Green Gown Awards 2012

Highly commended case study

Dissemination supported by: HIGHER EDUCATION FUNDING COUNCIL FOR ENGLAND hefce

European Bioenergy Research Institute (EBRI), Aston University

Research & Development

The EBRI Pyroformer™ – a new sustainable energy solution

EBRI
European Bioenergy Research Institute
Aston University

Profile

- Aston University was founded in 1895 and became a University in 1966.
- Our 40 acre campus in the centre of Birmingham houses our 9,500 students and 1,300 staff.
- Professor Dame Julia King became Vice-Chancellor of the University in 2006.

Section 1 About the project

Summary

EBRI Researchers have developed an innovative bioenergy solution - a Pyroformer™ - that uses waste products to generate cost-effective heat and power and could reduce the world's reliance on fossil fuels.

The Pyroforme™r offers the solution to many of the problems other renewable energy solutions have generated. Tests show that unlike other bioenergy solutions, the Pyroformer™ has no negative environmental or food security impacts. Its use of multiple feedstocks means it does not require the destruction of rainforests or the use of agricultural land for the growth of specialist biocrops.

The process is emission free and following significant R&D investment, the technology is now 'near market'. This is a clean energy source that can ensure energy security and market growth without damaging people or planet.

Section 2 The results

The problem

In 2010 the Coalition Government pledged to support the creation of green technologies through a programme of measures set to fulfill its ambitions for a low carbon and eco-friendly economy. Binding targets to increase the security of energy supply and reduce greenhouse gas emissions have been set for all EU member states with the UK committed to achieving a 15% share of renewable energy by 2020. Ambitious EU targets for CO2 levels - with reductions of 34% by 2020 and 80% by 2050 – have been agreed. Regions across the country have implemented schemes to reduce CO2 accordingly, and in some cases have been more aggressive: Birmingham City Council for instance has committed itself to a target of a 60% reduction of CO2 by 2026.

To achieve these targets will require a near 300% increase in renewable energy production before the end of this decade. Bioenergy is set to contribute more than 50% of this required increase in renewable energy. To meet this energy demand through existing bioenergy technologies however would require an enormous volume of biomass that is four times the height of Big Ben and 1.2km2 to be consumed every year!

With this in mind, EBRI developed the Pyroformer™, using multiple waste products to generate cost-effective heat and power.

The approach

The Pyroformer™ uses a patented heat transfer mechanism to pyrolyse waste material in a single step using a coaxial Archimedes screw system and an externally heated jacket. This intermediate pyrolysis works in contrast to existing slow and fast pyrolysis techniques. As the reaction occurs under controlled heating levels it avoids the formation of tar which is problematic for other forms of pyrolysis. It allows the more efficient coupling with gasifier equipment to produce a consistent gas output that can be mixed with biodiesel to drive CHP engines.

The Pyroformer™ has been thoroughly tested at laboratory scale and with the help of £16.5m ERDF funding, EBRI is constructing a new 'home' on the Aston University campus and industrial scale demonstrators. The first full-scale Pyroformer™ is operational at Harper Adams University College and a smaller scale demonstrator is in rural India. EBRI's new home will be a living laboratory on the Aston University campus where a Pyroformer™, gasifier, CHP demonstrator combination will be operational to provide the heat, electricity and cooling needed for the building.

Performance and results

The Pyroformer™ is scalable to units of 5 -10 MW of electrical power. It is capable of processing up to 100 kg/h of biomass feed and when coupled with a gasifier it will have an output of 400 kWel – the equivalent to providing power for 800 homes. The process is not just carbon neutral, it is *carbon negative* as up to 25% of carbon can be saved as biochar (a by-product) and sequesters which are returned to the soil in the form of fertilizer to increase agricultural productivity.

Section 3 The future

Sharing your project

EBRI is being funded by the European Regional Development Fund (ERDF) to provide a focal point for regional business support and technology transfer and growth opportunities. This £16.5m project is providing the new physical 'home' and demonstrator facilities for EBRI on the Aston University campus as well as the financial support needed to enable EBRI to provide free business support to organisations and businesses within the West Midlands. 100 organisations will be able to benefit from the support on offer from EBRI.

The Institute is also leading an ambitious international €8m European Union INTERREG IVB funded project – BioenNW - project which sees EBRI working with 14 European partners to increase the rate of implementation of bioenergy provision within North West Europe, to reduce carbon emissions, and increase energy security and employment opportunities.

EBRI is demonstrating how real-life solutions for tackling biomass based residues and waste can be achieved, with both environmental and financial benefits for households, businesses and local authorities.

What has it meant to your institution to be highly commended at the Green Gown Awards?

Aston University is committed to improving its environmental performance. This Award gives recognitions to this significant breakthrough in sustainable energy provision technology and demonstrates the critical role universities play in developing the solutions for the future of society.

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Further information

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