

# The plastic merry-go-round

*China's decision to reject shipments of plastic waste has put the spotlight on Britain's recycling system*

## What happens to our plastic waste?

In Britain, nearly all local authorities now offer kerbside recycling for plastic bottles, and three-quarters of them also collect pots, tubs and trays. The waste is then taken to a materials recovery facility, where the various elements of the “waste stream” are separated out: magnets grab the metal; glass and plastic are sifted out. The various types of plastic are then sorted and sold in the post-consumer commodities market. Plastic bottles, for instance, are compressed into huge bales and sent on to recycling plants. In 2016, one million tonnes of plastic packaging – 45% of the total – was sent for recycling.



*A plastic recycling plant in Dagenham*

## What happens in recycling plants?

In the most advanced plants in Europe, old bottles are ground into flakes in a shredder and submerged in water. The labels and other detritus float to the top of the tank, while the heavier plastic flakes sink to the bottom. The flakes are then washed and sorted by colour using infrared sensors and jets of air. After that they're melted down and turned into molten strings that, once cooled, are cut into pellets and heated again for several hours to strengthen them and remove impurities. The pellets can then be turned back into bottles and other food-grade plastics: Ribena's bottles, for instance, are made from 100% recycled pellets. The process can in theory be repeated indefinitely, a “closed loop” that eliminates the need to mine fresh materials.

## Does it always work that well?

No. The case for recycling aluminium, metal cans and paper is clear: they are expensive and energy-intensive to produce from scratch, and relatively easily recycled. Glass, by contrast, is often cheaper and more energy efficient to make from scratch. Plastic presents a different problem. Recycling it uses only about 25% of the power needed to create it from petrochemicals in the first place: most of the difficulties arise in the complex sorting process involved.

## Why is so much sorting required?

Because plastic comes in such a large variety of shapes and compounds. Six main kinds of plastic polymer are used in packaging, four of the main ones being polyethylene terephthalate (PET) – used in beverage bottles; high-density polyethylene (HDPE) – milk bottles; polyvinyl chloride (PVC) – used in cling film; and low-density polyethylene (LDPE) – most grocery bags. The different polymers are identified by a number inside the recycling triangle that is stamped on many plastic containers and packages. Thus a “1” stands for PET, a “2” for HDPE, a “4” for LDPE and so on.

## Why does this create a problem?

The different polymers are not compatible: even a small quantity of PVC will degrade recycled PET, for example, and vice versa. And because many consumer items consist of parts made of different plastics – PET bottles, say, usually have poly-

propylene (PP) lids – they are hard to separate. In addition, mixing plastics of one colour with another, let alone with foodstuffs or other waste, makes them less valuable. As a result, many plastics are “downcycled” into less pure, weaker forms: PET bottles become fleeces or carpets; HDPE bottles become flower pots; plastics that cannot be separated are turned into black rubbish sacks or “lumber” – slabs for decking and so on.

## Is plastic recycling economic?

Not really. There is strong demand in the UK for some recyclables, such as clear HDPE milk bottles. But by and large, the process is driven not by market forces – making new plastic is often cheaper than recycling it, particularly when oil prices are low – but by EU regulation and

the desire of companies to be seen as green. Hence, rather than being recycled here, much of our plastic is shipped to Asia, where demand for cheap plastic is far higher. In 2016, only 37% of our plastic recycling was done domestically. Until this year, the vast bulk of it went to China. But in January, as part of a campaign against *yang laji*, or “foreign garbage”, Beijing banned imports of all but the best-quality recyclables. Overnight, waste disposal sites across Europe have seen a build-up of plastic. Bottlenecks are predicted across the whole of the UK in coming months.

## What will happen to Europe's plastic waste mountain?

New markets will be sought in Asia, but undoubtedly some of it will end up in landfill, or in energy-from-waste plants, where rubbish is burnt to create electricity. Indeed, 40% of Europe's plastic packaging already ends up in such waste plants, and 30% goes to landfill: only 30% is recycled. However, the European Commission is treating China's decision as an “excellent opportunity” to create a truly “circular economy” in Europe for plastic. It wants the EU to recycle 55% of plastic packaging by 2030.

## A plastic-free world?

Recycling is only one of the “4Rs” invoked in the war on plastic: reduce, reuse, recycle, recover. The Government's Environment Plan aims to eliminate “all avoidable plastic waste” by 2042, by “taking action at each stage of the product life cycle”. Single-use plastic bags are once again in the firing line – they clog up the sorting machines, so few recyclers take them. All shops will be made to charge for bags (the use of bags has dropped by 85% since the supermarket charge was introduced in 2015). Supermarkets will be encouraged to reduce plastic packaging. Iceland announced that its own-brand products would be plastic-free by 2023.

But two things are worth noting. First, the issue of recycling in the UK is largely irrelevant to the most pressing current concern: plastic in the wild, especially the sea. That is a rubbish collection and disposal issue, and mostly an Asian one: Europe and the USA account for only 2% of the eight million tonnes of plastic leaking into the ocean every year; Asia for 82%. And second, plastic-free isn't always more environmentally friendly. For instance, glass, being much heavier, requires more energy to transport. And replacing fossil-fuel plastics with degradable bioplastics – made from corn starch or wood, not petrochemicals – would require using up a vast amount of agricultural land. So, given how cheap and useful it is, plastic packaging will be around for a long time yet. In Europe, much of it will end up having its energy “recovered” in plants that, while relatively efficient and non-polluting, do essentially just burn it.

## How can we recycle better?

In its 25-year Environment Plan (see box), the Government says it wants to work with manufacturers to rationalise packaging into a smaller range of formats, so they can be sorted and recycled more easily. Deposit schemes for plastic bottles have been successful in some EU and US states: Michigan has a ten cent deposit scheme and a bottle recycling rate of 97%. Germany has pioneered “extended producer responsibility”, which holds companies responsible for their environmental costs throughout their products' life cycle. Germany recycles about 20% more of its household waste than the UK.

## Is the whole process worthwhile?

In Europe, we recycle to save resources – plastic production accounts for 5% of all fossil fuels used – and to stop it being sent to landfill or burnt. These are admirable aims. But once you take account of the energy used in sorting and recycling, the gains are, for now, not that great.