

Local authorities' use of renewables in buildings and facilities

Worcestershire's Wood Fuel Project

Relevant to: England, Scotland, Wales and Northern Ireland

Introduction

Following the publication of its Environmental Action Plan in 1996, Worcestershire County Council decided to focus efforts on its own contribution to sustainability. Essential to this were two aims. The first was the development of understanding within the council about the issues surrounding problems such as climate change, whilst the second was the use of selected capital projects as pilots and examples of environmental best practice. These included passive solar design in Kidderminster Library and the Weobley Schools biomass demonstration project, the design and operation of which was an important influence on the council's thinking regarding woodfuel heating. The personal commitment of a core of enthusiastic County Council staff and County Councillors was also a major factor in ensuring the project's establishment and ultimate success.

Aims & objectives

Having taken a number of measures to maximise the energy efficiency of the County Hall in Worcester, the Council decided to turn to renewables to further reduce their carbon dioxide emissions. In addition the council wanted to:

- Improve the prospects for agriculture in the area, working towards this with a wide range of agencies.
- Support alternative options to fossil fuel use.
- Create economic opportunities in the local area by encouraging the development of a countywide biomass energy network, thus stimulating uptake of the technology in the County.
- Lead the development of this market by example.

Who is involved?

The wood fuel project was initially promoted internally by a group of the County Council's engineers and architects who had a particular interest in the environmental agenda. However, at the time when the concept was being developed there was the added benefit of strong support from a senior county councillor who, in effect, acted as an environmental champion.

The strong internal partnerships have been critical for the project's success. Those actively involved in the monitoring and development of the project and wood firing schemes include: Design Unit Manager; Chief Engineer; Principal Mechanical Engineer; Principal Energy Engineer; Energy Manager; and the Resident Engineer. In terms of external partnerships the council maintains strong links with the energy supplier, Econergy Ltd. There has also been continuing support from the Chief Officers' Management Board and Councillors, as part of the council's carbon management strategy developed with the Carbon Trust. The scheme has also generated ongoing interest from other organisations, and visits from other councils and organisations are frequent.

The approach

Funding for the wood fuel project was secured in 1998 as one part of the County Council's overall capital programme. However, in 1999 there was a change in the political make-up of the council's ruling group. It was therefore felt necessary to restate the case for the project in order to secure their support. The business case was given careful consideration and continuing support for the project was confirmed.

The process of site selection was driven by the need:

- To maximise the opportunity to reduce carbon dioxide emissions.
- To minimise infrastructure costs.
- To optimise management arrangements for the operation of the system.

Conventional procurement and heat purchase arrangements were considered in parallel to the proposal but effective comparison of alternatives was difficult. This was because appraisal of conventional capital procurement arrangements does not normally take account of issues such as long term environmental impacts or other aspects of full life cycle costs. However, the comparison process was adapted to take account of these issues. Final selection was based on the comparative cost per tonne of reduced carbon dioxide emissions measured over ten years.

The contract to supply heat to county hall was a ten year energy services contract with Econergy. The company supplied, installed, owns and operates the boiler plant, which produces around 1.3 million kWh/year of heat from between 500 and 600 tonnes of biomass fuel. Heat is sold to the council at a tariff competitive with energy from fossil fuels and a certificated heat meter measures the heat supplied.



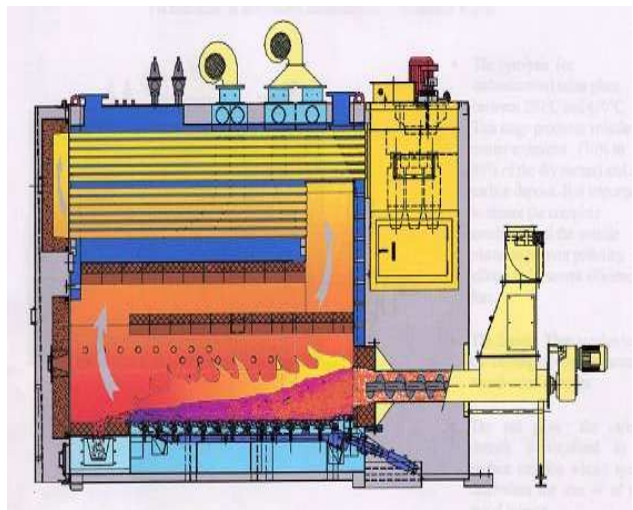
Compte 700kW boiler installation in progress, image courtesy of Worcestershire County Council

The boiler itself is a Compte Compact DH-V 70 inclined grate, wet wood boiler, rated at 700kW when using fuel with a 45 per cent moisture content. It is warranted at over 80 per cent efficient over its full output range. Fuel is fed to the boiler using the Econergy hooklift bin system and two 35m³

containers for storage. There is no tipping on-site and no need for an underground bunker, merely a flat concrete pad.

Econergy undertakes the operation and maintenance. A number of operational problems arose during year one and year two but these were of a developmental or 'teething' nature. Modifications were undertaken, both to the plant by Econergy and to County Hall's control system and heating system by the County Council, and these were successful. In year three the council experienced only minor problems with the boiler control and modem link, all of which were satisfactorily resolved by Econergy.

Fuel for the boiler is derived from a variety of local sources, the majority of which comes in the form of 'slabwood', dry untreated offcuts from two Worcestershire sawmills. The council's experience at Weobley School was an important factor in decisions regarding fuel and fuel sourcing. The division of procurement at the school, with the contract split between the boiler supplier and the



Cutaway view of Compte 700kW DH-V 70 wood chip boiler, image courtesy of Worcestershire County Council

fuel supplier, meant that if, as occasionally happened, the boiler feeding system jammed, then the council had to liaise with the fuel supplier directly. This experience fed directly into the decision to use an energy services contract for the council offices. The main control that the council has over this fuel supply is that the heating contract states that a large percentage of the fuel must be sourced locally. Otherwise fuel sourcing is

the responsibility of Eenergy. Over 90 per cent of the fuel is from sources within the county of Worcestershire. 100 per cent is stored and chipped at a local farm less than seven miles from the site, and delivered by a local haulage contractor.

Achievements

The boiler began generating heat in September 2002 and has been in full operation since then. It has enabled County Hall to cut carbon dioxide emissions by 250 tonnes per year at a cost that competes with other forms of energy. The project has also provided an extra source of income for local producers and processors of wood fuel and diversification options for local farmers, and thus has helped to enhance the local natural habitat.

Outcomes

Approximately 600-700 tonnes of carbon have been saved over the three years of operation based on 0.5 tonne carbon dioxide saved per tonne of wood fuel burned.

To date, no money has been saved but the aim of the project was to save carbon dioxide at minimum additional cost, and this has been achieved. However, the heat purchase contract includes a 'cap' on the cost of wood heat once the cost of gas rises above a preset value, and it is anticipated next year that some financial savings will accrue.



Harvesting in progress in local woodland, image courtesy of Worcestershire County Council

Next steps

The County Council sees this project as the first step in the development of a countywide biomass energy network linking producers and consumers of biomass fuels and this is progressing through liaison with a number of agencies. The council is also considering options for the installation of biomass heating at other sites, one of which, the Worcester Woods Visitor Centre, is currently out to tender. The council's design team are providing advice and support to other authorities and organisations interested in the adoption and promotion of wood fuel energy.

As part of this, the council has given presentations to the Energy Institute, the Local Government engineering society SCEME, the local office of Defra, the Local Government Association, several wood fuel producer groups in the region, and numerous other county and district councils and elected members. In November 2005 Worcestershire are hosting an evening Continuing Professional Development meeting for members of the Institution of Electrical Engineers and other interested visitors.

Lessons learned/issues raised

- The council paid a premium in infrastructure costs due to the demands of the planners, who wished to see the steel fuel containers hidden behind substantial facing brick walls and large solid gates. This was due to local concerns regarding noise and dust. These were unfounded and future planning applications are unlikely to require this provision.
- When attempting to gain planning consent local objections were received because of perceived pollution problems (based on a misunderstanding of the technology) and increased traffic due to fuel deliveries. There have been no public complaints since the system began operating. The wood fuel project was a 'first' but now the council has gained considerable operational experience using the enclosed containerised fuel system. No major problems were experienced and the issue should not arise again.
- The project encountered cynicism within and outside the council over the need for a wood fuel boiler but this was overcome by emphasising the importance of carbon dioxide emissions reduction in the context of climate

change, now enshrined in the council's Carbon Management Plan.

- Political change need not be an obstacle to the introduction of renewable energy generation provided the case is well made and supported.
- The heat contract supplier specified a French manufactured boiler because it was deemed most appropriate for the operating conditions at County Hall. At the time, the Compte boiler was the most thermally efficient available, and capable of matching the MTHW heating system at County Hall which operates at around 110°C. Since then, other makers including UK firms have developed more efficient boilers and the Worcester Woods project proposal incorporates a UK-made boiler.
- Management of the fuel supply chain by Econergy was crucial in deciding suppliers for the contract.
- Despite concerns, the wood fuel moisture content has only once been a problem. The boiler has proved it is highly reliable when burning a wide range of fuel types. Typically the fuel moisture content is about 30 per cent and stable. Occasional problems are experienced in very cold weather when moist 'fines' in the fuel have frozen, obscuring fuel flow sensors, but operational routines have prevented a recurrence and modifications are planned.



Chipped fuel ready for firing, image courtesy of Worcestershire County Council

Further information

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The Energy Saving Trust offers a free enquiries service via our dedicated Practical help team – the team will undertake to answer any query regarding sustainable energy or sustainable road transport within a maximum of three working days.

Abbreviations used

Defra	Department for the Environment
Food and Rural Affairs	
MTHW	medium temperature hot water
kW	kilowatt
kWh	kilowatt per hour
SCEME	society of electrical and mechanical engineers

At the time of publication and to the best of our knowledge, the information contained in this case study was correct. This case study was first published in January 2003.

Practical help cannot vouch for any of the organisations involved.

Practical help

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