

Life Cycle Analysis of Glass Recycling



Glass - An Amazing Material!

Glass is a familiar household material, most commonly found in jars and bottles containing food and drinks, but also all around us in windows, our cars, televisions and in our kitchens. Glass is natural, pure, easily shaped, transparent, strong, and completely inert, properties which make it ideal for packaging.

Glass is also uniquely sustainable because it can be recycled again and again without any loss in quality, purity or clarity. This process saves energy, emissions and natural resources.

The Best Use of a Valuable Resource

Once collected for recycling, glass should be considered as a valuable resource, which must be used wisely. Recycled glass can be used in a “closed loop” to make new containers and has a range of additional uses such as shot blast abrasive, water filtration medium, fluxing agent in brick manufacture, fibre glass or aggregates.

The important question to be answered is:

Which use most benefits our environment ?

The Project

The environmental consultancy, Enviros carried out a study into the relative environmental benefits of the various options. They used a ‘Life Cycle’ approach to develop a model for each recycling option taking into account all of the energy and emissions associated with collection, transport, processing and manufacture.

The study converted all the various environmental impacts throughout this supply chain into carbon dioxide (CO₂). CO₂ is the principal ‘Greenhouse Gas’ and is the major contributor to global warming. Under the Kyoto protocol, the UK is committed to reducing CO₂ emissions by 12.5% by 2010 and the Government has recently set out its long term goal of reducing emissions by 60% by 2050.

Why is carbon dioxide important?

Carbon dioxide is produced as a result of burning fossil fuels (oil, gas and coal) in power stations, factories and homes. The atmospheric concentration of CO₂ has risen steeply over the past century as a result of increasing energy consumption. Rising CO₂ levels is one of the principal causes of global warming.

Where does CO₂ come from?

10 tonnes of CO₂ is produced when:

- A petrol engine car is driven 30,000 miles
- An articulated lorry travels 5,000 miles
- A 100W light bulb shines for 26 years

Every year the UK emits around 575 million tonnes of CO₂.

The Best Environmental Use for Recycled Glass

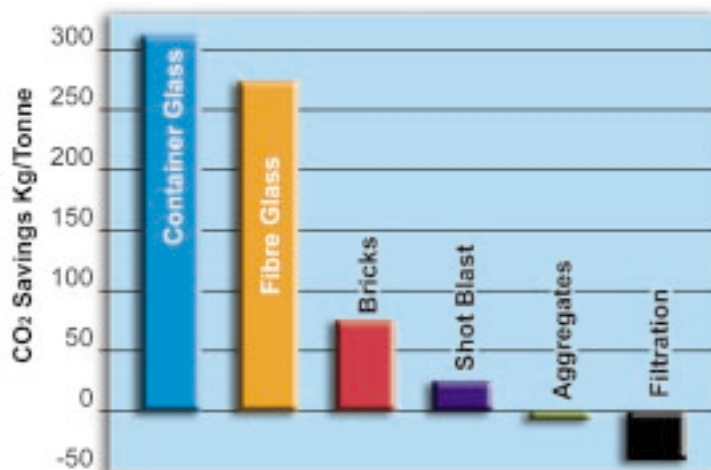


The Impacts

- If recycled glass is used to make new bottles and jars, the energy needed in the furnace is greatly reduced. After accounting for the transport and processing needed, the study showed that 315kg of CO₂ was saved per tonne of glass melted.
- Some recycled glass from the UK is exported to glass container makers in other European countries, because bulk transport by sea uses very little energy this use still saves 291 Kg CO₂.
- Recycled glass can also be used as a feedstock for making fibre glass giving savings of 276 Kg CO₂. The glass fibre insulation then goes on to save further energy in our homes.
- Using glass as a fluxing agent in bricks saves 72 Kg CO₂.
- Using glass as a shot blasting abrasive saves 19 Kg CO₂.
- From a global warming perspective there is limited environmental benefit to using recycled glass to replace quarried aggregates. However, the use of recycled glass in alternative applications is an important part of the UK meeting its overall glass recycling targets.
- Crushed glass can replace sand in water filtration and provide a high value alternative market for recycled glass, but in this case there is a small net increase in CO₂ emissions. However the wider health benefits provided by improved water filtration are not captured by this type of LCA and some energy reduction in water pumps is expected but has not yet been quantified.

The results of the study are summarised below and clearly show the large reductions in CO₂ emissions when recycled glass is used as a feedstock for the manufacture of new glass containers and glass fibre.

CO₂ Savings



From the point of view of combating global warming and reducing CO₂ emissions, the best use for recycled glass is as a feed stock in the manufacture of new glass packaging.

Recycled glass should be directed towards the most beneficial use. Collection methods should be managed practically to ensure that CO₂ reductions are maximised.

Without a range of uses for all recycled glass, the maximum amount of glass will not be diverted for recycling and an environmental opportunity will be lost.