



postnote

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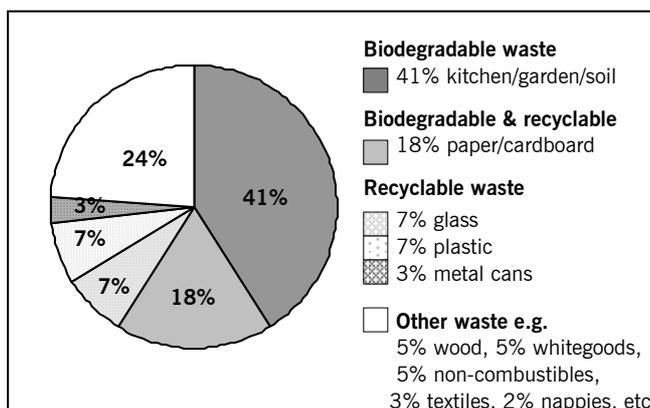
RECYCLING HOUSEHOLD WASTE

About 29 million tonnes of municipal waste, 87% of which was household waste, was produced in England in 2003/04. Most waste ends up in landfill sites; only 19% of household waste is currently recycled or composted. Recycling is widely assumed to be environmentally beneficial, although the collection, sorting and processing of materials gives rise to some environmental impacts and energy use. This POSTnote summarises the environmental impacts of recycling household waste, and examines some of the reasons why recycling rates are still relatively low.

Background

Responsibility for waste is devolved. This note deals with England only. England disposes of 72% of its municipal waste in landfills, yet much of it could be recycled or composted¹ (graph 1).

Graph 1. Composition of UK household waste (2001)



(Source: *Analysis of household waste composition*, Dr J. Parfitt, WRAP 2002)

In 2003/04, England's municipal waste recycling and composting rates increased to 19% from 15.6% in 2002/03¹. It is difficult to compare recycling rates between countries as different measurements are used. Nevertheless, other EU countries such as the Netherlands, Austria, and Belgium appear to achieve much higher levels of recycling: more than 50% in some cases. The 2005/06 household waste recycling target for the UK is 25%².

Policy

The main statutory driver behind household waste reduction is the 1999 EU Landfill Directive, which aims to prevent or reduce the environmental effects of landfilling waste³. The Directive requires that the UK reduces the amount of biodegradable waste going to landfill to 75% of 1995 levels, by 2010. The focus is on reducing the amount of biodegradable waste sent to landfill because it decays to produce methane, a potent greenhouse gas that contributes to climate change.

Although household waste accounts for only 9% of total UK waste, a high proportion is landfilled and recycling rates are low. The then Department for Transport, Environment and the Regions' 'Waste Strategy 2000' set a target of increasing recycling rates of municipal waste to 30% in England and Wales by 2010⁴.

Government recycling initiatives

The Household Waste Recycling Act was introduced in 2003. It requires all English local authorities to provide kerbside collections for a minimum of two recyclable materials for all householders by 2010^{5,6}. Nearly all local authorities in England have schemes to recycle the largest fractions of recyclable household waste (paper/cardboard and glass), and 79% of households are

now served by "kerbside" collection schemes. To improve recycling, the government established WRAP⁷ (Waste & Resources Action Programme) in 2001 to stimulate markets for recycled materials.

Recycling

Recycling is widely assumed to be environmentally beneficial, although collecting, sorting and processing materials does give rise to environmental impacts and energy use. The pros and cons of recycling some common components of household waste, that is, paper, glass, metal cans and plastics, are outlined in box 1. Table 1 summarises the current impact of recycling in the UK, compared with manufacture from raw materials.

The elements of household waste most commonly collected for recycling are garden waste for composting, then paper and third glass. Metal cans make up only 1% by weight of the material collected for recycling, but recycling them offers high energy and material savings (Table 1).

Plastic recycling is not very common, partly because few facilities exist to handle the material. Collection is complicated by the need to segregate waste plastics into the various different types. Since plastic bottles are made from only three different types of plastic, collecting them offers the greatest potential for increasing household plastic recycling.

Plastic bags make up only 1% of household waste by weight, but some 20% of total household plastic waste. Some groups argue that we should recycle more plastic bags as they are a highly visible and persistent feature of the litter stream that also pose a threat to wildlife. However, plastic bags are not routinely collected by kerbside recycling schemes. One of the reasons for this is that their low density makes their collection and recycling uneconomic.

Government recycling targets currently focus on weight of waste rather than volume, so plastic recycling schemes are difficult to operate economically because plastic is so light. This approach was criticised in a 2003 report on waste management by the Commons Environment, Food & Rural Affairs Select Committee, which recommended that the government move away from targets based purely on weight⁸.

Table 1. Impact of recycling

Material	% of household waste	energy	emissions	raw material saved /tonne recycled
Paper	18	28-70% less	95% less (air pollutants)	-----
Glass	7	18% less	30% less	1.2
Plastic	7	up to 66% less	-----	1.8
Cans (Fe)	3	70% less	86% less	2.0
Can (Al)	3	95% less	95% less	4.0

Source: www.wasteonline.org.uk

Box 1. Recycling

Paper

Almost any household waste paper can be recycled. Recycling paper requires 28-70% less energy, produces 95% fewer emissions, requires less water, and far fewer raw materials (Table 1). However, paper cannot be recycled indefinitely. Every time paper is recycled the fibre length decreases. After being recycled about six times the fibres become too short for papermaking, so some virgin fibres will always be required to maintain paper strength and quality. Not all paper produced can be recovered and recycled. For example ~1 million tonnes per year is used for toilet paper, while other paper is stored as books, files and wallpaper.

Glass

Around 3.6 million tonnes is used each year in the UK. Glass is infinitely recyclable with no loss in quality when reprocessed⁹. Recycling involves collecting bottles and jars, crushing and melting them in a furnace. Using recycled glass reduces the amount of energy required and the amount of new raw materials needed. Recycling also reduces CO₂ emissions. An alternative to recycling glass is re-using it. Reusable glass bottles are designed to be repeatedly returned to the manufacturer, cleaned and refilled. However, they must be stronger and heavier to withstand wear and tear³. There are few disadvantages to glass recycling. Contamination of the recycling process with non-glass material, such as Pyrex, is the main issue. Recycled bottles and jars can contain between 25-40% of unwanted material, all of which must be removed, often by hand, prior to crushing. Colour contamination is also an issue particularly for clear glass.

Metal Cans

Metal has a high rate of recycling in the UK due to its high economic value. The two most common metal items found in household waste are aluminium and steel cans, which together comprise 3% of household waste. Aluminium and steel can both be recycled indefinitely as the metal can be re-melted without any loss of quality. Recycling aluminium is very energy efficient; producing aluminium from recycled materials uses only 5% of the energy used in primary production and generates only 5% of the greenhouse gas emissions associated with manufacture from raw materials^{10 11 12}. Recycling steel reduces the need for raw materials, uses 75% less energy and thus produces fewer emissions. In 2003, 42% of aluminium cans and 44% of steel cans were recycled; steel has the added advantage that it can be sorted automatically and cost-effectively from the waste stream by magnetic extraction.

Plastic

Recycling plastic is complicated by the fact that there are about 50 different types of plastic. Currently, plastics must be sorted manually into the different types prior to recycling although technology is being introduced for automatic sorting. Following sorting, each plastic type can either be:

- melted down and moulded into a new shape;
- or broken down into its chemical components and used again to make other products (chemical recycling).

Making carrier bags from recycled plastic consumes two-thirds less energy, releases lower levels of pollutants and uses nearly 90% less water than making them from new plastic. However, the need to separate plastics into the various different types means that in practice the most commonly recycled household plastic item is the plastic bottle. These are easy to segregate as they are made of only three types of plastic, and account for 40% of all household plastic waste.

Issues

Impact of recycling

Recycling has a lower impact than producing new products from raw materials for all the waste items compared in this note. Table 1 (p.2) summarises the energy and environmental impacts of recycling household waste. Both recycling and manufacture from raw materials affect the environment in several ways, for example through greenhouse gas emissions, pollution or the use of finite resources. The weight attached to each category of impact depends on policy priorities. Life Cycle Assessment (box 2) is a way of assessing all the impacts of a particular process. The impacts of recycling or manufacture can differ according to the details of the systems under consideration. For example the impact of kerbside recycling and bring schemes can be affected by housing density.

Box 2. Life Cycle Assessment (LCA)

Life cycle assessment (LCA) measures the total environmental impact of products or processes over their life cycle, from extraction of raw materials to eventual disposal. LCA takes into account all the energy and emissions associated with collection, transport, processing and manufacture of a product.

Kerbside collection versus 'bring' schemes

A 1996 study showed that the method of collecting and transporting post-consumer waste is important. For all recycled materials, kerbside collection is more energy efficient than 'bring' schemes. A 'bring' recycling scheme involved a vehicle travel distance of 271km per tonne of material recycled, while a kerbside collection scheme required only 14km per tonne. This large disparity is because kerbside collection schemes are generally located in compact residential suburban areas with a high throughput of materials, which increases the efficiency of the collection, and transport system. However, in rural areas large transport distances can quickly undermine the benefits, and in some cases the social and environmental cost of collecting, sorting and transporting a recovered material may be greater than the savings that can be made by avoiding the production of primary materials.

(Source: J. Powell et al., *Journal of Environmental Planning and Management*, 39 (1) 97-112, 1996)

Who is responsible for recycling?

To a large extent, UK recycling policy derives from EU Directives. These set out both general principles such as the 'waste hierarchy'¹³, and targets, such as those for diversion of biodegradable waste from landfill. The Government is responsible for implementing the Directives. However, in the UK, waste is a devolved matter so the devolved administrations are responsible for waste policy in their countries.

In England, Defra sets recycling targets to be met by each local authority. These are the only statutory waste targets; the national targets set out in the waste strategy are what the Government hopes will be achieved through the local targets. Local authorities have some flexibility in

how they meet the targets and some have pooled their targets in order to reduce costs. Ultimately, though, household recycling rates depend on how consumers, retailers and producers behave. In turn, this depends in part on the services available.

Consumer behaviour

Householders are encouraged to separate recyclable materials from the rest of their waste and either put them into a kerbside box or take them to a collection point. At present there are no measures to compel them to do so.

The National Consumer Council (NCC) has reviewed the factors that may inhibit people from acting 'sustainably', including recycling¹⁴. It said that sustainable options were perceived as more expensive; people lacked the relevant information or facilities; were reluctant to inconvenience themselves; and may not trust those, whether governments or businesses, that exhorted them to behave differently. The NCC argues that consumers should be persuaded to act sustainably by incentive schemes rather than just "finger-wagging".

Retailers

Retailers, particularly large companies, can influence the behaviour of both their customers and their suppliers. Recycling 'bring' banks are often put in supermarket car parks, to encourage more people to use them and to discourage householders from making an extra car journey to recycle, which reduces the environmental benefits of recycling.

Many supermarkets offer 'bags for life', which are thicker than normal plastic shopping bags and are intended to be re-used many times and thereby reduce waste. Retailers can stock products with a high recycled content, although many would argue that they can only do so if there is already a demand for those products.

Producer responsibility

Producer responsibility is a variant of the 'polluter pays' principle that requires businesses to take responsibility for their products at the end of their life. Producer responsibility measures derive from EU Directives, including the Packaging Directive and the Waste Electrical and Electronic Equipment Directive¹⁵. Their intention is that placing at least part of the costs of collecting and recycling goods on the manufacturers should provide an incentive to design products that generate less waste and are easier to recycle.

Obstacles to Recycling

The main obstacles to recycling include a lack of viable markets for the recycled products and of collection facilities and reprocessing plants¹¹. Some materials, such as composite packaging, present particular challenges.

Lack of markets

Collecting and recycling post-consumer waste is only the first part of the recycling cycle; the loop is closed only when consumers buy recycled products. Markets for some such products are still undeveloped so the demand

for recycled goods is sometimes not high enough to support collection and re-processing. Unless markets are developed, business will see investing in reprocessing facilities as too high a risk. For example, in 2002 the UK had an estimated 400 kt capacity to shred plastic for reprocessing, but only half that capacity was used, because either non-recycled material was cheaper or not enough recycled material was available to meet demand.¹⁶

There has been a perception that recycled materials are lower quality than those made from virgin materials. For some specifications, such as product packaging, strict colour requirements mean that recycled materials, such as glass, would have to be sorted by colour, which adds to the expense.

The Waste and Resources Action programme (WRAP) is concentrating on creating efficient and stable markets for recycled goods. One element of WRAP's work is to identify high value uses for recycled materials. For example, glass filtration media can perform better in waste water treatment than traditional sand filters. Recycled plastic can perform better than wood for some purposes such as boardwalks, barriers and handrails because it is rot and algae proof, is less flammable and does not splinter.

Lack of collection and reprocessing facilities

Reprocessing plants are built and run by commercial businesses that need to be sure of a market before they will invest. There may be insufficient reprocessing facilities for some wastes, or those facilities may be located far from the point of collection or use.

Although more and more councils are providing kerbside collection facilities, it is harder to offer this service for some types of housing than for others. For example, it can be difficult or expensive to collect boxes from high-rise flats or, conversely, from sparsely populated areas.

In sparsely populated rural areas, large transport distances can quickly undermine the benefits of recycling (box 2). In these cases, it may be better to set up 'bring sites' where householders can deposit recyclable materials.

In some cases the social and environmental cost of collecting, sorting and transporting a recovered material may be greater than the savings that can be made by avoiding the use of primary materials.

Non-recyclable and composite materials

'Composite packaging' refers to packaging made up of more than one material, for example drink cartons that use a layer of aluminium as a smell and taste barrier, sandwiched between layers of plastic and paper. These laminated cartons comprise about 75% paper, 20% plastic and 5% aluminium foil. As they are an amalgam of materials, they are difficult to recycle because their component materials have different properties, often

require different extraction techniques and have different end uses and markets.

There are currently very few collection points for the reprocessing of these materials in the UK. However, in July 2004, the UK's first dedicated 'mixed material' carton recycling plant opened in Fife, Scotland. The plant has the capacity to recycle 20% of all the UK's laminated drink cartons. However, collection of these cartons for recycling is not yet widespread in the UK.

Overview

- The UK recycles about 19% of its household waste. This is low compared with other EU states and the Government has a number of targets in place to increase recycling.
- For common household waste streams such as paper, glass and metal, recycling incurs lower environmental costs than production from virgin materials.
- Recycling plastic can offer environmental benefits, but there are several obstacles to increased recycling, including the large number of types of plastic, contamination problems and the difficulty of collecting large volumes of lightweight plastic.
- Composite materials are difficult to recycle. At present there is only one reprocessing plant for composite cartons in the UK.
- Obstacles to increased recycling include a lack of collection and reprocessing facilities, particularly in rural areas, and underdeveloped markets for some recycled goods.

Endnotes

- 1 *Municipal waste management survey 2003/04*, Defra 2005
- 2 <http://www.defra.gov.uk/environment/waste/index.htm>
- 3 EC Directive 99/31/EC on the landfill of waste
- 4 *Waste Strategy 2000 for England and Wales*, DETR 2000 Cm4693
- 5 www.wastewatch.org.uk
- 6 www.letsrecycle.com
- 7 www.wrap.org.uk
- 8 EFRA Committee, Eighth Report of Session 2002–03, HC 385
- 9 www.glasspac.com
- 10 www.alupro.org.uk
- 11 www.environment-agency.gov.uk/subjects/waste
- 12 www.wasteonline.org.uk
- 13 The waste hierarchy, in order of preference, is: waste minimisation; re-use; recycling; disposal.
- 14 *16 pain-free ways to save the planet*, Holdsworth and Stephen, National Consumer Council 2005
- 15 EC Directive 94/62/EC on packaging and packaging waste and EC Directive 2002/96/EC on waste electrical and electronic equipment.
- 16 HC Deb, 19 Sept 2003, col 253 W [Commons written answer]

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POST is grateful to all contributors and reviewers. For further information on this subject, please contact Dr Kate Trumper, at POST.

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The Parliamentary Office of Science and Technology, 7 Millbank, London SW1P 3JA; Tel: 020 7219 2840; email: post@parliament.uk

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