



## Royal Agricultural College

### Case Study

#### Using woodfuel to heat the next generation

The Royal Agricultural College was the first agricultural college in the UK and has been at the forefront of agricultural education since 1845. Over the years, the number of students and diversity of courses has continued to increase. It now offers foundation, undergraduate and postgraduate degrees to over 1,000 students from more than 40 different countries. Subjects not only include agriculture, but also agribusiness and food supply, equine, business and management studies and rural land and property management.

The college is located approximately one mile out of Cirencester and lies within the Cotswold AONB. The campus buildings are of various ages ranging from the early Victorian era through to recent additions and include both teaching and student accommodation buildings. As a result of plans to upgrade and extend a number of the teaching blocks the decision was taken to remove the old boiler plant and replace it with new “green heat technology” for a range of environmental, educational and financial reasons. Following a pre-feasibility study, it was decided to install a woodchip boiler to heat these buildings via a district heating system.

Project/business	Royal Agricultural College
Location	Royal Agricultural College, Stroud Road, Cirencester, Gloucestershire, GL7 6JS
Technology/system	ETL Listed Froeling Turbomat 500 (500kW) Woodchip
MW produced	550,000 kW h per annum
Benefits	Each year, it is estimated that there will be a CO <sub>2</sub> saving of over 100 tonnes and at least £10,000 saved in heating costs.
Links and more information	<a href="http://www.rac.ac.uk/">http://www.rac.ac.uk/</a> <a href="http://www.woodfuel.co.uk/">http://www.woodfuel.co.uk/</a>

*“The installation of a woodchip boiler offers environmental, educational and financial benefits”*



## Key points from the project

- The RAC is a large educational establishment with many students and a high heat demand. Students study and live on site.
- The redevelopment of part of the site provided an opportunity to install a new woodchip boiler and the heat mains required for a district heating scheme.
- The project provides a way of reducing the College's fuel costs and its carbon footprint as well as providing an educational tool for the students, staff and visitors.

## Case Study

The Royal Agricultural College is a popular place to study; the numbers of students applying to the College have been steadily rising. In order to cope with this, it was decided to upgrade and extend a number of the teaching buildings and in turn improve facilities for both students and staff. As part of these proposals, the decision was taken to remove one of the old main oil boiler systems and replace it with a more sustainable energy source for a range of environmental, educational and financial reasons. Different technologies were explored but it was decided that a biomass boiler would be the most suitable solution.

A pre-feasibility study recommended a 500kW boiler (ETL Listed Froeling Turbomat 500) in conjunction with two new small oil fired boilers to provide back up. The backup was installed to aid peak load times and as a precaution as so many people rely upon the system for heating. A separate boiler house was built to house the woodchip boiler, buffer tanks, master controls and viewing area and a new below-ground wood chip store was put in adjacent to the boiler. The boiler system is fully automated and can be "remotely" controlled and monitored via a computer. Furthermore, the maintenance of the system is expected to be limited. The ash will only need to be emptied once a week and the boiler system serviced twice a year.

This project provides heat for a number of the College buildings which require heating from 8:00am until 7:30pm. The buildings consist of the library, gym, two lecture blocks, and the sports hall. The heat is distributed by an underground district heating system.

Econergy were the company commissioned to install the biomass system. The co-ordination and management of this project, along with the overall building was undertaken by the College's Director of Estates and their appointed external architects/engineers, Astam GBC. The woodchip is being supplied by Midlands Wood Fuel. The College is charged on an energy basis rather than volume of wood - the cost is just over 3p/kWh.

The College is expecting a carbon saving of at least 100 tonnes of CO<sub>2</sub> per annum. It is also anticipating making significant saving on annual fuel costs. However the initial capital cost of this biomass system is considerably greater than installing a new oil fired boiler. The total cost of the system amounted to over £500,000. The College were fortunate to be awarded a £150,000 grant under the South West Bio-energy Grant Scheme – without such assistance, the financial case for the



project would have been questionable. However receipt of this grant funding means that the College will not be eligible for annual Renewable Heat Incentive payments (unless of course it elects to repay the grant monies).

Due to the overall building project and the requirements of the grant, the building works for the biomass system started in September 2010 and had to be completed by the end of January 2011. The biomass system was fully functioning by the end of February 2011.

### **Problems, successes and solutions**

The cost of a woodchip boiler is often two to three times more expensive than a conventional boiler. In addition, for this project, there was a need for a fuel store and an underground district heating network, as a number of buildings are heated by the boiler. This significantly increased the overall capital costs and thus the availability of potential grant support was an important consideration. However, the main sources of grant aid were all discretionary and dependent on the availability of grant funds and the demand for them, so it was difficult to predict the likelihood of securing grant funding in advance of undertaking the project. Furthermore the timing constraints resulting from the grant offer provided a very restrictive timeframe for undertaking the works – in this case, works were not permitted to commence until September 2010 and had to be completed by February 2011. In addition, the biomass system works needed to be co-ordinated with the overall building refurbishment works. Despite these issues, the biomass system was successfully installed and was fully functioning by the end of February 2011. In the future, the introduction of the renewable heat incentive, as an alternative to the former capital grant schemes, should provide much more certainty for those considering similar projects and in turn encourage many more new schemes.

There were also a couple of technical issues. Firstly, some adaptations needed to be made to the boiler house. Once the building had been built there were concerns that there was not enough ventilation and so, in order to overcome this, some walls had ventilation panels installed. In addition, the fuel store is quite small for the required heat load. In winter it will need to be filled once a week so good communications and relations with the wood fuel supply company will be crucial.

### **What are the benefits and how have these occurred?**

#### **1. Benefits to the College and its students**

There are many benefits for the College. Firstly, it will result in a significant reduction in carbon emissions which in turn will help the College achieve its overall carbon reduction targets. Secondly, it will reduce its energy costs. Thirdly, it is seen as a valuable educational resource which aligns well with the subjects that the College offers to its students – indeed the biomass system has already been incorporated into some of its teaching programmes. Furthermore a number of workshops, seminars and conferences aimed at people involved in the land management and renewable energy sectors have already been organised.



## 2. Benefits to the wider community

The College is training people to work in a variety of rural based sectors. The education of these students may encourage them to consider biomass as a fuel source later in their working life and thus inspire other installations in the future.

As mentioned above, the College will also be running events for external visitors to learn about woodfuel and renewable technologies.

## Further Questions and Conclusions

### Has the Project inspired any other work?

As the boiler has only recently been installed, it is too early to assess whether it has inspired any other projects. It is hoped, however, that some of the large numbers of students and other people who will become familiar with the project will be prompted to consider this technology in the future.

### Has the Project inspired any future plans or further steps?

The College is planning to build a new accommodation building and, as the proposed location of this building is relatively close to the biomass boiler, there is an opportunity to extend the biomass system to provide heat for this building also. However, if this does go ahead there will be a need to extend the fuel store.

### What would the message be to others interested in undertaking a similar project?

Planning and careful research are key as there is a range of important factors to consider. These include the:

- type and choice of biomass boiler, but also the related infrastructure, including the fuel store, the controls and associated pipework and how these integrate with the existing heating system;
- choice of suppliers, installers and the fuel supply company.

Finally it is important to carefully research the costs, grants and any other financial support available (such as the RHI and Green Loans etc.). In addition, they also recommended looking at other installations and talking to those involved in the process so that a full understanding of the technology and what is involved can be gained. The College put a lot of effort into getting all these matters right.

## Conclusion

The College's experience is that installing a biomass system can be a very worthwhile project, with the "new green technology" expected to deliver a range of educational, environmental and financial benefits. It is therefore hoped that this will be viewed as a flagship project to help inform and inspire others.

