

Measurement of the energy yield from the biobased fraction of mixed waste

BRIEF

AN INTRODUCTION TO SBRI

SBRI is a mechanism which enables public sector bodies to connect with innovative ideas and technology businesses to provide innovative solutions to specific Public Sector challenges and needs.

The Public sector is able to find innovative solutions by reaching out to companies from different sectors including small and emerging businesses. New technical solutions are created through accelerated technology development, whilst risk is reduced through a phased development programme. SBRI also provides business with a transparent competitive and a reliable source of early-stage funding.

SBRI competitions are open to all companies. The SBRI scheme is particularly suited to small and medium-sized business, as the contracts are of relatively small value and operate on short timescales. Developments are 100% funded and focused on specific identified needs, increasing the chance of exploitation. Suppliers for each project will be selected by an open competition process and retain the intellectual property generated from the project, with certain rights of use retained by the contracting Department. This is an excellent opportunity to fund development of a new technology.

Summary

Decc and the Technology Strategy Board are launching this competition on the development of methods to measure the energy yield from the biobased fraction of mixed waste. This follows on from the recent competition the TSB arranged with Defra which focused on determining the biogenic energy content of a range of mixed waste streams prior to their use for energy recovery. In this competition we would like to move the focus to measuring the renewable energy output from all wastes, especially mixed streams, that may be utilised across the whole range of energy conversion technologies listed in the Renewables Obligation Order 2009. (thus widening the focus from just combustion to all technologies, and concentrating on measuring the actual energy output from mixed wastes which is renewable, rather than the renewable content of the waste feedstock itself).

Department of Energy and Climate Change (Decc)

Decc is the government department responsible for energy and climate change policy.

The UK government is working to achieve a legally-binding EU target of 15% of energy generation from renewable sources by the end of 2020. In order to do this there must be an increase in renewables from the current level of 3% in 2009 to 15% in 2020

This will bring significant benefits to the UK. By 2020 it will:

- Reduce the UK's harmful carbon emissions by over 190MT and contribute 73MT of carbon savings over the third carbon budget period (2018-2022);
- Contribute to our future energy security, by increasing the diversity of supply and reducing fossil fuel demand by 10% and gas imports by 20-30% from what they would otherwise have been;
- Create opportunities for the UK economy, with the potential to create up to 500,000 new jobs from the estimated £100billion of private sector investment required to achieve the target (as highlighted in the Renewable Energy Strategy 2009).

Background and Challenge

Energy from waste has an important contribution to make in tackling climate change. It can mitigate climate change, not only by displacing fossil fuels, but also by reducing emissions of methane from landfill. Energy from waste can also contribute to renewable energy targets, improve our energy security and create new business and job opportunities.

The UK government is committed to increasing the proportion of energy we obtain from bio-based waste. In 2009, 2.3% of total UK electricity was generated from all types of energy from waste plants. There is huge potential for this to increase, but a number of barriers to overcome to realise this. The UK currently produces significant quantities of biomass waste each year. Waste tends to arise /be collected in 5 main waste streams:- municipal, commercial and industrial, construction and demolition, agricultural and sewage. All include elements that are bio based and suitable for renewable energy production, for example waste wood from the demolition of buildings, waste paper and board; crop residues such as straw; agricultural wastes such as poultry litter, manures, slurries; sewage sludge; and food waste.

The use of waste to produce electricity is supported under the Renewables Obligation (RO). This is the Government's main mechanism to incentivise investment in eligible renewable electricity generation technologies. The RO issues tradable Renewables Obligation Certificates (ROCs) to generators for qualifying generation. Under the RO, Advanced Combustion Technologies (such as advanced gasification, advanced pyrolysis and anaerobic digestion) receive 2 ROCs per MWh. Energy from Waste with combined heat and power (CHP) plants receive 1 ROC per MWh. Energy from Waste plants without CHP, e.g. straight incineration plants, are not supported. Support for electricity generation from small-scale anaerobic digestion plants under 5 MW is available through the Feed-in Tariffs Scheme.

The Renewables Obligation Order 2009 (ROO 2009) included provisions to make it easier for operators using waste for eligible electricity generation under the RO to claim ROCs on the renewable energy content of that waste. Under these provisions the fossil fuel energy content of municipal mixed waste is deemed to be 50% from 2009 to 2013; 60% from 2013 to 2018; and 65% from 2018.

The ROO 2009 allows Ofgem to award ROCs¹ on up to 50% of the total energy content of the waste fuel stream to operators who satisfy evidential requirements without necessarily requiring those operators to directly measure the renewable energy content of the waste. Where an operator wishes to claim ROCs on more than 50% of the total energy content of the waste fuel stream they will be required to directly measure the renewable energy content of the waste.

A scheduled review of bands under the RO began in October 2010 . DECC intends to consult on new banding proposals in Summer 2011 and confirm the new bands by Autumn 2011. The new bands will take effect on 1 April 2013, subject to State Aids and Parliamentary approval.

Aim of the Competition

The aim of this competition is the development of methods to measure the **energy output from the biobased fraction of mixed wastes, as accurately as possible, on a basis acceptable to Ofgem.**

While the practice of deeming allows project developers to base their pre-investment financial models on a fixed, albeit declining, financial assumption concerning the level of ROC income this is only an interim solution and it is widely recognised that cost effective measurement may bring a number of advantages, namely:-

- The UK will be able to count all renewable energy derived from biobased waste towards its renewable target.
- Biomass measurement techniques and supporting methodologies approved by Ofgem will strengthen the industry as they will be able to claim ROC s
- Measurement methods can be built into projects and included as part of the initial investment cost
- Allow operators to claim ROCs on actual biomass content, rather than the deemed level of biomass, where appropriate

This will help to develop an agreed accurate technique or method to measure energy output from all types of mixed wastes so that all renewable energy generated from bio based wastes is counted towards our targets. It will also allow us to make full use of potentially untapped waste resources, and ensure that industry receive the appropriate ROCs.

Scope

The objective of this competition is to identify and develop methodologies, techniques or technologies capable of measuring **the energy output from biobased waste.** The accuracy of the method proposed must not depend inherently upon the sampling of the mixed waste stream itself, beyond that which may be required for purposes of calibration.

¹ For illustration the value of a ROC to a supplier was £49.16 per MWh at June 2010 making this by far the most valuable element of support for renewable energy projects. This can vary on a daily basis.

Whilst methods such as Carbon-14 provide an accurate method of determining renewable carbon content, they do not give a direct measure of energy content and this challenge seeks to address a means of providing a transparent method for determining the renewable energy content from a variety of renewable waste streams.

In assessing both proposals and proof of concept studies we will take into account the following:

- Suitability of the approach
- Robustness and accuracy of the approach including a thorough (ideally quantitative) consideration of sources of error
- Speed of acquisition / processing of data Whatever method is employed, the approach should allow the collection, analysis and presentation of data in a form that is acceptable to Ofgem²
- Cost-effectiveness and practicality of the approach for operation with high-volume, and highly heterogeneous waste streams

For Phase 1 of this competition, the main deliverable will be a proof of concept study for the methodologies, techniques or equipment to achieve the competition objective.

Subject to a satisfactory response to Phase 1 of this competition, a Phase 2 competition may take place in 2011 to further develop promising approaches to this challenge.

APPLICATION PROCESS

Directions on how to enter this competition can be found in the Invitation to Tender (SBRI_Decc-Defra_Invitation to Tender). The Invitation to tender and instructions on how to register for the full set of competition documents will be available on the SBRI competitions website when the competition opens on 24 January 2011.

<http://www.innovateuk.org/deliveringinnovation/smallbusinessresearchinitiative/competitions.ashx>

More information on other competitions may be obtained at www.innovateuk.org

² For example, see Ofgem's Fuel Measurement and Sampling guidance at <http://www.ofgem.gov.uk/sustainability/environment/RenewablObl/Documents1/FMS%20final.pdf>