

INTEGRATING MODERN GAS ENGINES INTO BIOMASS CHP PLANT

LEAD ORGANISATION

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COST AND DURATION

The Carbon Trust contribution towards this project is £50,000. The project started in November 2006 and is due for completion in April 2008.

PROJECT REFERENCE

NUMBER
062-055

OBJECTIVES

The objective of this project is to overcome the following issues that prevent the full exploitation of modern gas engines in biomass CHP plants:

- Quality issues associated with gas produced from biomass in a gasifier (tar and particulate levels)
- Engine management issues (lambda and power control, and knocking detection and prevention).

SUMMARY

The use of modern, efficient, gas-fuelled engines is essential for maximising the economic viability and minimising the environmental impacts of biomass combined heat and power (CHP) plant.

Biomass CHP Ltd has been developing biomass CHP projects for nearly ten years. Early research and development was carried out at the Blackwater Valley Museum (BWV) in Armagh, Northern Ireland using a dual-fuelled, normally aspirated diesel engine to drive the generator. On the basis of this development, the company won a contract to supply a 130kWe unit to the prestigious BEDZED site in Croydon.

To adhere to the BEDZED ethos of zero fossil-fuel usage, a modern gas engine was installed and powered by gas from a biomass gasifier. However, the gas cleaning and engine control systems developed at the BWV site were totally inadequate for these modern, turbocharged, inter-cooled gas engines. The result was poor reliability and high manpower requirements.

The exploitation of this technology will not be possible until it is fully automated and capable of operating with only minimal manpower requirements.



The Blackwater Valley Museum site

This project aims to achieve this in the following three phases:

- Phase one comprises installing and evaluating an advanced gas-cleaning and computerised engine management system (EMS) at the BWV site, which has a 200kWe gas engine
- Phase two is to fully automate the gas cleaning system and use the engine data to complete the development of the EMS. This will be integrated within the existing biomass CHP unit at the BWV site to create a fully automated biomass CHP unit that fully utilises the benefits of modern gas engines
- Phase three is to operate the unit for an extended period to generate information on the performance and reliability of the unit

To date, biomass CHP units have not been able to compete against fossil-fuel-fired CHP units or biomass combustion systems due to a lack of reliability and commercial operating data. However, if this project can demonstrate reliable operation and produce commercial operating data, then the application of biomass CHP technology will produce significant carbon savings over these competing systems.

