs for tenants meant that reducing demand through energy efficiency was adopted as a first priority. The buildings were designed to achieve high standards of both thermal efficiency and airtightness (with an air leakage rate of approximately 3 m<sup>3</sup>/m<sup>2</sup>/h at 50 Pa). A timber frame structural insulated panel (SIP) construction with a low U value building fabric (0.11 W/m<sup>2</sup>K for walls and roof, and 0.7 W/m<sup>2</sup>K for glazing) was used. Due to the high levels of airtightness within the dwellings, a Mechanical Ventilation Heat Recovery (MVHR) system was incorporated to maintain indoor air quality and maximise the efficiency of space heating.



Biomass Boilers installed at Mendip Place  
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In order to comply with the 'zero carbon' stipulation of CSH Level 6, the residual space heating, hot water and electricity demands needed to be met using renewable and low carbon technologies.

The development comprised social housing, maintained by a single owner rather than individual residents, and so district heating was well suited to the scheme. Two communal biomass boilers, each capable of supplying 60 kW of heat, were selected for provision of hot water and space heating. While a single larger biomass boiler was initially considered, greater financial support was available for two boilers, which also allowed a level of redundancy to be built into the heating system.

The biomass boilers are run on sustainably sourced wood pellets. Heat is distributed to the dwellings using an underground pre-insulated pipework system. The primary heat circulation pumps in the pipework system have been fitted with variable speed controls. These adjust the rate of heat supply depending on the heat load on the system. Each home is fitted with a heat exchanger connected to the heat distribution system, with a smart meter to monitor energy consumption.

Roof mounted photovoltaic arrays were selected to provide electricity for the development and was sized to meet the loads for the MVHR systems, lighting and all electrical and cooking appliances (i.e. regulated and unregulated carbon emissions). In order to satisfy 100% of the annual electricity demand, it was necessary to utilise almost the entire south facing roof space of the development for the

PV array. It should be noted that since construction of the Mendip Place development, the definition of "zero carbon" in CSH Level 6 has changed so that 'unregulated' carbon emissions are no longer included within the definition.

The Energy Performance Certificate (EPC) ratings for the dwellings range between 104 and 107, with 160% to 174% improvement over Part L of the 2006 Building regulations. Design stage calculations anticipated that the annual carbon dioxide (CO<sub>2</sub>) emissions would be between -1.1 and -3.4 kg CO<sub>2</sub>/m<sup>2</sup>/yr. Additionally, it was estimated that the development would have a negative net annual energy demand of between -8 to -24 kWh/m<sup>2</sup>/yr.

## Monitoring and Operation

A site-wide remote monitoring system was installed in order to monitor the performance of the PV array.

The boilers have been fitted with an automatic ash extraction system to minimise the frequency of maintenance visits. Additionally, critical and low-fuel alarms have been integrated as part of a remote monitoring boiler performance system.

The client has indicated that the consumption of biomass pellets has been greater than anticipated, although this is considered to be likely due to the unusually cold winter of 2010.

The site wide monitoring system also remotely monitors heat meters installed at each property, so that tenants are only billed for their actual heat consumption.



## Lessons learnt

### Technological supply issues

- The Code for Sustainable Homes Assessor was involved in this project very early on in the process which helped to ensure that the solutions to meet the requirements of the Code could be designed-in rather than 'bolted on' later on.
- A single renewable energy partner was selected to develop the energy strategy (including heating, electricity and monitoring installations), which simplified the renewable and low carbon technology procurement process from a client perspective.
- The energy strategy for the site is fairly simple with only a few technology types integrated to meet the "net zero carbon" requirement of CSH Level 6. Minimising the complexity of the scheme has reduced maintenance requirements of the technologies.



Dwellings of Mendip Place development  
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## Awards and Achievements

- First affordable housing development to be constructed to Code for Sustainable Homes Level 6;
- 160–174% reduction in CO<sub>2</sub> emissions compared to Building Regulations Part L 2006;
- Shortlisted for Building Magazine's Sustainable Housing Project of the Year Award;
- Shortlisted for Sustainability Awards 2010 Sustainable Project of the Year (Under £10m); and
- International Green Apple Environmental Gold Award 2011.

## Further information

The Zero Carbon Hub

[www.zerocarbonhub.org](http://www.zerocarbonhub.org)

Kingspan

[www.tek.kingspan.com](http://www.tek.kingspan.com)

Solartech Limited

[www.solartech.org.uk](http://www.solartech.org.uk)

The Homes and Communities Agency

[www.homesandcommunities.co.uk/](http://www.homesandcommunities.co.uk/)

Renewable Heat Incentive, DECC

[www.decc.gov.uk](http://www.decc.gov.uk)

Ingleton Wood LLP

[www.ingletonwood.co.uk](http://www.ingletonwood.co.uk)

These case studies are presented to show examples of how buildings can be designed and built to be low carbon and incorporate renewable and low carbon technologies. This case study is part of a series of case studies supporting a separate practice guidance document on low carbon buildings. **For further information see [www.wales.gov.uk/planning](http://www.wales.gov.uk/planning)**

