

# Brookside Recycled Energy from Waste Community Interest Company Small scale Anaerobic Digestion scheme for food waste

## Development Plan Summary (Telford, Birmingham, UK)

**Overview: Brookside Recycled Energy from Waste (BREW) Community Interest Company (CIC) received support through the BioenNW project to explore the feasibility of installing a small scale anaerobic digester (AD) at the heart of the residential community of Brookside, Telford. The AD unit would provide a renewable heat source for the large Community Centre which is currently being redeveloped, as well as providing a small income through the Feed-in Tariff.**

### Project detail

The European Bioenergy Research Institute (EBRI) at Aston University, UK reviewed the overall efficiency of the system, conducted a sensitivity analysis to show how the scheme could be expected to perform under different external costs and operating conditions, and replicated a business model presented by the supplier.

The sensitivity analysis conducted showed the effect of changing one variable by a given percent and measuring the effect on an output variable, in this case this was the change in the payback duration. The five key operational variables that would have the most significant impact on the project were:

- operating hours per annum
- utilisation of heat per annum (kW<sub>h</sub>)
- feedstock cost (£/t)
- electricity price (p/kWh)
- heat price (p/kWh)

EBRI further supported BREW in generating a list of queries which would need to be addressed by the developer and the technology provider. This included considering options for the management of the digestate produced. It was possible to approximately model the financial case presented with some assumptions.

This modelling of the financial case added an additional level of depth to the resilience of the proposed installation.



## Outputs

The initial cash flow provided by the technology provider gave an expected payback period of under 5 years. When the model was reviewed with project specific assumptions the payback duration was slightly extended to 5 years which was mainly due to the adjustment of incentive revenue to match the expected level of heat utilisation.

## Future developments

This work also considered the integration of AD and pyrolysis. EBRI is undertaking extensive research to investigate the integration of these two bioenergy processes as well as the significant economic and environmental benefits that the coupling of these processes can generate. EBRI's innovative intermediate pyrolysis reactor – the Pyroformer™ – is able to convert the residues from AD processes (digestate) into fuels for heat and power generation, creating a second energy recovery phase from the original waste material and therefore increasing the overall efficiency of the process. Furthermore, the introduction of the Pyroformer™ can also enhance the gas yield produced by the digestion process.

Research undertaken by EBRI has shown that the biogas yield from AD can be increased by up to 15% through incorporating the water fraction produced through pyrolysis into the digester tank. Anaerobic

micro-organisms can break down the soluble volatile organic acids present in the pyrolysis water, biochemically converting these acids into methane – a valuable fuel gas.

The coupling of AD and pyrolysis can offer the following benefits:

- the residue from AD can be used as a feedstock for the Pyroformer™
- gas yield from the AD system can be increased by 15%
- transportation cost can be reduced by removing the need for waste disposal
- AD does not need to be linked to a land bank as the process can take place in a city centre
- production of quality fertilizer in the form of odourless biochar which can be easily stored and transported

This development plan has been produced through BioenNW – a €7.9m strategic initiative of the European Union INTERREG IVB North West Europe Programme (2011-2015). BioenNW is led by the European Bioenergy Research Institute at Aston University, UK and sees 11 partners working together to deliver small-scale bioenergy schemes throughout North West Europe.



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