



British Glass

Maximising the recyclability of glass packaging

Part of the Glass-pack portfolio:
A series of no-nonsense guides for
people working with glass packaging.

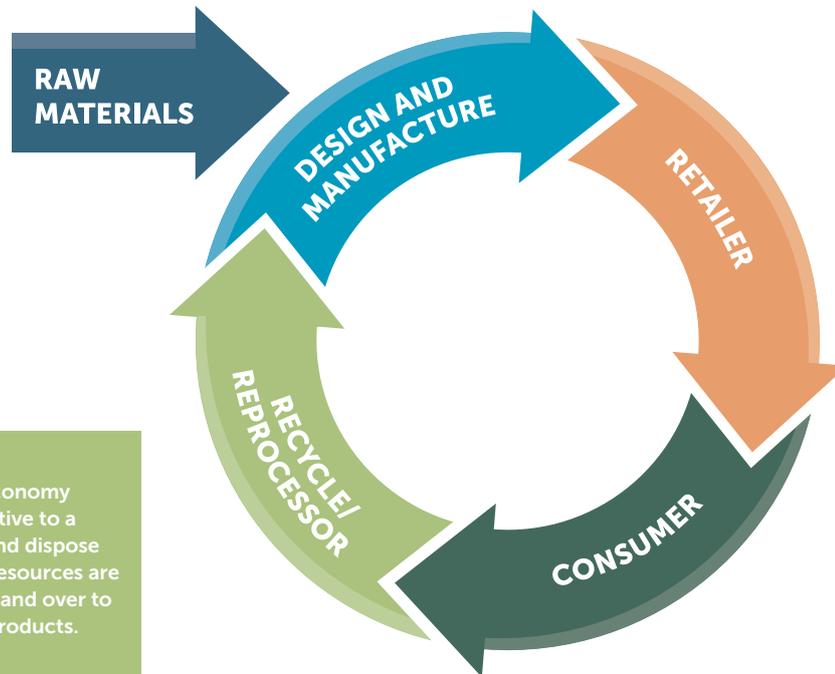
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Maximising the recyclability of glass packaging

Glass is an ideal circular economy material – it can be remelted indefinitely with no loss of quality. But for waste glass to be re-melted it must be processed to remove non-glass contaminants.



A circular economy is an alternative to a make, use and dispose economy. Resources are reused over and over to make new products.

2 With a little knowledge about how glass is made and recycled, everyone along the supply chain can take steps to make sure as much glass as possible is reused indefinitely.

Why recycle glass?

Cullet definition - waste glass that's been processed, ready for recycling



Using recycled glass is an important part of glass making and always has been – even if there were no environmental benefit, glass makers would seek to use recycled material to optimise process control and melting.

However, using cullet also reduces carbon emissions in two ways:

- CO₂ is released from the raw materials themselves as they melt. However for cullet, this process was completed the first time the glass was made – when it is remelted there is no further CO₂ to be given off. Every tonne of glass that goes back to re-melt saves around 185kg of carbon dioxide (compared to using virgin raw materials).
- when cullet is used it takes less energy to melt than virgin raw materials – so there are lower CO₂ emissions from fuel; substituting 1 tonne of glass cullet for raw materials saves 322 kWh of energy (<https://www.britglass.org.uk/knowledge-base/resources-and-publications/balance-between-furnace-operating-parameters-and-recycled>).

Increasing the amount of cullet used in glass manufacturing is a key priority for the UK glass industry – but accessing the quantity and quality of cullet required is an ongoing challenge.



Re-melt vs other glass recycling

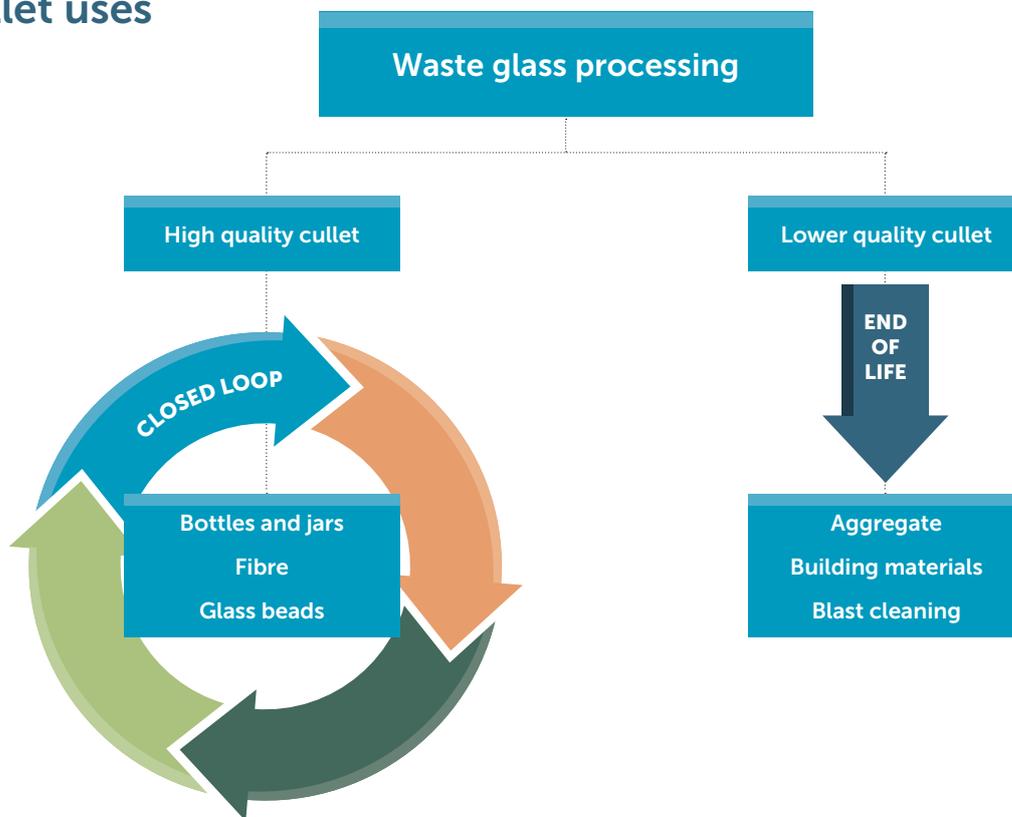
People often assume that recycling glass means re-melting it for use in new glass. But if cullet has too high a level of contamination by non-glass materials, it cannot go back into a glass furnace.

The greater the levels of non-target material in the collected waste glass, the greater the cost of cleaning and processing glass to produce furnace-ready cullet. Sometimes it's just not commercially viable and the cullet has to be used for secondary applications, such as aggregate, an additive in building materials (including eco-cements and concretes), water filtration or blast cleaning. This is open-loop recycling (or down-cycling).

Re-melting back to glass (closed-loop recycling) is the best environmental option. In line with circular economy principles, British Glass advocates prioritising re-melt uses and keeping glass at its highest material value for as long as possible, reducing use of virgin raw materials and energy.

Cullet uses

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You can find data about recycling rates and recycled content of glass packaging on www.britglass.org.uk/our-work/recycling

How glass gets back to a furnace

CONSUMER

Doorstep collection or glass banks – most local authorities in the UK have a system for consumers to recycle their glass bottles and jars. And commercial waste contractors also collect glass from bars, restaurants and other businesses.

Glass can be labelled 'widely recycled'

MATERIALS RECOVERY FACILITY

If glass is collected with other materials as part of a co-mingled collection, it first goes to a materials recovery facility (MRF – pronounced to rhyme with Smurf). Other materials are removed from the co-mingled recyclates first – what is left is so-called MRF glass.

This is about 35% other materials – from bits of paper, plastic and metal too small for the MRF to capture right through to used nappies and broken plates.

GLASS PROCESSOR

When waste glass first arrives to be reprocessed it's left outside for a little while to weather – letting the rain and sun loosen dirt, labels and so on.

As co-mingled collections have become more common, the glass processing industry has had to make huge investments and leaps in sorting technology to ensure that furnace ready cullet can be made from the collected waste glass.

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The glass then goes through processes including washing, hand picking, suction, eddy current, magnetic sorting and sieving to remove non-glass debris and pieces of glass too small to be screened effectively at the next stage.

Porcelain, ceramic, pyro-ceramic and borosilicate glass (eg Pyrex) are especially problematic because they are difficult to sort out from the cullet and can damage the furnace or compromise the quality of the glass that is produced.

Optical sorting technology – using x-rays, hi-resolution cameras, infra-red and lasers – removes further non-target material and sorts the glass by colour.

FACTORY

The glass manufacturer will carefully inspect all cullet coming in to ensure it is free from contamination.

The proportion of cullet to virgin raw materials to be used will depend on a number of factors but will range from 0% cullet to as much as 85%.

Cullet is then mixed with some virgin sand, limestone and soda ash and added to the furnace.

Glass can go from a kitchen cupboard back to the shop shelf – as a new bottle or jar – in as little as 30 days.

Making sure packaging is as easy to recycle as possible

Compared to many other packaging materials, glass is actually very simple to recycle, because:

- **glass is a single material – so there is no mixture of materials to separate**
- **all bottles and jars are globally the same basic composition – so they can all be recycled together no matter where they were manufactured.**

It is not even necessary to separate the different colours at collection nowadays (although older colour-coded banks are still in use, most are relabelled for 'mixed colours'). Some local authorities still ask people to colour sort.

There are a few points that packaging designers should be aware of to ensure the maximum amount possible of their packaging makes it back to a glass furnace:

- **Caps and closures** – most are easily removed in the recycling process. However, swing stoppers can cause problems: they are difficult to remove from the bottles.
- **Labels and sleeves** – most of these cause no problem in the recycling process and are easily removed. However, plastic labels attached with very strong adhesive sometimes don't wash off and the attached glass ends up being rejected.
- **Direct print onto glass** – if this completely covers large areas in colour it can cause glass to be incorrectly colour sorted for reprocessing. At the current low levels seen in the market, this is not being considered as a problem.
- **Glued on decoration eg badges, medals in plastic or metal** – these should ideally be avoided. The glue is usually strong enough to withstand the initial processing, so the portion of the bottle attached to the non-target material is rejected. Attaching to the minimum possible surface area will reduce the proportion of glass lost from each container.
- **Secondary packaging eg whisky presentation boxes** – so long as these are easily separated, they are not a problem. However recyclability of any outer packaging needs to be considered separately.
- **Spray mechanisms, collars, pouring inserts etc** – again, provided these will separate from the glass easily when the bottle/jar is broken, they pose no problem. If more firmly attached then the attached portion of glass will be lost.

Encouraging recycling at every stage

There are things that can be done at each stage of the supply chain to get a greater proportion of glass back to re-melt. Packers, fillers and retailers can help by:

- using on-pack recycling labelling to remind consumers to recycle.
- hosting glass banks – the latest generation of glass banks use internet-of-things technology to monitor the fill level, ensuring they're emptied at the most efficient intervals. This in turn reduces road miles and helps prevent over-filling.
- work with the glass industry to help consumers get the message – just as Lidl have done in Leeds.
- the ideal is to have one bottle bank per 100 people, sensibly located.



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Case Study

Retail partnership creates Recycling Heroes

In Leeds, household glass is collected at glass banks, not kerbside. This captures glass with lower contamination than mixed material collections, but there is a trade-off in convenience and awareness.

That's where retailers can make a practical and positive contribution to increasing recycling.

In partnership with Lidl, British Glass and Leeds City Council embarked on an awareness campaign after placing glass bring banks at Lidl's Halton store.

The total glass captured from all banks within one mile of the store in March 2018 was up six tonnes on the same period in the previous two years – showing the new banks have captured additional glass, not just diverted it.

Produced in association with British Glass members and Glass Technology Services Ltd (GTS)



URM UK Ltd – the UK's largest purchaser and recycler of waste glass. It operates world-class cullet treatment plants in Knottingley, Tilbury, Doncaster and South Kirkby and provides fast and efficient collection services through bottle banks, kerbside and trade collections.



Viridor – which operates two dedicated glass recycling facilities in addition to direct contracts between the glass facilities and glass producers and other waste management companies. Viridor is an experienced reprocessor of recycled glass cullet and is proud to be one of only a handful of UK companies that is certificated as an 'End of Waste' (EoW) glass re-processor.



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For an environmental assessment of container glass, e.g. CO2 footprint, life cycle assessment (LCA), recycled content is NOT the correct indicator. The recycling rate is the valid indicator, which for glass packaging in the UK is a recycling rate of 68%.

We recommend organisations do not use recycled content data for any assessment of environmental performance, or other environmental evaluation. Recycled content data should be used only for internal reference and material stewardship.

NB. The environmental assessment process is complex and ISO guidelines for the assessment of plastic packaging are different to those for glass.