

# “Less is more”: Business Opportunities in Waste & Resource Management



*Photos courtesy of DHL Supply Chain and JD Wetherspoon*

March 2010

# BIS

Department for Business  
Innovation & Skills



**defra**  
Department for Environment  
Food and Rural Affairs

Information about this publication and further copies are available from:

Defra,  
Commercial and Industrial Waste,  
6D, Ergon House,  
London SW1P 2AL  
020 7238 4332  
Email: [commercialandindustrialwaste@defra.gsi.gov.uk](mailto:commercialandindustrialwaste@defra.gsi.gov.uk)

© Crown copyright 2010

Copyright in the typographical arrangement and design rests with the Crown.

This publication (excluding the royal arms and departmental logos) may be reused free of charge in any format or medium provided that it is reused accurately and not used in a misleading context. The material must be acknowledged as crown copyright and the title of the publication specified.

**Acknowledgements:**

Thank you to all those individuals and companies who contributed to the development of this report.

This document is available on the Defra and BIS websites:

<http://defra.gov.uk/environment/waste/index.htm>

<http://bis.gov.uk/policies/new-industry-new-jobs>

Published by the Department for Environment, Food and Rural Affairs

# Contents

<b>Joint Ministerial Foreword</b>	3
<b>Executive Summary and Recommendations</b>	4
<b>Business Opportunities</b>	7
Waste Minimisation	7
Design and Production	7
Extended Product Life	7
Procurement	8
Product Service Systems	8
The Management of Waste	10
Commercial and Household Waste	10
Recycling and Reprocessing	11
Food Waste	12
Paper/Card	12
Glass	13
Plastics	13
Commodity Market Development	14
Infrastructure and Technology	15
Moving the Agenda Forward	17
<b>Annex A</b>	18
New Industry, New Jobs	18
Supply Chain Analysis	18
<b>Annex B</b>	19
Supply Chain Analysis of the Waste Management Sector	19

## Joint Ministerial Foreword

As the global economy returns to growth, it is essential that British business is in a strong position to take advantage of the new opportunities that emerge.

British businesses, and the British economy as a whole, have some fundamental strengths – science and innovation, advanced manufacturing and world-leading business services. But the Government realises that there is more that it can do to help businesses exploit new opportunities across a changing global economy.

We understand that in devising policy or introducing new regulation, Government affects how markets work and impacts on businesses and the commercial world more generally. We need to look strategically at the different ways in which Government shapes the markets in which British businesses operate. This is particularly true of the waste management market, which is framed by regulation and taxation.

Defra and BIS joined forces to take a close look at business's use of material resources and waste. We set out to understand the barriers and incentives to more efficient resource use, the business opportunities if those barriers are overcome and the potential for government action.

We have identified opportunities for British businesses across the supply chain, from product design and manufacture, through to management, recovery and re-use of materials. In all of these areas, economic and environmental benefits go together. These are opportunities which support a healthy natural environment and the sustainable use of resources.

In doing this, the Government has started to build a deeper relationship with business. This means earlier and more open discussions. It means joint teams from different departments having a single conversation and making more effective use of business people's time. And it means making better use of business expertise when designing and implementing policy, so that the objectives are delivered in a way that also supports growth.

In the spirit of shared enterprise, we are delighted to be publishing this document which sets out a clear direction for our two departments and for business in this important area. We believe this is a model that should inspire a new form of relationship with British business over the coming years.



**Pat McFadden**  
**BIS**



**Dan Norris**  
**Defra**

## Executive Summary and Recommendations

In April 2009, *New Industry New Jobs* underlined the Government's commitment to taking positive measures to support economic growth. It promised closer collaboration between government departments in designing policy, earlier and more open discussions with business, and a specific focus on identifying the opportunities for British business as government policy is developed.

Taking the principles of the *New Industry New Jobs* agenda, Defra and BIS have been working together to identify the opportunities which exist for business, now and over the next few years, in using and managing material resources and waste more efficiently.

This work has identified that the area of greatest business opportunity lies in **reducing or eliminating waste at source**, when materials have most value and none of the costs of disposal or treatment have been incurred. These opportunities occur throughout the supply chain and across all businesses. For the waste management sector, it is a chance to use their expertise to deliver higher value-added services and share knowledge in resource efficiency from the design stage onwards.

*"We have to go higher up the chain and offer our services as consultants and then specialise further down the chain in tighter and tighter recovery, for instance with the precious metals in mobile phones. We need to focus on value rather than volume. It's a time of great change and it requires thinking through."* (Chartered Institute of Waste Management)

### Development of new business models

From design and production through to purchasing and product use, there are opportunities for **new business models to be applied to existing markets**. These include improving the efficiency of material use and the durability of products at the design stage, process improvements in manufacturing and the development of product service systems ("goods to services") that facilitate repair and refurbishment rather than outright replacement.

Defra and BIS will work with business to develop the evidence base across a range of product sectors, taking into account the opportunities for the repair, maintenance and servicing sectors. We will identify the factors that contribute to successful models, their drivers and barriers for adoption and build up a programme of work to address these.

### Innovative collection

There is an opportunity for the **improved collection and sorting** of waste from smaller companies and commercial premises, allowing the value in these materials to be recovered. Defra's proposed change to the definition of municipal waste will help to encourage this. Defra will support innovative ways of collecting waste, and is currently trialling a range of different waste collection systems for SMEs. The lessons from these pilots will be used to support local authorities and the waste management sector develop long-term, sustainable solutions across a range of different situations.

Defra will also encourage and advise local authorities who are looking for contract arrangements with waste service suppliers which incentivise waste reduction. There is a significant opportunity to build on the limited examples of this type of contract which currently exist.

There are also opportunities for British companies with a process engineering capacity to manufacture more of the equipment deployed in waste management infrastructure.

## Executive Summary and Recommendations

### Market development

Procurement can have a powerful role in shaping markets and driving demand for new technologies and processes. There are significant business opportunities which can be supported by existing Government mechanisms such as Buy Sustainable Quick Wins or Forward Commitment Procurement.

In waste collection and reprocessing, the main opportunity is in **the development of new markets for recovered products** so that materials currently seen as waste come to be seen as a valuable resource for another process or sector of industry. There are mature markets in several products already, including most metals, paper and glass, and significant opportunities in areas such as plastics, coloured glass and food waste.

Defra will continue to support work on the development of markets in recovered materials, led by the Waste and Resources Action Programme (WRAP). We will promote market transparency and the development of standards, such as the “quality protocols” or end-of-waste criteria which are designed by the Environment Agency and WRAP to encourage the use of recovered materials in place of virgin materials.

Defra will continue to fund the South East *Pathway to Zero Waste* through 2010/11 and, in particular, support its planned pilot commodity trading scheme for recovered materials, drawing on this experience to determine whether additional intervention is required to develop better functioning markets for specific waste material streams.

Finally, Government will consider the extent to which, without seeking unrealistically to track every material or product, a better understanding of key material resource flows through the economy might help identify how more of the economic value of those materials can be retained in Britain, strengthen our understanding of our domestic material resource security, and promote closed loop recycling systems.

### Working with Business

Government wants to deepen its relationship with business. Defra and BIS commit to **engaging with business at an early stage** in the development of policy, building on existing relationships where possible, developing new ones where necessary. We will develop and promote these principles across departments. The design and implementation of regulations and other Government interventions will be informed by dialogue and shared analysis with business, linking economic growth with environmental outcomes throughout the policy making process.

Defra and BIS will continue to **work together in joint teams** to deliver on this ambition and will play an active role in helping British business to take advantage of opportunities across the waste and resource economy.

*“I firmly believe policy should come out of Government talking openly with business. You need the industry’s expertise and you need them on your side.” (Shanks)*

# Executive Summary and Recommendations

## Changing Perceptions

Defra and BIS will work with the waste management sector and major business producers of waste to **transform the perceptions of waste**, to focus on it as managed resource, rather than simply a cost for business to bear. Waste companies can become long-term partners in the efficient management of resources, valued for their professional expertise and advice.

*“We have a lot of work to do to communicate what we really do and who we really are. Take the trade in recycled commodities for instance. That is often told as a ‘UK dumps rubbish in the Third World’ story when actually we’re exporting recycled commodities they really need.” (Viridor)*

Defra and BIS will promote evidence based debate. With the Department for Energy and Climate Change, Defra is leading work on Energy from Waste technologies, examining current challenges and opportunities, with the aim of providing clarity and guidance. Defra will encourage waste technology projects which involve and engage local residents so that they are seen as an asset to the community.

*“Unless we improve communications with the public, we (industry) will continue putting forward developments which will leave them behind in terms of their understanding of the benefits that can arise. These developments need public support and involvement to be successful (Cory Environmental).”*

Defra, BIS and WRAP will spread best practice and innovation through research, case studies and specific events, in particular to suppliers and smaller companies. We will do this in partnership with the network of Regional Development Agencies, trade associations and individual companies. We will raise awareness of the opportunities which exist in this sector and encourage deeper partnerships between waste management firms and their customers. To begin this process, Defra and BIS will bring together representatives of small businesses and waste management contractors to address the barriers to more widespread and sustainable recycling of commercial waste.

With waste produced across all sectors of the economy, and throughout supply chains, it is a business imperative to look for opportunities to prevent waste from arising in the first place and to manage the waste that does arise more effectively.

## Waste Minimisation

The most valuable opportunities for business centre on the efficient use of resources and reduction or elimination of waste. By optimising the resources associated with a product, businesses can provide the market with effective product at minimum environmental impact. In many cases this will also provide a lower-cost product, enhancing margin and improving the competitive position.

The overall scale of the opportunity is considerable. A research report conducted for Defra in 2007 estimated the potential resource efficiency gains available to UK business, covering energy, waste and water, to be as high as £6.4 billion a year<sup>1</sup>, with over 40% of this directly attributed to waste and material resource efficiency measures.

Businesses that take a strategic approach to minimising waste are likely to save the most money. Experience in the UK suggests that businesses across a range of industries can save 4-5 per cent of turnover by employing waste minimisation techniques.

## Design and Production

A well-designed product will use fewer resources and be cheaper to make. Making the right choice about materials used can provide significant savings. For example, the use of recycled materials in place of virgin materials helps to control supply costs in the car-making industry. Some electronics manufacturers, such as IBM, Lenovo and Sony, have introduced recycled content products which both appeal to environmentally-conscious consumers and provide real business savings. A recent trial by WRAP demonstrated a 70% carbon footprint saving and over 20% cost saving by substituting recycled plastics from waste electronics back into new electronic products ("closed-loop recycling").

## Extended Product Life

In a recent WRAP study on resource efficiency<sup>2</sup>, the increase, or optimisation, of a product's lifetime was identified as a key contributor to resource efficiency savings, with an accompanying benefit for the repair and maintenance sectors.

The UK imports over 1,500,000 tonnes of electronic products each year. We collect around 30% of this volume as waste and often export low-value recovered wastes. Increasing product lifetimes could stimulate the domestic repair, maintenance and service sector – a function that, in some cases, can only be delivered locally. This would increase the value to the UK economy. Business opportunities lie in developing support and repair markets for these products.

Where there is an accompanying service or maintenance provision, some manufacturers have already taken steps to extend product life. IBM is designing its PCs so that the outer casing can be reused with upgraded components. The drum in Kyocera's Ecosys laser printer is coated with silicon rather than plastic and lasts for 300,000 pages, or about five years, compared with 5,000-20,000 pages for the conventional printer. This encourages extended customer tie-in.

<sup>1</sup> "Quantification of the business benefits of resource efficiency: a research report completed for Defra by Oakdene Hollins and Grant Thornton, October 2007". The £6.4 billion figure quoted covers only savings from measures requiring zero or low (payback within one year) financial investment.

<sup>2</sup> Meeting the UK climate change challenge: the contribution of resource efficiency, November 2009.

## Procurement

The Government spends around £220bn a year on the procurement of goods and services, 95% of it with firms with operations in the UK. Procurement can have a powerful role in shaping markets and driving demand for new technologies and processes, creating opportunities for UK-based businesses to compete to meet Government needs.

There are significant business opportunities connected with resource and waste management. These do not require a new layer of targets or criteria, but can be addressed through well-established, existing mechanisms.

- Defra will continue to expand the range of Government Buying Standards (formerly known as Buy Sustainable Quick Wins), easy to use specifications for use by procurement teams, to include products and services that can demonstrate waste-reduction benefits without incurring excessive cost.
- We will continue to support innovative products and services through the Forward Commitment Procurement which allows public bodies to work with providers at the pre-procurement stage, for example by providing information on future demand, allowing businesses to invest, or seek external finance, knowing that a market exists.
- We will work with Government purchasers to identify areas of procurement where waste currently arises and encourage innovative approaches from the private sector, either to eliminate the waste before it arises or to use the waste material or energy as a resource for another process.

## Product Service Systems

Product service systems are a way of enhancing business opportunities while limiting material use. Longer-life, more reliable products are typically more expensive to produce. This is why some consumers will only purchase less reliable items: they simply cannot afford the expensive ones, or cannot easily assess the long-term payback of a reliable model.

From a business perspective, by providing a longer-term service model producers can limit the initial cost of procurement for consumers and recover margin over time. Businesses can continue to receive service payments long after the item has depreciated in value on their balance sheet and keep customers for a number of years, rather than compete for their business at irregular intervals. If customers are satisfied with the quality of service then the incentive to change suppliers lessens.

Successful product service system models operate in a range of sectors, including commercial vehicles, office IT, household washing machines, power tool hire or the use of electronic media to replace CDs, DVDs, books and newspapers. Product service systems can provide incentives for producers, retailers and consumers to reduce product ownership and resource throughput. WRAP estimates that up to 20% of household expenditure on material goods could be shifted to services. This is likely to be higher for businesses.

## Business Opportunities

Further work is needed to identify alternative models across households, businesses and the public sector which are equally or more successful economically than current models which focus on high levels of production and consumption. Defra, BIS and WRAP will work together to:

- Identify successful business models for a range of product leasing combinations to extract the benefits of lifetime optimisation;
- Develop an evidence base for potential business models across a range of product sectors and their drivers and barriers for adoption. On the back of this, promote the benefits of new business models with manufacturers.

### Case Study: JD Wetherspoon and DHL

JD Wetherspoon (JDW) is one of the largest free house chains in the UK with more than 750 public houses nationwide. For the past five years, DHL has managed the supply chain for JDW including the outbound distribution of products and the processing of returned items for re-use and recycling.

Waste materials for recycling are segregated into streams at each pub and then placed into empty roll cages, which are collected when the next delivery is made. A dedicated resource recovery unit has been established at the JDW distribution centre where the contents of the returned cages are sorted for reuse or recycling. Materials such as cardboard, plastic, aluminium and steel are sent for recycling. Used cooking oil is sent for processing into bio-diesel and the delivery vehicles use a proportion of bio-diesel in their fuel. JDW and DHL “Reduce, Re-use and Recycle” to mitigate their impact on the environment.

**Reduce:** Reducing the packaging across four product lines has given annual savings of 13 tonnes of plastic and 65 tonnes of cardboard.

**Re-use:** New internal processes mean re-usable crates and trays are used to deliver products in high-quality condition mitigating supply chain waste. In 2009, 30 tonnes of plastic was diverted from landfill.

**Recycle:** A database of all products enables pubs to identify recyclable items. Other than glass which is currently recycled locally, all materials and products that can be recycled are returned to the distribution centre. These actions have helped reduce waste to landfill by a further 17% against 2008 as the parties work towards their goal of 95% waste reduction. This reduction is despite a year on year growth in the number of pubs within the JDW estate.

The overall benefits of the JDW recycling programme have been environmental and economic:

- Reducing waste to landfill – in 2009 over 14,000 tonnes of packaging and used cooking oil was re-used or recycled;
- Maximising recycling – a process of continuous improvement and process innovation has led to an increase in recycling from 43% in 2008 to 64% in 2009;
- Reducing waste costs – in 2009 landfill tax saving alone was in the order of £500,000;
- Minimising CO<sub>2</sub> – the carbon saving from recycled packaging was more than 10,000 tonnes.



## The Management of Waste

Despite advances in waste minimisation, there will continue to be extensive opportunities in the handling and recovery of material waste resources. The waste market in the UK accounts for some 0.7% of GDP. In 2009, BIS concluded<sup>3</sup> that the waste management sector was worth £4.8 billion, with 42,000 employees, with the waste recovery and recycling sector worth an additional £6.5 billion with over 53,000 employees.

As landfill tax continues to rise – reaching £72 per tonne in 2013 – and with possible restrictions later this decade on the types of material which can be sent to landfill, the financial savings to be made from reducing waste and business opportunities in collecting and recovering this material will each grow significantly in the coming decade.

While this report has a clear domestic focus, it is important to recognise the scale of overseas opportunities in resource and waste management which exist for British companies, as part of the global market for environmental goods and services. These will include opportunities both for equipment sales, but also for the development and sale of service solutions to waste management challenges in overseas markets.

## Commercial and Household Waste

Over the coming years, the separate collection<sup>4</sup> of recyclable material from households and businesses will become even more important than it is today. Currently, many SMEs argue that they cannot find affordable trade waste recycling services – of the type provided to households – and end up disposing of materials they would otherwise recycle as part of a single residual waste collection.

Some waste companies already provide innovative solutions and are prepared to work with companies to help them extract the maximum value from their waste materials. Local authorities and businesses should be challenging their waste management companies to incentivise waste reduction and separate collection of recyclable waste. Defra, with support from WRAP and Regional Development Agencies, will encourage and advise local authorities who are looking for contract arrangements which incentivise waste reduction, building on the limited examples of such arrangements which currently exist.

Defra and BIS will support innovative ways of collecting waste. Defra's October 2009 statement of aims and actions on commercial and industrial waste included support for a pilot trade waste bring bank and additional funding for pilot trade waste collection schemes.

The lessons from these trials will be used to support local authorities and the waste management sector develop long-term, sustainable solutions in different situations.

There is also scope for greater harmonisation of the collection and sorting of household and commercial waste, which itself could reveal significant opportunities for business. The disjoint in collection in some areas leads to significant inefficiencies both in the waste management sector and among commercial producers of waste. Defra will:

- consult on the implications of a proposed change in the definition of municipal waste, with a view to promoting synergy between household and commercial waste collections, whether run by local authorities or by private sector waste management companies;

<sup>3</sup> "Low Carbon and Environmental Goods and Services: an industry analysis, BERR 2009".

<sup>4</sup> This might mean collection of mixed, or source-segregated, recyclates.

## Business Opportunities

- bring local government, the small business sector and waste management industry representatives together to address the barriers to more widespread recycling of commercial waste and identify whether and what further government action is required.

### Recycling and Reprocessing

While the priority should always be to prevent waste arising in the first place, over the coming decade, there will nevertheless be significant business opportunities in collecting a higher percentage of the recyclates produced by households and businesses. These materials must be treated as a valuable resource, rather than a waste for disposal. For high-value materials such as metals, or those such as paper where collection and recycling processes are already in place, well-established international markets exist. For materials that are not commonly recovered, market development is required. Once a transparent market exists, firms have the information they need to invest in collection and processing.

There is potentially a role for Government in setting specific market standards, facilitating transparency, collating information, or even helping to create a pilot market for a greater range of materials.

The following four key waste streams – food, paper/card, plastics and glass – provide examples of the potential actions which can support market development.

#### Case Study: Shellfish

Shell waste is a major financial and operational burden to the seafood processing industry, with 63,000 tonnes of shellfish waste sent for disposal every year at a cost of almost £3m. This is a major cost to the industry and makes no use of the potential resource in the material. In theory there are many uses for shell but to date there has been no accepted solution to treat and subsequently use these materials as by-products.

The Environmental Sustainability Knowledge Transfer Network tasked one of its Innovation Managers to work with the South West Regional Development Agency at the heart of the UK's shell fishing industry. He recognised that the waste management industry had an established solution to this problem: autoclaving – the application of steam under pressure which results in a clean, sterile material.

The Innovation Manager put the Sea Fish Industry Authority (Seafish) in touch with local waste management provider Aerothermal Ltd to undertake a trial run at their client demonstration facility in Poole, Dorset. This was technically successful, yielding a clean odour-free shell suitable for use in a wide range of products such as aggregates or garden mulch. The other product is a liquid with high organic content, which was confirmed as a good feedstock for anaerobic digestion to generate biogas and hence renewable electricity.

Having proved the concept, Seafish is now working with its partners to make the commercial case. A 20,000 tonnes per year autoclave facility has a projected payback of 3–5 years, depending on energy costs, the market for clean shell and the price of renewable electricity.

More information: [www.resource-efficiency.org](http://www.resource-efficiency.org)  
[www.seafish.org](http://www.seafish.org)  
[www.aerothermalgroup.com](http://www.aerothermalgroup.com)



### Food Waste

Campaigns such as *Love Food Hate Waste* have helped raise awareness of the amount of food waste generated in the UK, around 17 million tonnes per year. Most food waste currently ends up in landfill, with the remainder sent to anaerobic digestion (AD), composted or used for specific applications such as animal feed or land-spreading.

There are two main opportunities. The first, is around development of commercial collections, which are currently isolated and small scale. The other lies with augmenting AD capacity to generate biogas. AD is now an established technology and every tonne of food waste treated through AD rather than landfilled saves between 0.5 and 1 tonne of CO<sub>2</sub> equivalent. The UK has AD capacity of just under 400,000 tonnes, with a further 1.7 million tonnes in planning or build – not all of which will be realised. This leaves room for large increases in capacity, the incentives for which are largely in place.

### Conclusions: Food Waste

Significant opportunities:

- Increase availability of commercial collections;
- Additional capacity for anaerobic digestion, using established technology;
- Application of newer technologies.
- Increased use of digestate on land.

Market development:

- Consistent signals on regulation
- Forward visibility of pricing for renewable energy
- Data on food waste hot spots where specific market gaps exist
- Long-term supply contracts to underpin investment

### Paper and Board

There is a strong domestic and international market in recovered paper and board. Close to 9 million tonnes of paper and board were recovered in the UK for recycling in 2008 with just over half sent overseas for recycling. However recovery from some groups and sectors is patchy – these include the hospitality and event sectors and smaller commercial premises.

The UK produces only 5 million of the 12 million tonnes of paper it consumes, reflecting the global nature of the paper industry, the relatively high costs of manufacturing in the UK and the over-capacity which prevails for some grades in Europe. Business opportunities in the sector are actively explored by market participants, with new newsprint capacity added in 2009 through inward investment. Additional capacity of containerboard production is also currently being planned.

## Business Opportunities

### Conclusions: Paper and Board

Significant opportunities:

- Inward investment to the UK by paper producers
- Additional collections from small firms in the commercial sector

Market development:

- Already a transparent and mature market

### Glass

The UK collected 1.6m tonnes of packaging glass for recycling in 2008<sup>5</sup>. Of this, 1.3m tonnes were recycled domestically but under 800,000 tonnes of cullet (crushed recovered glass) were recycled by UK container and glasswool manufacturers. The rest was used in other markets such as aggregates. While this avoids landfill, the CO<sub>2</sub> benefits are significantly inferior to those from remelt applications.

The economics of sorting mixed-colour cullet to make it suitable for use by the UK glass container industry, and issues surrounding the quality of cullet, have resulted in a falling proportion of glass going to remelt (the most environmentally beneficial option) and an increase in glass going to aggregates.

Opportunities therefore lie in either developing viable capacity for sorting this glass or developing markets for closed loop recycling using mixed colour glass. Defra is currently consulting on proposals to set higher packaging waste recycling targets for 2011 to 2020 and for glass the proposals are intended to help promote closed loop recycling.

### Conclusions: Glass

Significant opportunities:

- Implement technology to separate coloured glass from mixed cullet
- Establish customer acceptance of non-standard coloured glass

Market development:

- Evaluate the economics of closed loop recycling and cullet use in aggregates
- Defra and WRAP to investigate and develop markets for mixed colour glass

### Plastics

In 2008 the UK recovered in excess of 500,000 tonnes of plastic packaging every year. Most of this is exported for recycling overseas but domestic reprocessing capacity is increasing. Rapid expansion in plastic bottle collection has allowed investment in UK reprocessing with more than 260,000 tonnes of capacity planned by the end of 2011. Each tonne of PET<sup>6</sup> recycled back to a PET application saves 1.5t CO<sub>2</sub> emissions.

<sup>5</sup> Out of a total of 1.9m tonnes of all glass collected for recycling. The remainder is exported primarily for use in the European container furnaces.

<sup>6</sup> PET stands for Polyethylene terephthalate. 70% of soft drinks (carbonated drinks, still and dilutable drinks, fruit juices and bottled water), are packaged in PET plastic bottles.

Recycling of “mixed plastics” (i.e. plastics other than bottles) is less well developed. Most of the 1 million tonnes of mixed plastics in the UK household waste stream is landfilled. Mixed plastics have traditionally been considered too difficult or of too low value to warrant recycling. However, WRAP has found that a combination of increasing landfill tax and decreasing costs of sorting technology now means that the recycling of mixed plastics can be viable. This is an area with great potential for growth.

Another area of opportunity lies with commercial and industrial plastics packaging collection (packaging film, returnable transit packaging, plastic pallets). Information on this sector is poor but likely arisings are around half a million tonnes per year in the UK with recycling rates in the 40-50% range.

### Conclusions: Plastics

Significant opportunities:

- Further develop cost-effective sorting technology for mixed plastics
- Divert those plastics from landfill through recycling
- Collection of plastics packaging from commercial and industrial customers

Market development:

- Analyse the relationship between domestic reprocessing and export markets
- Develop a stronger evidence base in commercial and industrial plastics
- Develop market specifications for the most common plastic streams

### Commodity Market development

Government can play a key role in market development. The markets for some important recovered material streams are hampered by a lack of standardisation. The Government has been supporting the Environment Agency and WRAP’s development of end-of-waste criteria which determine when a waste can be considered a fully recovered material, fit for use on the same terms as virgin material.

In some cases, Government’s role may need to go further. The Pathway to Zero Waste, a programme of work led by the South East of England Development Agency, WRAP and the Environment Agency, and part-funded by Defra, is piloting the development of a true commodity trading scheme for recovered materials. This pioneering approach will provide accurate and timely market information and material standards, diverting millions of tonnes of construction waste from landfill and ensuring that this is recovered and re-used elsewhere in the industry. Defra and BIS will support this programme and seek to learn from the pilot whether additional Government intervention in this area is needed.

In addition, Government will consider the extent to which, without seeking unrealistically to track every material or product, a better understanding of key material resource flows through the economy might help identify how more of the economic value of those materials can be retained in Britain and strengthen our understanding of our domestic material resource security.

## Business Opportunities

### Case Study: Sustainable Clothing Roadmap

Defra has established a set of pilot “product roadmaps” to understand the lifecycle impacts of a range of products through engagement with industry. The pilots consider social and economic sustainability alongside the main focus on environmental improvements. Clothing is one of the ten pilots.

The UK consumes two million tonnes of textiles each year, over half of this is clothing. The waste-related business opportunity lies in the fact that only 500,000 tonnes of textiles is collected for re-use and recycling each year, with an estimated 615,000 tonnes per year going to landfill and 310,000 tonnes being accumulated in the nation's wardrobes. Mixed textiles can hold a value of over £300 per tonne meaning that there is significant value that could be generated by liberating these resources from storage, or diverting them from landfill each year.

Nearly 300 stakeholder organisations along the supply chain of UK consumed clothing have participated in the roadmap to date, including retailers, manufacturers, suppliers, clothing reuse and recycling organisations, charities, industry associations, government, NGOs, practitioners, academia and support organisations. The Roadmap is based on stakeholder co-operation and agreed commitments to enable the improvement process to accelerate at a quicker rate.

Of the 300 participants, about 50 have committed to take actions to improve sustainability of their clothing-related activities. These actions are set out in the Sustainable Clothing Action Plan.

<http://www.defra.gov.uk/environment/business/products/roadmaps/clothing/documents/clothing-action-plan-feb10.pdf>

As they complete an action, participants are asked to generate case studies to demonstrate how their work improves the sustainability of their business and increases sales or profits. For example, Continental Clothing instigated the design and supply of a sustainable clothing range. They have shown that products can be designed and produced with a minimum impact while generating a brand that grows in the competitive market. Marks and Spencer's “Plan A” sustainability initiative has sought to introduce resource efficiency measures into its supply chain and has saved money as a result. These extend from growing crops and producing goods through to packaging of products and initiatives to encourage consumers to return clothing through a partnership arrangement with Oxfam.

### Infrastructure and Technology

The recovery of waste is an increasingly technology-intensive industry. There are a wide variety of different technologies available, from AD and composting to thermal treatments such as combustion, gasification and pyrolysis. Defra's New Technologies Demonstrator Programme funded nine projects between 2004 and 2009 to demonstrate the economic, social and environmental viability of innovative waste treatment technologies as possible alternatives to landfill. The programme aimed to identify the strengths and weakness of each of the technologies and the lessons from these projects will help overcome the real and perceived risks, and barriers of introducing new and alternative technologies in England<sup>7</sup>.



<sup>7</sup> The final reports for each project will be available on the Defra website in 2010 at <http://www.defra.gov.uk/environment/waste/residual/newtech/demo/index.htm>

Investment in infrastructure development – both with PFI support and private capital investment – continues to grow, in response to rising landfill tax and the need to meet EU landfill directive targets on biodegradable municipal waste. Infrastructure contractors have underlined the importance of the Government providing fiscal and regulatory consistency and transparency to underpin investment in the move from landfill to waste recovery infrastructure development.

*“The worst thing is when Government prevaricates or even changes its mind. It’s very frustrating when you make an investment because the rules are about to change and then the Government changes its mind and your investment has gone to waste. We need good notice so we can plan and we need consistency and clear direction. The way landfill is being handled is a good example.”* (Chartered Institute of Waste Management)

Barriers to the full development and commercialisation of new technologies remain, but these are more often commercial or social in origin rather than strictly technological. There are examples of successful infrastructure projects, such as the development of three Energy from Waste plants in Hampshire, which prove that, whatever the technology, working with and communicating openly with local people can help ensure that issues such as the planning regime are not insurmountable barriers.

With the Department for Energy and Climate Change, Defra is leading work on Energy from Waste technologies, examining current challenges and opportunities, with the aim of providing clarity and guidance at a national and local level.

The growth of waste recovery technology means that it is also increasingly a process engineering sector. The UK’s historic reliance on landfill led to the development of strong skills in landfill management and waste logistics, but the suppliers of much of the equipment for waste treatment plants remain European or American companies. There are opportunities for more of that equipment to be manufactured in Britain. This includes both companies that are already involved in waste infrastructure equipment, but also engineering companies who may have little specific waste experience, but have expertise in similar manufacturing processes.

In addition, there is a specific opportunity for the development of a system to enable rapid, online determination of the energy content in the biomass fraction of a mixed waste stream (e.g. solid recovered fuel), something currently requiring cumbersome sampling and testing. The Government will encourage the development of the science behind this process.<sup>8</sup> This will enable not only energy from waste plants with Combined Heat and Power (CHP) to obtain the appropriate level of Renewable Obligation Certificates more easily, but also biomass electricity generating stations subject to Ofgem’s fuel management and sampling procedures.

---

<sup>8</sup> Further details are available in the Government’s Renewable Energy Strategy 2009  
[http://www.decc.gov.uk/en/content/cms/what\\_we\\_do/uk\\_supply/energy\\_mix/renewable/res/res.aspx](http://www.decc.gov.uk/en/content/cms/what_we_do/uk_supply/energy_mix/renewable/res/res.aspx)

# Business Opportunities

## **Moving the agenda forward**

There are clear roles for Government, its agencies and business itself in opening up opportunities in material resource and waste management. Businesses want certainty from Government about the tax and regulatory regime which is so important in framing the waste and recovered materials market in Britain. Beyond that the most effective Government interventions are often those that help develop transparent markets. This can be standard-setting, the provision of advice, or by acting as a facilitator to bring businesses together.

Business itself must take a lead in demonstrating that environmentally beneficial innovation can also bring economic benefits. For example, in the areas of design and product use, many of the most attractive opportunities require development of new business models in what are otherwise well-functioning markets. The barriers to innovation can be commercial as much as technical, and business – with the support of Government – needs to demonstrate that technology and innovation meet the needs of real customers.

Talking to business, and attempting to identify how individual policies may impact on British industry, is vital to successful policy making. Taking the lessons from this project, Defra and BIS commit to working together to incorporate early business engagement as a bedrock of policy development across our work.

## New Industry, New Jobs

In April 2009, the Government published a strategic vision for Britain's recovery from the economic downturn, *New Industry, New Jobs*<sup>9</sup>. The strategy describes how the Government can promote investment, growth and jobs in Britain through more policy consistency across departments, greater regulatory certainty, smarter public procurement and a readiness to intervene where necessary.

As part of the *New Industry, New Jobs* strategy, the Government committed to taking action to 'ensure that the consideration of business opportunities is part of every department's policy-making, starting with pilots in selected key areas'. Material resource and waste management was chosen as the subject of one of these pilots. The other areas chosen were rail, housing construction and broadband.

## Supply Chain Analysis

The pilot projects tested the Government's belief that a more complete understanding of the costs and opportunities created by policy choices is achievable through more complete **supply chain analysis** and better **business engagement**.

The BIS interim report *Thinking Business in Policy*, published in December 2009<sup>10</sup>, explained that a supply chain analysis should provide:

- a wider and deeper assessment of the policy options open to Government;
- a clearer view of the capability in the UK to take advantage of new commercial opportunities created by Government;
- a better understanding of the barriers companies face in supply chains;
- a more complete understanding of the policy delivery implications of different choices.

*Thinking Business in Policy* noted that "Effective supply chain analysis is challenging – supply chains are multi-dimensional and ever-evolving. Policy-makers do not have robust guidance to do this analysis." The pilot projects developed a format with the detail necessary, while still being accessible and quick to create.

This process was particularly challenging in the case of resource management, since every household and business sector impacts on or produces waste. A full investigation of the supply chain would imply analysis of the entire UK economy. The approach used was to take an overview of the role and importance of waste in the economy and then look at more detail at specific sectors and waste streams.

---

<sup>9</sup> <http://www.bis.gov.uk/policies/new-industry-new-jobs>

<sup>10</sup> <http://www.bis.gov.uk/policies/thinking-business-in-policy-an-interim-report>

## Supply Chain Analysis of the household and commercial waste market

### Scope and format

- The analysis covers the collection, sorting and management (recycling, recovery, disposal) of household, commercial and industrial waste in the UK.
- Many companies provide integrated waste management services, from collection through to disposal. As a result, figures on the size and market value of different stages of the supply chain are not readily available. Figures quoted tend to be for the sector as a whole, rather than specifically for household and C&I waste management.
- The format of the study is based on the initial recommendation of the Business Opportunities and Policy team at the Department for Business. Data is sourced by Defra and WRAP and the interpretation and analysis are the work of the project team.



<b>Description of supply chain stage</b>	Collection of waste from households, commerce and industry.	Sorting of waste into material streams for recycling, and residual for disposal.	Recycling and recovery of material waste streams.	Disposal of residual waste to landfill.
<b>Size (£m)</b>	Waste Management Sector estimated market size of £4.8bn. 42,000 employees. Around 90 million tonnes waste/year collected from all sources.  Figures on the total size of the waste and recycling market vary from £7 billion to over £11 billion. Figures quoted here come from BIS's 2009 Low Carbon Industrial Strategy.		£6.5bn 52,000 employees	33 mt of waste from these sources sent to landfill. costing > £2 billion in landfill tax and gate fees.
<b>Key players (revenue, market share)</b>	Local authorities responsible for collection of municipal waste. Around 50% of collections by in-house operations, 50% by private companies, though contracting out of recycle collection more common than residual waste.  Limited collection of trade waste by local authorities: collection of C&I waste, and all sorting and other treatment done by private sector.	All the large waste management companies are involved in treatment and disposal, offering integrated services from collection through to recovery/disposal.  A number of smaller companies are involved in development of new waste recovery technologies.		

## Annex B



<b>Key players (revenue, market share)</b> <i>continued...</i>	Around 1,000 waste management companies in UK, but 8-9 large companies – e.g. Veolia, Biffa, Sita, Shanks, WRG, Viridor, Cory – account for over 50% of the market.			
<b>Business model</b>	Separate collection of recyclable and residual household waste. c.50% LAs provide alternate weekly collection, half weekly. Around 50% of recyclable waste separated at kerbside, 50% co-mingled and sorted at MRF.  Private sector offers recyclate and residual trade waste collection services, but separate collections can be more expensive than a single, mixed waste collection, particularly for smaller companies.	Infrastructure for recycling and recovery of municipal waste underpinned by PFI. Merchant facilities rely on private sector investment.	Historic legacy of landfill disposal in UK. Trend away from disposal in landfill driven by tax and regulation.	
<b>Market drivers</b>	Legal requirements (including definition of 'municipal waste') and economics of storage and collection of residual trade waste compared to recyclates.	Quality of output achieved via different sorting methods. Price difference between different grades of material relative to costs of improved sorting technology. Preferred end-use or disposal route.	Regulation (landfill directive, packaging regulations), landfill tax. Established uses for recovered materials. Price transparency and consistency of supply.	Landfill tax escalator and landfill directive.
<b>Trends</b>	Trend towards increased collection of household and trade recyclates, although mixed/residual waste collection remains over 50% by volume.	Trend towards collection of co-mingled household recyclates with sorting at a MRF as sorting technology improves. Separate kerbside collection depends partly on location and housing type.	Recycling rates increasing. Rising investment in merchant facilities and new technologies as move away from landfill gathers pace. Market development and novel uses for recovered materials.	Disposal in landfill remains important route, but volumes steadily falling as tax rises. Potential landfill bans or restrictions later this decade could have significant impact.



<b>Issues and barriers</b>	Definition of municipal waste and landfill allowance trading scheme, acts as disincentive to harmonised household and C&I waste collection. Collection services of recyclable trade waste can be prohibitively expensive for SMEs.	Debate around benefits of kerbside sorting against co-mingled collection. Former leads to higher quality output, however this requires storage space. The right solution depends on housing mix and availability of MRF capacity.	Investment in merchant facilities for dealing with non-municipal waste hampered by planning constraints and difficulties in securing finance.	Disincentives to disposal in landfill rising rapidly with landfill tax escalator.
<b>UK strengths</b>	Competitive industry. Strong market presence by large (often multinational) companies who offer a range of integrated services, from collection to disposal. Open tendering and good availability of information.		Mature, open market for many materials. Sound business environment generally.	Experience in landfill (construction, management) means industry skills transferable to countries with rising waste management standards.
<b>Risks (Probability /Impact)</b>	Some evidence of regional monopolies reducing competition (Med/Med)	Planning and finance constraints prevent expansion of capacity (High/Med).		Rising landfill tax leads to increase in fly-tipping and rising cost of clean-up (Med/Med)
<b>Potential for market failure?</b>	Medium – The societal cost of landfill is still not reflected in the incentives faced by households, however the planned increase in tax is designed to address this.	Medium – availability of finance and planning constraints are limiting investment even where there is a good case. These are largely economy-wide issues that are being addressed at that level. Some failures of information in specific markets for recovered materials – scope for public intervention to address these.		Low – the market is competitive and landfill tax regime well-established. The tax ensures that market incentives reflect wider costs of disposal.



<b>Potential Govt. policy options</b>	<p>Redefine municipal waste to include more trade waste. Reform LATS. Introduce new incentives (and targets?) on business – to recycle. Promote innovation in collection mechanisms for SMEs e.g. bring banks. Use procurement to change contractual incentives.</p>	<p>Provide greater support to local authorities on procurement (up-skilling).</p> <p>Take steps to increase availability of finance generally. Consider long-term contracts for guaranteed volumes of mixed waste (but need to assess risk carefully).</p>	<p>Continued PFI support for local authorities. Establish infrastructure needs and gaps for C&amp;I waste – facilitate industry/finance discussions. Consider long-term contracts for guaranteed volumes of specific materials (but need to assess risk carefully).</p>	<p>Provide greater certainty around long-term direction of fiscal and regulatory framework.</p>
<b>Impact on business</b>	<p>Improved SME and wider trade waste collection could reduce costs for business while offering greater material streams for waste companies. Opportunities for private and third sector co-operation.</p>	<p>Improved lending conditions would benefit all parts of the economy, this is being addressed.</p>	<p>Increased recycling and recovery infrastructure sees many businesses refocus to become material and/or energy suppliers.</p>	<p>Negative impact on landfills but with more than commensurate benefits elsewhere further up hierarchy.</p>
<b>Opportunities for business identified</b>	<p>Innovate collection systems. Potential for different contractual arrangements with local authorities.</p>	<p>More efficient and cost-effective sorting arrangements.</p>	<p>Better integration of recycling and reprocessing capacity with more established feedstock flows. Business is best-placed to identify specific opportunities.</p>	<p>Potential to export skills in landfill design and management.</p>

Published by the Department for Environment, Food and Rural Affairs.  
© Crown Copyright 2010.

Printed on material that contains a minimum of 100% recycled fibre  
for uncoated paper and 75% recycled fibre for coated paper.

Nobel House, 17 Smith Square  
London SW1P 3JR

[www.defra.gov.uk](http://www.defra.gov.uk)

PB13392 March 2010