

## UK - cutting the carbon impacts of waste

### *A batch of excellent reports, coming usefully ahead of the new English waste strategy.*

A clearer picture of how waste can be managed to reduce its impacts on climate change emerges in new research. The reports (from RRF members ERM & Eunomia) anticipate the greenhouse gas effects of the UK's main waste streams between 2005 and 2031, and assess the different ways of dealing with household garden and food waste.

### **ERM report Carbon Balances and Energy Impacts of the Management of UK Wastes**

Findings illustrate that some materials and management routes show significant potential for greenhouse gas emission and fossil energy demand savings. Although there are a number of uncertainties (see below), the largest potential, over and above current recovery efforts, is with regard to:

- ♣ energy recovery via anaerobic digestion of agricultural manures/slurries
- ♣ energy recovery via combustion of waste wood
- ♣ recovery of both resources (through recycling) and energy (through combustion) from waste paper and card
- ♣ recycling of non-ferrous metals.

The energy benefits estimated for these materials and management routes equate to a combined saving in the region of 88 to 202 PJ-equivalents per year over the period assessed. This is equivalent to approximately 1-3% of UK energy consumption in 2003. Discounting the influence of relative material arisings, on a tonne-for-tonne basis the recycling of textiles and plastics and energy recovery via anaerobic digestion of kitchen and green wastes and combustion of crop and other organic wastes also show significant potential for benefit. It was our objective to assess the broad alternatives for managing waste materials and identify where potential benefits might lie.

Four core scenarios were developed to assess the management of waste arisings over the period 2005 to 2031:

1. **baseline scenario** - reflecting best current estimates of waste material arisings and management, and assuming that this will not change
2. **high resource recovery scenario** - reflecting increased rates of recycling and composting over the period
3. **high energy recovery** - reflecting increased rates of energy recovery via thermal processing technologies (with energy recovery) or anaerobic digestion
4. **combined recovery** - reflecting a combination of both resource and energy recovery.

Each scenario was designed to assess the maximum performance theoretically achievable for each waste material, in the absence of current policy or infrastructural barriers. The maximum limit was set based on best performance demonstrated across Europe - under the proviso that if it has been achieved elsewhere, it is 'theoretically achievable' in the UK. The major flows of both carbon/greenhouse gases and energy through waste management systems result from:

- ♣ ancillary requirements for fuel and energy in processing and transporting materials
- ♣ direct releases from waste fractions on processing (eg biological processing or combustion) or disposal in landfill
- ♣ avoidance of greenhouse gas emissions or energy use elsewhere in the economy
- ♣ sequestration of carbon in soils.

The ERM report shows that recycling has significant benefits over landfill, particularly in terms of reduced greenhouse gas emissions, for:

- ♣ non-ferrous metals such as aluminium
- ♣ plastics

- ♣ textiles
- ♣ paper and card
- ♣ food and garden waste (particularly by anaerobic digestion, which produces heat and power).

Glass was not specifically covered as it is a small proportion of the total waste streams with relatively high recycling rates. However, other recent research has found significant environmental benefits from recycling glass, particularly back into containers .

For waste wood, the research established that both energy recovery and recycling bring environmental benefits. In general energy recovery is shown to offer a greater reduction in greenhouse gas emissions than recycling. However the extent of the benefit will be dependent on the type of wood waste, the level of contamination, and whether reuse options are available.

For paper and card, recycling brings the greatest environmental benefits. This is consistent with other recent published work. The net impacts projected for different options in the future will depend on what assumptions are made about technological change and energy use.

For garden and food waste, all three reports show that minimising the amount of these materials going to landfill is better, both in terms of environmental impact and, increasingly, cost. Anaerobic digestion in particular, but also composting, brings about a net reduction in greenhouse gas emissions, although there is uncertainty over the scale of the reduction that can be attributed to composting. This uncertainty will be addressed in a further Defra-funded study to be published in the next 18 months.

The Eunomia research shows that there can be real cost and environmental gains from collecting garden and food waste separately from each other. This enables the processing costs to be minimised and can increase the amount of food collected. In terms of environmental impact, anaerobic digestion of food waste in particular performs best. The Eunomia Food waste report suggests that if the 5.5 million tonnes of food waste in the UK were targeted for separate collection and anaerobic digestion, between 477 and 761 GWh/year of electricity would be generated - enough to meet the needs of up to 164,000 households.

There is clear evidence that to achieve the lowest financial and environmental costs, decision makers need to take a whole system approach, which considers options for treatment together with those for collection systems. The research results will contribute to Defra's revised Waste Strategy, due for publication this Spring.

The ERM report **Carbon Balances and Energy Impacts of the Management of UK Wastes Defra R&D Project WRT 237** is available on the Defra website at:

[http://www2.defra.gov.uk/research/project\\_data/More.asp?I=WR0602&M=KWS&V=Carbon+balance&SUBMIT1=Search&SCOPE=0](http://www2.defra.gov.uk/research/project_data/More.asp?I=WR0602&M=KWS&V=Carbon+balance&SUBMIT1=Search&SCOPE=0)

We can send you an entire PDF (3.5 MB) on request.

**EUNOMIA FOOD WASTE REPORT - Dealing with Food Waste in the UK  
Dominic Hogg, with Josef Barth, Konrad Schleiss and Enzo Favoino**

In considering the financial costs, the report finds:

- ♣ Systems which include free garden waste collections tend to be more costly per household than those which target food waste only. In general, systems collecting garden waste, or mixed garden and food waste, fortnightly and free of charge, are more expensive than systems collecting food waste weekly. Encouraging householders to compost garden waste at home, where possible, reduces the risk of attracting extra material into the waste stream. Home composting promotion is also popular with gardeners, favourable on environmental grounds and can improve the economics of kerbside garden waste collections
- ♣ The additional cost associated with adding food waste to an existing free garden waste collection is significant. This is because the resulting mixture of food and garden waste must be treated by in vessel systems, which are more expensive than windrow composting of

garden waste. In general this is a very expensive way of treating small amounts of food waste

- ♣ Collecting only food waste allows the processing costs to be minimised and can increase the capture rate. There is barely any difference in cost between the systems in which a) all garden waste collected at household waste recycling centres (HWRCs) is composted in windrows, and food waste is digested anaerobically; and b) all food waste and garden waste (collected at HWRCs) is composted at in-vessel systems. If the garden waste is processed by anaerobic digestion (AD) along with the food waste collected at kerbside, the costs are significantly higher. This is because windrow is a much cheaper way of treating garden waste than AD
- ♣ As the costs of residual waste management increase, so the benefits of separate biowaste collections increase, relative to the baseline (in which no biowaste is collected)
- ♣ Overall where home composting is promoted intensively by local authorities the financial costs of the biowaste management system are likely to be lower than in situations where this does not happen and it is a popular option for gardeners.

On environmental costs, the report finds:

- ♣ If the system chosen for biowaste collection and treatment is separate collection of food waste coupled to anaerobic digestion, the environmental performance of the system is likely to be the best compared to all the other systems examined in this report
- ♣ The work re-affirms the results of earlier studies concerning the relative merits of open-air windrow composting, in-vessel composting and anaerobic digestion systems
- ♣ The performance of the systems relative to residual waste treatment is influenced by:
  - ♣ The quality of the residual waste treatment
  - ♣ The assumptions regarding the unit environmental damage costs.

However, it seems that separate collection systems targeting biowaste are likely to show greater environmental benefits than collecting food and garden waste together.

The Eunomia reports are (or will be) available on WRAPs website at:

#### **Dealing with Food Waste in the UK - Final (0.8 MB)**

[http://www.wrap.org.uk/downloads/Dealing\\_with\\_Food\\_Waste\\_-\\_Final\\_-\\_2\\_March\\_07.bbee7f17.pdf](http://www.wrap.org.uk/downloads/Dealing_with_Food_Waste_-_Final_-_2_March_07.bbee7f17.pdf)

We can email you a copy, on request.

#### **Managing Biowastes from Households in the UK: Applying Life-cycle Thinking in the Framework of Cost-benefit Analysis.**

The second report provides further details on the cost-benefit analysis for dealing with food and garden waste. It is the first major study of its kind in the UK and shows how cost-benefit analysis can help inform decision making. This comprehensive 400 page report will be published later in March, together with a short summary of the research.

THIS INFORMATION COMES TO YOU FROM THE RESOURCE RECOVERY FORUM. DON'T FORGET THIS COMES FREE OF CHARGE TO YOU AS A MEMBER OF RRF. **WE CAN ADD ANY OF YOUR COLLEAGUES TO THIS SERVICE, ALSO FREE OF CHARGE** - THEY NEED THE SAME EMAIL DOMAIN (ie the suffix after @). JUST EMAIL THEIR ADDRESS TO US FOR IMMEDIATE ACTION. IF THIS EMAIL SERVICE IS SIMPLY TOO MUCH, YOU CAN OPT FOR THE WEEKLY DIGEST SERVICE - JUST SEND US AN EMAIL.

---

Resource Recovery Forum, 1st Floor, The British School  
Otley Street. Skipton, North Yorkshire BD23 1EP. UK  
Director: Kit Strange  
Tel: +44 (0) 1756 709 808  
Fax: +44 (0) 1756 709 801  
Email: [info@resourcesnotwaste.org](mailto:info@resourcesnotwaste.org)  
www: [www.resourcesnotwaste.org](http://www.resourcesnotwaste.org)

\*\*\*\*\*