

Oakley Vale Primary School, Corby, Northamptonshire



Using renewable technologies to reduce energy costs

This case study focuses on the use of renewable (biomass and solar) technologies to reduce energy costs in a relatively new school. Although designed to be environmentally friendly from the outset, the different technologies in the building didn't all work together. The case study describes how the school tackled these problems and also went on to install solar PV panels to generate electricity.

Oakley Vale Primary School in Corby, Northamptonshire opened in 2008. It has recently become part of an academy run by Brooke Weston Trust. It has 397 pupils with space to grow to 420.

Checklist

This case study focuses on:



Background

When Oakley Vale school was being planned, the aspiration from Northamptonshire County Council and other stakeholders was that the building was to be an environmentally sound one.

The resultant design incorporated several technological features such as under floor heating throughout powered by a biomass (wood chip) boiler, a rainwater harvesting system and computer controlled motorised windows system and lighting sensors.

While the building design was environmentally outstanding in theory, the innovative systems used were not integrated and hence were not easily managed. The Site Manager and the Principal, however, have been proactive in

developing solutions to such problems thereby lowering their energy bills over subsequent years.

For example, the different computerised control systems for the biomass boiler and the windows were not interfaced and operated on entirely different feeds of data. So when the biomass boiler heated the rooms up via the under floor heating system at 5.00 am in response to falling temperatures, the windows opened at 7.00 am in response to a different program that focused on promoting airflow and natural ventilation within the building.

The end result was the loss of heated air out of the building causing the rooms to cool down and need reheating. This increased the school's energy consumption resulting in higher energy bills. The Site Manager turned off the computer control over the windows and made it manually operable where it wasn't before. The occupants can now open the windows when required, limiting heat loss.

The school received support from Northamptonshire County Council's Energy and Carbon Management Team who sent various independent specialists to survey the school.



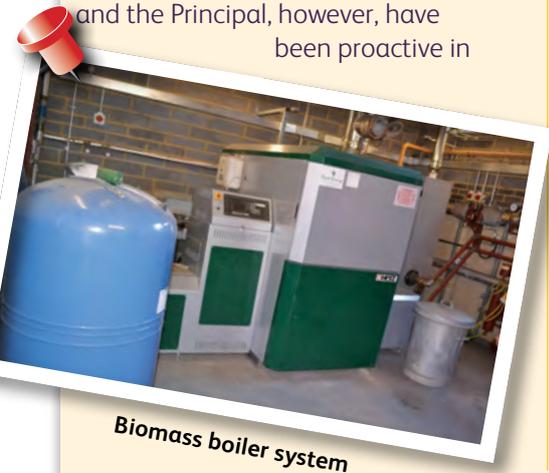
Sports hall with PV solar panels

Recommendations for improvements were made and many of these have since been implemented.

Project Background

The biomass boiler, which feeds an under floor heating system, is run by a sophisticated computerised system that allows it to vary the fuel feed and output temperature in response to changing conditions. The system also takes into account information including previous weather conditions, whilst computing output.

While the biomass boiler provides heating, electricity is now produced by PV panels installed on the roof of the sports hall. An additional set of solar thermal panels on the roof of an out building provides hot water to top up that produced by the biomass boiler in the summertime.



Biomass boiler system

Project Particulars

Renewable technology within the school

Biomass Boilers

Oakley Vale Primary relies solely on a 125 kW woodchip biomass boiler and does not use any fossil fuels to heat the school. This was incorporated into the design of the school and paid for as part of the build costs with Government funds. The boiler

operates on the Austrian method using woodchip with 30% moisture content which has a longer heating time and doesn't burn out too quickly, thereby ensuring maximum fuel efficiency.

The woodchip is sourced from Boughton Estate located six miles away from the school. The school receives regular deliveries of 10m³

of wood chip which is stored in a pit. An Archimedes Screw draws the woodchip into the boiler. The resulting ash by product is partly used as a fertilizer on the school grounds.

The headmaster maintains that "the biomass system is as reliable as can be" The system works very well as a robust method of heating for the size of establishment and demand. It

may not prove suitable for a smaller building with lower heat demand as it works most efficiently when it is continuously fuelled up.

Photo Voltaic Panels

PV solar panels generate clean electricity from a renewable source which can be used on site (helping reduce electricity bills), with any excess supplied back into the grid. PV panels have been installed on a roof south facing, above a row of class rooms. It is a 17 kW system covering 200 sq metres of roof. The PV system has generated 31,942 kWh of electricity since installed in January 2012. The panels generate as much as 12.8kW, even on dull and cloudy days.

The table to the right outlines the estimated savings of the project:



Shed with woodchip fuel and Archimedes screw which feeds the fuel into the biomass boiler



Solar thermal panels on top of an outbuilding

Project	Value (£)	Annual kWh saved	Annual cost saving	Annual CO ₂ tonnes saved	Payback period
Photovoltaic panels	£62,910	13,773	£4,932	6.1	12.75 years

Table 2: Estimated annual savings from PV scheme



Biomass boiler display

Although the project did not qualify for Salix funding (which requires pay back within five years) the County Council provided the investment on the basis that they receive the Feed-in Tariff payments over the next 25 years, which will help fund similar projects on other council properties. Nevertheless, the financial benefit to the school is a reduction in its annual electricity bill of £2,000.

Results and achievements

Site Manager Rob Morrison has researched other schools of comparable sizes that are typically run on gas and found the energy bills of Oakley Vale are about 33% lower. The school's Energy Performance Operational Rating

is 43 whilst a building of this size and type would typically be 100.

The community has also made financial gain in the form of funds generated from the project that has

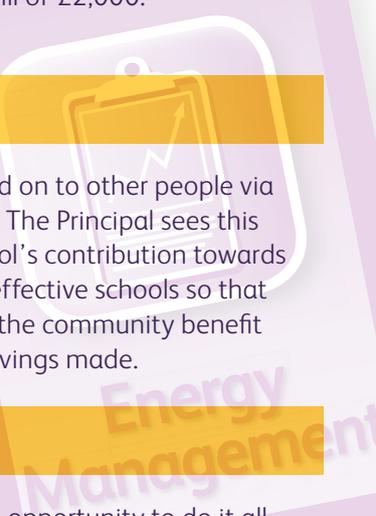
been passed on to other people via the council. The Principal sees this as the school's contribution towards more cost effective schools so that children of the community benefit from the savings made.

Lessons and Reflections

Site Manager Rob Morrison believes there is valuable learning to be made from the school's experience of intelligent technologies and that it should be designed around user

needs rather than taken off a generic checklist of viable environmentally friendly technology. This could be achieved by involving the users in the initial design and planning stages.

If given the opportunity to do it all over again, the potential for solar PV on the south facing sports hall roof would have ideally been identified at the initial design stage and incorporated into the build.



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Next Steps

Perhaps surprisingly, the school is in the early stages of looking into the possibility of replacing the current boiler with a newer, more efficient one. Although the capital costs would be considerable, with the rest of the biomass heating infrastructure already in place, this would be the only cost. The main attraction for the school is the Government's Renewable Heat Incentive scheme, which could provide an anticipated £18,000 annual income over the next 18 years if they were successful in applying, though at present the viability is unknown.

The energy efficiency measures taken so far have made the school "leagues

ahead of other schools" says Principal Mike Deane-Hall; it is the most energy efficient school in the Brooke Weston Trust which has 9 schools in all. The school's Display Energy Certificate has a B rating and is getting better. With energy efficiency systems in place and working well, the Principal feels that the next step should involve promoting positive behaviour change among staff, visitors and children.

The action plan when ready will incorporate actions such as making

sure lights are switched off after use and shutting doors after use of rooms in order to keep the heat in during colder seasons. It is anticipated that this will contribute significantly to lowering energy bills. It has been observed, for instance, that leaving the door open for longer than necessary can bring about a 1°C fall in temperature and it then takes an hour to get the temperature back up using the under floor heating.

Company	Product/Service	More information
Prescient Power, Ashby de la Zouch, Leicestershire	Installation and project management of Solydra solar PV system	www.prescientpower.co.uk

Further Information and Contact Details

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Youtube:

Headteacher's talk on the school's experience of using its biomass and other systems
<http://youtu.be/p1WqPOn8ggQ>



One of a series of case studies about schools' action on reducing carbon emissions through work on sustainable energy. These case studies have been developed by Climate East Midlands for the benefit of other schools who wish to cut their own costs and carbon. Other case studies in the series can be viewed at the web address below.

E: info@climate-em.org.uk

T: 01664 502 620

W: www.climate-em.org.uk/resources/category/casestudies

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www.benchmark-design.co.uk

***SCoRE programme**

This was an East Midlands wide energy and carbon reduction project with 9 local authorities and 80 pilot schools and ran in 2011/12. It was managed by the Carbon Trust in conjunction with Briar Associates and commissioned by Climate East Midlands as part of the Government-funded Climate Change Skills Programme.

Information and resources can be found at: www.climate-em.org.uk/projects/score-schools-collaboration-on-resource-efficiency/

Saving Money