



# THE BIOMASS BOILER

## Bradford woodchip to heat University buildings

These briefing papers describe sustainability actions at the University of Bradford as part of the development of our Ecoversity programme.

These papers are developed through The Sustainable Education Directorate together with University staff and students featured inside, and are part of our commitment to improving communication around Ecoversity.

Comments and feedback are welcome and should be sent to: [ecoversity@bradford.ac.uk](mailto:ecoversity@bradford.ac.uk)

## From fossil fuel to renewable energy

The University currently operates gas-fired boilers to provide heating for buildings on campus. The University has two main boiler houses - one in Richmond Building and one in the J B Priestley library. Burning fossil fuel releases carbon to the atmosphere which is considered to be contributing to global warming. The University currently emits 15,000 tonnes of carbon per annum.

The University engineers have investigated ways of reducing our reliance on gas through investment in renewables and reducing our emissions of carbon. The engineers recommended the replacement of one of the main boiler houses within the J B Priestley library complex with a 500 kW biomass boiler.

## What is biomass ?

Biomass is classed as a renewable energy source and is considered carbon neutral, as the modest amounts of carbon dioxide released during combustion are replaced by what is absorbed as the trees grow. The University engineers have chosen to use woodchip as opposed to wood pellet to fire the boilers because it is available locally. Wood pellet is not yet widely available in the UK and is currently imported, the transport of which largely negates any carbon savings.

Our biomass boiler uses woodchip 30 grade (30 relates to the moisture content). The woodchip is dried for twelve months to ensure consistent quality. The University sources woodchip from a Bradford-based supplier. The woodchip is processed from Forestry Stewardship Council Certified (FSC) woodland.

## Does biomass have any negative impacts ?

Biomass is not the same as biofuel. The term biofuel has come to be commonly used to refer to ethanol and diesel made from crops such as corn, sugarcane and rapeseed. There is considerable debate about the environmental impact of growing biofuels including biodiversity, food supply issues and land-take. Small- scale, well-managed local biomass production can have positive biodiversity benefits.

As biomass becomes a more popular fuel there have been concerns raised about security of supply and it remains to be seen how robust the supply, chain will be in the future.

Further concerns have been raised of 'other' pollutants being released into the atmosphere by the combustion of biomass. This in the main relates to small wood-burning stoves and domestic heating boilers, and depends to a large extent on the cleanliness of the timber.

*“This is probably one of the largest step changes in the reduction of building-emitted carbon that the University can make, which can only enhance Ecoversity.”*

Russell Smith  
Estates Manager - (Engineering)



There is a higher maintenance cost on this type of plant, and some of the technology used has not been used over extended periods in the UK. However, the small additional cost does not affect the positive economic case of the Bradford project.

## What is a biomass boiler ?

Biomass boilers are generally fired on wood products to produce heat, rather than gas, coal or oil. The biomass will be burnt to produce hot water which will be used to heat the J B Priestley library and Communal Building. As biomass varies in quality it is not easy to predict how much biomass we will need each year, but a rough estimate is 500 tonnes. This biomass is stored in the green hoppers behind the J B Priestley library.

## Can we burn paper and old furniture?

The boiler requires a consistent and high quality of woodchip free from metal, varnishes or other contaminants. Hence we have to be very careful about what we burn.

## Costs and savings

The biomass boiler cost £327,000, of which £147,000 was paid for by a grant from DEFRA. The biomass costs approximately 2.5p per delivered kWh although this includes the delivery system to feed the biomass into the boilers. In the past 3 years gas prices have doubled, rising from 1.4p to 2.9p per Unit. The University currently spends over £1 million on gas.

It is estimated that the boilers will save approximately £6,000 per annum at 2008 gas prices. This would mean that the payback on the University investment is around 15 years, although we expect this to be lower as the price of gas is expected to rise whilst the price of biomass is predicted to fall by 2 - 3% in future years as the market grows.

## Carbon reduction

It is anticipated that the biomass plant will save in the order of 500 tonnes of carbon per annum; this will be a step change in carbon reduction on campus and will assist in diversification of the University's energy supply chain. Central Government have announced that they are set to cap building-related carbon emissions. It is expected that from 2010 large organisations (including universities) will be legally required to buy and sell carbon to meet these mandatory targets. With the known information on the scheme, the plant being installed is likely to save the University up to £9,000 p.a., reducing the overall payback period to 8 - 9 years.

## Other benefits

The facility has in-built elements that will allow it to be used for academic purposes. The facility has a viewing platform which allows staff or students to visit the facility and see it in operation.

As well as installing biomass plant, the opportunity is being taken to create an Energy and Recycling centre at the back of the J B Priestley library. The road infrastructure has been improved to allow for the safe delivery of the fuel to the boiler. It therefore made sense to make use of economies of scale to create a cost-effective central recycling facility for the University. This will have the added benefit of tidying up what is currently an unattractive area and making recycling more effective and focused.

## Construction and start-up

Work on the project started in February 2008. The boilers were installed and commissioned in July 2008. They became operational in September 2008 for the start of the next heating season. A second biomass boiler is being installed at the School of Management.

## Links for more information

The Association of University Engineers recently ran a national seminar at Bradford on biomass boiler technology. The presentations from this event can be viewed at:

**[www.bradford.ac.uk/ecoversity/carbon](http://www.bradford.ac.uk/ecoversity/carbon)**

More information on the Forest Stewardship Council certification scheme can be found at:

**[www.fsc.org](http://www.fsc.org)**

UK Biomass Strategy can be found at:

**<http://www.defra.gov.uk/environment/climatechange/uk/energy/renewablefuel/pdf/ukbiomassstrategy-0507.pdf>**

## Further Information

For further information or communication on Ecoversity or this briefing paper email [ecoversity@bradford.ac.uk](mailto:ecoversity@bradford.ac.uk)

For more detail on Ecoversity:  
[www.bradford.ac.uk/ecoversity](http://www.bradford.ac.uk/ecoversity)



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