Proceedings of the Institution of Civil Engineers
Energy 160
May 2007 Issue EN2
Pages 49–50
doi: 10.1680/ener.2007.160.2.49
Paper 700008
Keywords:
energy/renewable energy/waste management & disposal

Briefing: ICE and RPA report on potential of waste to energy

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1. BACKGROUND

The requirement to meet the UK's obligations under the EU landfill directive has resulted in a need to procure and deliver a new network of waste treatment facilities. This provides an opportunity to shift the UK's approach to waste from one of managing disposal and its environmental consequences towards maximising the value extracted from discarded materials. Reuse, recycling and composting will of course be important elements of the new system. Energy from waste (EfW) is a good option for the residual fraction of waste left after recycling targets have been met. In addition, the biological fraction of this material can be considered as a source of renewable energy and can thus contribute to meeting the UK's targets for electricity generation from renewable sources. ICE and the Renewable Power Association (RPA) felt that a lack of hard data on the potential of EfW was contributing to its low profile with policy makers—a situation which could lead to the UK missing out on a significant opportunity.

To address this issue, ICE and the RPA commissioned a study, *Quantification of the Potential Energy from Residuals (EfR) in the UK*, which was published in March 2005.[1] The study, conducted by Oakdene Hollins Ltd, had three overriding objectives.

(*a*) Objective 1: to assess the potential electrical yield from the UK's residual waste up to 2020.
(*b*) Objective 2: to assess the contribution that energy recovery from residual waste could make to the UK's targets under the EU renewable energy directive.
(*c*) Objective 3: to assess the additional contribution to the UK renewables obligation (RO) if eligibility for renewables obligations certificates (ROCs) were extended to all techniques for recovering energy from residual waste.

The report focused on energy that could be recovered from residual waste material left over after achievable levels of recycling and composting have been carried out. There are of course debates on the optimal level of recycling. For the purpose of the study it was assumed

(*a*) that non-statutory targets set by the Cabinet Office strategy unit for recycling or composting at least 35% of household waste by 2010 and 45% by 2015 would be met
(*b*) that the 45% target would persist between 2015 and 2020
(*c*) that recycling and reuse of commercial and industrial (C&I) waste would increase from 39% in 2001 to 46% in 2020. This figure was based on projections from English regional assemblies.

The study then analysed the composition of waste and its likely change over time with increased recycling. These figures were used to assess the calorific value of residual waste over time and thus the potential for electricity generation. Within this global figure the study also assessed the tonnages and calorific value of the biodegradable fraction of municipal waste. This latter figure was important as this was the source of energy with the potential to contribute to the UK's EU renewables directive targets and also of interest in any reformed version of the RO.

2. RESULTS

2.1. Objective 1

The study found that the potential yield from residual municipal and commercial and industrial (C&I) waste amounted to 17% of total UK electricity consumption in 2020. It is important to understand that this is a theoretical figure based on all the above waste being treated by the process with the highest yield rate, in this case mechanical and biological treatment (MBT), producing solid recovered fuel (SRF) for use in conventional power stations. Setting a theoretical maximum is, however, a useful first step towards setting an achievable target. While further work is required to set a meaningful target, a figure of even 5–10% of UK electricity consumption would be significant. It would also contribute to broader policy goals of generating more of the UK's electricity from indigenous sources while increasing diversification of supply.

On the report's model the gross thermal value of all residual waste was calculated as 708 000 terajoules (TJ) in 2005, rising to a projected 722 000 TJ in 2020. The calculation also assumed a net generation efficiency of 40% for power stations. The current UK average is 34%. The study sought, however, to establish the potential maximum electricity yield over the period to 2020 so it was considered appropriate to use current best rather than average practice in the expectation that there would be a trend towards better performance.

2.2. Objective 2

Using the analysis above, it was possible to separate out the energy generation potential of the biodegradable fraction of UK residual waste. This was then used to assess the theoretical maximum that using this material for energy generation could contribute to meeting the UK's EU directive target of sourcing 10% of gross electricity consumption from renewables by 2010. The UK's 2010 obligation was calculated as 35·5 tera Watt hours (TWH). The study found that if all residual municipal and C&I waste were treated by the optimal method described above it would yield 40·5 TWH in 2010. Again this figure should be used with caution as it is based on a theoretical maximum rather than an assessment of the likely waste treatment options that will be used in the UK.

2.3. Objective 3

Under this objective, a more realistic assessment of the potential contribution to renewables targets was made, based on modelling of future waste treatment options conducted by the Cabinet Office strategy unit. While counting towards EU targets, energy generated from mixed wastes only counts towards the UK government's domestic RO if converted through selected technologies. Using the strategy unit's technology forecasts and assuming an average net generation efficiency of 25·4% from 'conventional' EfW, the study found that if eligibility to ROCS was extended to energy generated from biodegradable residual waste, irrespective of technology choice it could contribute

(*a*) 9·1 TWH or 26% of RO in 2010 (2·5% of total UK consumption)
(*b*) 16·25 TWH or 23% of RO in 2020 (4·3% of total UK consumption).

Following the publication of the ICE/RPA study, the UK Department for Trade and Industry (DTI) conducted a review of the RO. This review concluded that conventional EfW was economically viable without the support provided by the RO and therefore declined to extend eligibility for ROCs. In addition there was concern that bringing EfW into the RO could undermine confidence in the fledgling system and divert ROCs away from other technologies in which the energy sector was in the process of making major investments. The DTI did however commit itself to working with the Department for Environment, Food and Rural Affairs to examine how further take up of EfW could be facilitated.

3. CONCLUSION

The ICE/RPA study has highlighted that there is a significant, indigenous source of renewable energy that the UK could exploit. At a time when energy policy is focusing on diversity and security of supply and reducing the UK's overall carbon footprint, this is an important finding.

REFERENCE

1. Lee P., Fitzsimmons D. and Parker D. *Quantification of the Potential Energy from Residuals (EfR) in the UK*. Institution of Civil Engineers/Renewable Power Association, London, 2005. Available at: http://www.ice.org.uk/downloads/energy_from_waste.pdf