

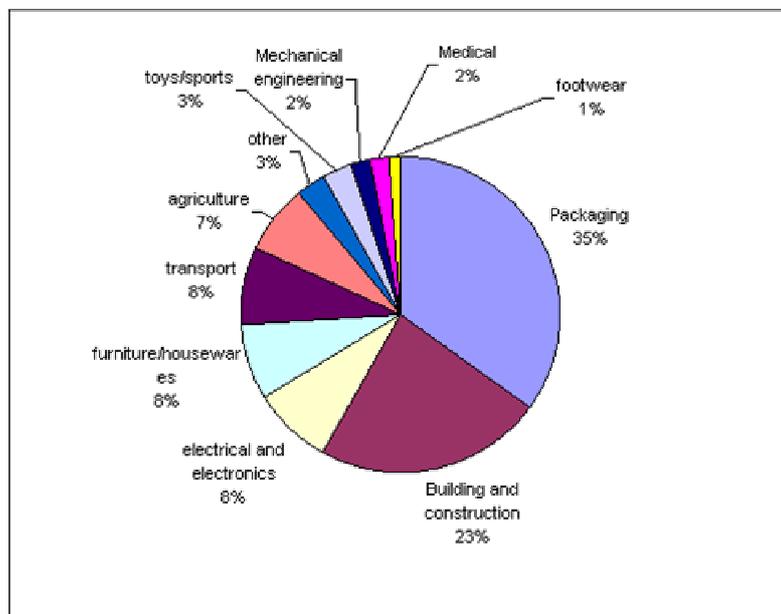
Plastics recycling information sheet

The world's annual consumption of plastic materials has increased from around 5 million tonnes in the 1950s to nearly 100 million tonnes today.

We produce and use 20 times more plastic today than we did 50 years ago!

Uses of plastic

Packaging represents the largest single sector of plastics use in the UK. The sector accounts for 35% of UK plastics consumption and plastic is the material of choice in nearly half of all packaged goods.



Plastics consumption is growing about 4% every year in western Europe.

Types of plastic

Here are about 50 different groups of plastics, with hundreds of different varieties. All types of plastic are recyclable. To make sorting and thus recycling easier, the American Society of Plastics Industry developed a standard marking code to help consumers identify and sort the main types of plastic. These types and their most common uses are:

	PET	Polyethylene terephthalate - Fizzy drink bottles and oven-ready meal trays.
	HDPE	High-density polyethylene - Bottles for milk and washing-up liquids.
	PVC	Polyvinyl chloride - Food trays, cling film, bottles for squash, mineral water and shampoo.
	LDPE	Low density polyethylene - Carrier bags and bin liners.
	PP	Polypropylene - Margarine tubs, microwaveable meal trays.
	PS	Polystyrene - Yoghurt pots, foam meat or fish trays, hamburger boxes and egg cartons, vending cups, plastic cutlery, protective packaging for electronic goods and toys.
	OTHER	Any other plastics that do not fall into any of the above categories. - An example is melamine, which is often used in plastic plates and cups.

Benefits of plastics

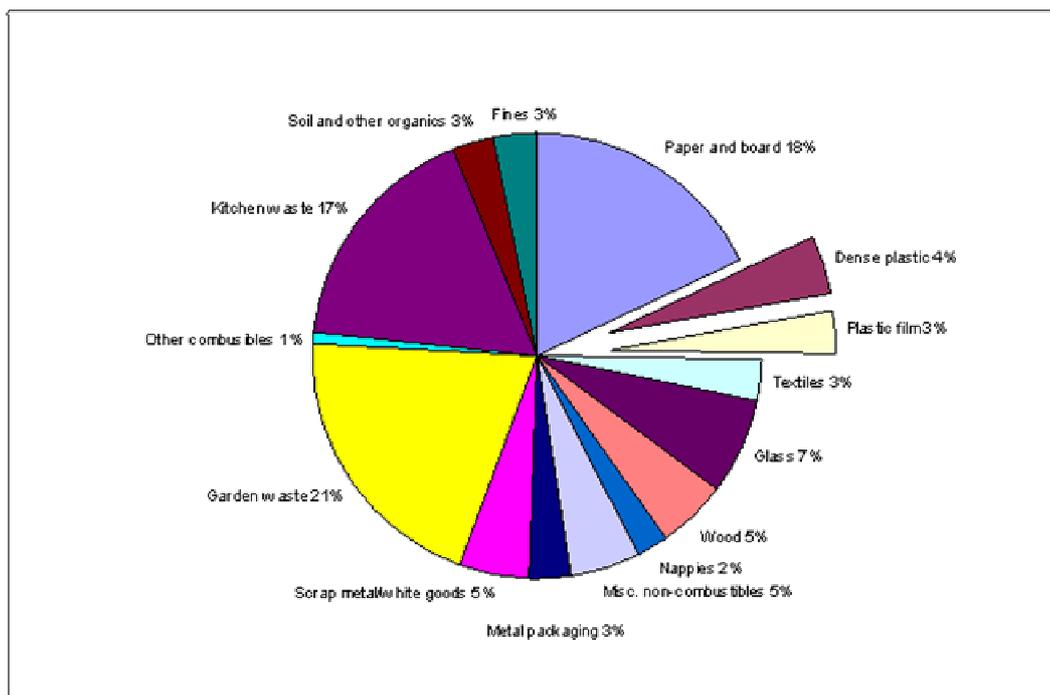
The considerable growth in plastic use is due to the beneficial properties of plastics. These include:

- Extreme versatility and ability to be tailored to meet very specific technical needs.
- Lighter weight than competing materials, reducing fuel consumption during transportation.
- Extreme durability.
- Resistance to chemicals, water and impact.
- Good safety and hygiene properties for food packaging.
- Excellent thermal and electrical insulation properties.
- Relatively inexpensive to produce.

One tonne of plastics is equivalent to 20,000 two litre drinks bottles or 120,000 carrier bags.

Why bother?

Plastics makes up around 7% of the average household dustbin.



Source: Analysis of household waste composition and factors driving waste increases - Dr. J. Parfitt, WRAP, December 2002

The amount of plastic waste generated annually in the UK is estimated to be nearly 3 million tonnes. An estimated 56% of all plastics waste is used packaging, three-quarters of which is from households. It is estimated that only 7% of total plastic waste arisings are currently being recycled.

The production and use of plastics has a range of environmental impacts. Firstly, plastics production requires significant quantities of resources, primarily fossil fuels, both as a raw material and to deliver energy for the manufacturing process. It is estimated that 4% of the world's annual oil production is used as a feedstock for plastics production and an additional 3-4% during manufacture.

A report on the production of carrier bags made from recycled rather than virgin polythene concluded that the use of recycled plastic resulted in the following environmental benefits:

- reduction of energy consumption by two-thirds
- production of only a third of the sulphur dioxide and half of the nitrous oxide
- reduction of water usage by nearly 90%
- reduction of carbon dioxide generation by two-and-a-half times

A different study concluded that 1.8 tonnes of oil are saved for every tonne of recycled polythene produced.

In addition, plastics manufacture requires other resources such as land and water and produces waste and emissions. The overall environmental impact varies according to the type of plastic and the production method employed.

Plastics production also involves the use of potentially harmful chemicals, which are added as stabilisers or colorants. Many of these have not undergone environmental risk

assessment and their impact on human health and the environment is currently uncertain. An example of this is phthalates, which are used in the manufacture of PVC. PVC has in the past been used in toys for young children and there has been concern that phthalates may be released when these toys are sucked (come into contact with saliva). Risk assessments of the effects of phthalates on the environment are currently being carried out.

The disposal of plastics products also contributes significantly to their environmental impact. Because most plastics are non-degradable, they take a long time to break down, possibly up to hundreds of years - although no-one knows for certain as plastics haven't existed for long enough - when they are landfilled. With more and more plastics products, particularly plastics packaging, being disposed of soon after their purchase, the landfill space required by plastics waste is a growing concern.

Plastic waste, such as plastic bags, often becomes litter. For example, nearly 57% of litter found on beaches in 2003 was plastic.

How, what and where of recycling plastic

Plastics are used in a wide range of applications and some plastics items, such as food packaging, become waste only a short time after purchase. Other plastic items lend themselves to be reused many times over.

Reusing plastic is preferable to recycling as it uses less energy and fewer resources. Long life, multi-trip plastics packaging has become more widespread in recent years, replacing less durable and single-trip alternatives, so reducing waste. For example, the major supermarkets have increased their use of returnable plastic crates for transport and display purposes four-fold from 8.5 million in 1992 to an estimated 35.8 million in 2002. They usually last up to 20 years and can be recycled at the end of their useful life.

According to a 2001 Environment Agency report, 80% of post-consumer plastic waste is sent to landfill, 8% is incinerated and only 7% is recycled. In addition to reducing the amount of plastics waste requiring disposal, recycling plastic can have several other advantages:

- Conservation of non-renewable fossil fuels - Plastic production uses 8% of the world's oil production, 4% as feedstock and 4% during manufacture.
- Reduced consumption of energy.
- Reduced amounts of solid waste going to landfill.
- Reduced emissions of carbon-dioxide (CO₂), nitrogen-oxide (NO) and sulphur-dioxide (SO₂).

Plastic process scrap recycling

Currently most plastic recycling in the UK is of 'process scrap' from industry, i.e. polymers left over from the production of plastics. This is relatively simple and economical to recycle, as there is a regular and reliable source and the material is relatively uncontaminated. Process scrap represents some 250,000 tonnes of the plastic waste arising in the UK and approximately 95% of this is recycled. This is usually described as reprocessing rather than recycling.

Post-use plastic recycling

Post-use plastic can be described as plastic material arising from products that have undergone a first full service life prior to being recovered. Households are the biggest source of plastic waste, but recycling household plastics presents a number of challenges. One of these relates to collection. With over 20 million UK households, kerbside recycling systems are required to regularly collect relatively small quantities of mixed plastics from a large number of sources. Currently, just over half of local authorities offer some form of plastic bottle collection service, and only an estimated 15% of UK households are served by kerbside collections that include plastic bottles. The densest network of plastic bottle collection schemes is found in the South and East of England and the Midlands. East Anglia, Wales, Scotland and Northern Ireland have the least coverage. There are approximately 4,000 plastic bottle collection banks in the UK.

RECOUP (RECYcling Of Used Plastics Limited) undertakes an annual survey of plastic bottle recycling activity in the UK. Results of the most recent survey indicate that an estimated 24,000 tonnes of plastic bottles were collected in 2003. However, this still only amounts to approximately 5.5% of all plastic bottles sold.

Mechanical recycling

Mechanical recycling of plastics refers to processes which involve the melting, shredding or granulation of waste plastics. Plastics must be sorted prior to mechanical recycling. At the moment in the UK most sorting for mechanical recycling is done by trained staff who manually sort the plastics into polymer type and/or colour. Technology is being introduced to sort plastics automatically, using various techniques such as X-ray fluorescence, infrared and near infrared spectroscopy, electrostatics and flotation. Following sorting, the plastic is either melted down directly and moulded into a new shape, or melted down after being shredded into flakes and then processed into granules called regranulate.

Chemical or feedstock recycling

Feedstock recycling describes a range of plastic recovery techniques to make plastics, which break down polymers into their constituent monomers, which in turn can be used again in refineries, or petrochemical and chemical production. A range of feedstock recycling technologies is currently being explored. These include: pyrolysis, hydrogenation, gasification and thermal cracking. Feedstock recycling has a greater flexibility over composition and is more tolerant to impurities than mechanical recycling, although it is capital intensive and requires very large quantities of used plastic for reprocessing to be economically viable (e.g. 50,000 tonnes per year).

Plastics recycling in the UK

In 1998, a pilot feedstock recycling plant went operational at BP's Grangemouth site in Scotland, with a capacity to process 400 tonnes of mixed plastic waste per annum. A feasibility study into its viability concluded that a 25,000 tonnes per annum plant could be supported from the area's municipal waste sources alone.

In 1991, LINPAC Plastics Recycling opened a unique plant with the ability to recycle post-consumer polystyrene products. The plant, based in Allerton Bywater, West Yorkshire, has a capacity of over 14,000 tonnes per year, which is set to increase to 25,000 tonnes per year by 2005. The plant is able to process fast food boxes, meat trays, egg cartons, yoghurt pots, vending cups, and a range of other polystyrene products. In addition, the plant processes a range of polyethylene and polypropylene goods, such as bottles, crates, sheets, caps, pipes and fibres.

Degradable and bio-plastics

Degradable plastics

A number of UK retailers have recently introduced degradable carrier bags. These bags are made from plastic which degrades under certain conditions or after a predetermined length of time. There are two types of degradable plastic: bio-degradable plastics, which contain a small percentage of non oil-based material, such as corn starch; and photodegradable plastics, which will break down when exposed to sunlight.

Degradable plastics are already being used successfully in Austria and Sweden, where McDonalds has been using bio-degradable cutlery for three years. This enables all catering waste to be composted without segregation. Carriers for packs of beer cans are now being manufactured in a plastic which photo-degrades in six weeks. There is also potential to use such plastics in non-packaging applications such as computer or car components.

There are a number of concerns over the use of degradable plastics. First, these plastics will only degrade if disposed of in appropriate conditions. For example, a photodegradable plastic product will not degrade if it is buried in a landfill site where there is no light. Second, they may cause an increase in emissions of the greenhouse gas methane, as methane is released when materials biodegrade anaerobically. Third, the mixture of degradable and non-degradable plastics may complicate plastics sorting systems. Last but not least, the use of these materials may lead to an increase in plastics waste and litter if people believe that discarded plastics will simply disappear.

Bio-plastics

A number of manufacturers have been exploring alternatives to plastics made from non-renewable fossil-fuels. Such alternative 'bio-plastics' include polymers made from plants sugars and plastics grown inside genetically modified plants or micro-organisms.

Health and safety concerns have arisen over potentially hazardous chemical additives to plastics and consumer pressure has contributed to manufacturers switching to plant-based plastics in such cases. For example, the world's largest toy manufacturer Mattel announced in 1999 that PVC would be replaced with plant-based plastics in new products from 2001 onwards. A range of other companies, including LEGO, IKEA, Nike and The Bodyshop have made similar pledges.

Use of recycled plastic

There is a wide range of products made from recycled plastic. This includes polyethylene bin liners and carrier bags; PVC sewer pipes, flooring and window frames; building insulation board; video and compact disc cassette cases; fencing and garden furniture; water butts, garden sheds and composters; seed trays; anoraks and fleeces; fibre filling for sleeping bags and duvets; and a variety of office accessories.

The Recycled Products Guide (RPG) www.recycledproducts.org.uk is a listing of products made from recycled. Buying recycled products is a practical way of supporting markets for recycled products and 'closing the loop'. In addition, a list of suppliers of goods made from recycled plastic is available on RECOUP's website.

It takes 25 two litre plastic drinks bottles to make one fleece garment.

Despite the wide range of recycled plastics applications, the actual tonnage of waste plastic which is returned to the material cycle is relatively small. Currently, recycled plastics are rarely used in food packaging - the biggest single market for plastics - because of concerns about food safety. A method of addressing this problem is by enclosing the recycled plastic between layers of virgin plastic to ensure the packaging conforms to hygiene standards. These multi-layered containers are now being used in some drinks bottles, but recycling cannot eliminate the colours from plastics so they cannot be used in transparent or light coloured applications.

Another constraint on the use of recycled plastics is that, to be economically viable, plastic processors require large quantities of recycled plastics, manufactured to tightly controlled specification at a competitive price in comparison to that of virgin polymer. This is a challenging task, particularly in view of the diversity of sources of waste plastics, the wide range of polymers used and the high potential for contamination of plastics waste.

In order to encourage market development for recycled material applications, the UK Government has set up the Waste and Resources Action Programme (WRAP) whose task is to promote sustainable waste management by creating stable and efficient markets for recycled materials and products.

Plastics waste collection systems

An increasing number of local authorities are now providing plastics collection services. Research by RECOUP has shown that local authorities can achieve cost-effective high-achieving plastics collection systems by integrating plastic bottle collection with other recyclable materials. For example, Daventry District Council introduced such a system in 1998 and has been able to increase recycling rates from 12% to nearly 50%.

In Adur, West Sussex, and Milton Keynes in Buckinghamshire, plastic bottles and polystyrene are collected through 'blue box' schemes, where residents place recyclable materials in a separate box for sorting by the refuse collectors at the kerbside. Plastics and other materials are sorted into a compartmentalised vehicle, then taken to the Materials Reclamation Facility (MRF) for final sorting before transport to reprocessing plants.

What does the law say?

Legislation which is particularly relevant to plastics is the 1994 European Union Directive on Packaging and Packaging Waste 94/62/EC (the Packaging Directive), which aimed to establish producer responsibility for packaging waste. The directive was implemented in the UK through the Producer Responsibility Obligations (Packaging Waste) Regulations 1997 and the Packaging (Essential Requirements) Regulations 1998. The former sets targets for the recovery and recycling of packaging wastes, including plastics packaging waste. These targets are currently being revised by the EU. The UK government has recently published the national packaging recycling and recovery targets for 2006 and beyond. These require 23% of plastics waste to be recovered by 2006, rising to 25.5% by 2010.

For detailed information on these regulations and targets, see [Waste Watch's Legislation information sheet](#).

What you can do

A note regarding plastic bottle top collections: At present we are aware of only two collectors that will accept plastic milk-bottle tops for cash. If you believe you know of a scheme collecting for wheelchairs or other causes or cash, contact them directly to make 100% certain that they are willing to take bottle tops. The money that can be raised through plastic bottle top collections is small and it may be more worthwhile to collect cans, mobile phones or printer cartridges. If you have already collected a large number of bottle tops then it may be possible to find a reprocessor using the search facility on www.recoup.org.

When you put plastic bottles in recycling banks, or even in your bin, ALWAYS REMOVE THE BOTTLE TOPS. This also enables them to be crushed more easily so they occupy less space.

- Choose goods with minimal packaging, and which are packaged in a material that can be recycled or returned in your area.
- Try to reduce the need to throw away plastics. For example, take a reusable shopping bag to the supermarket or corner shop, or re-use the bags you were given last time. Don't accept a bag if you don't need one. When they are beyond reuse, plastic carrier bags can be put into collection banks at some Morrisons, Tesco and Sainsbury's supermarkets.

Every year, an estimated 17½ billion plastic bags are given away by supermarkets. This is equivalent to over 290 bags for every person in the UK.

- Rather than throwing them away, give plastic toys or containers to children's scrap stores or playgroups for reuse.
- Use plastic containers and bags again or make them into something else. For example use yoghurt pots to grow seedlings, use the top part of drinks bottles as cloches for plants and offer clean plastic carrier bags to charity shops.
- Buy products that are refillable.
- Think of ways of reducing the need for packaging. Don't add extra packaging yourself - a melon, a grapefruit or a bunch of bananas already has natural packaging - does it need to go in a plastic bag as well as your shopping bag, and does that already efficiently packaged dairy product or piece of meat really need another wrapper?
- Ask your local authority recycling officers which materials are currently collected or may be collected in the future.
- Look for products, e.g. bin liners and refuse sacks, made from recycled plastic, now available in many supermarkets. Also look out for products packaged in at least partially recycled material. For example, Shell Oil's 1 litre and 4 litre Helix oil packs now contain a proportion of recycled plastic, collected from domestic and industrial waste.
- If it does not already run one, suggest to your local authority that it considers starting a plastics recycling scheme. The development of market opportunities has

meant that at the moment demand is outstripping supply of plastic bottles, so new initiatives are needed to feed the process and ensure its success.

- Encourage your local authority to buy products, such as street furniture, made from recycled plastic rather than wood.

Useful publications

- **Community Recycling**, a comprehensive guide to setting up, maintaining or expanding a local recycling scheme. Available to download from: www.wasteonline.org.uk/resources/WasteWatch/CommunityRecycling.htm
- **Waste at Work**, a practical guide to dealing with office waste. It includes ideas on reducing and reusing everything from toner cartridges through to toilet rolls, as well as a step-by-step guide to setting up an office recycling scheme. Available to download from: www.wasteonline.org.uk/resources/WasteWatch/WASTEWORk1.htm
- **Plastics in the UK economy**, a guide to polymer use and the opportunities for recycling. This report looks at the use of plastics in different industry sectors and explores the potential for recycling. Available to download from: www.wasteonline.org.uk/

Useful contacts:

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Produces a range of literature on plastic consumption, production and recycling.

Source : <http://www.wasteonline.org.uk/resources/InformationSheets/Plastics.htm>