

Glass recycling and cullet use in Great Britain

Introduction

1. Cullet—or recycled waste glass—can often be a technical substitute for the mix of virgin raw materials (‘the batch’) used in making glass, and is therefore able to replace silica/glass sand up to certain limits. In Great Britain, recycled glass comes from two sources:

- (a) factory cullet, comprising rejects from glass manufacturing processes; and
- (b) external cullet, the latter being mainly collected through ‘bottle banks’ operated on a subsidized basis by local authorities.

Benefits

2. Cullet use may result in both private and public benefits or cost savings. By reducing batch melting temperatures, each 10 per cent increase in cullet use allows savings of around 2.5 per cent of the total energy used in glass furnaces. Alternatively, when cullet is added to the batch, the furnace load increases by some 10 to 15 per cent. The benefits are therefore either an increase in furnace efficiency or an increase in overall production capacity.

3. Public benefits come in the form of reduced carbon dioxide emissions, brought about by: (a) a reduction in fuel consumption; and (b) reduced usage of soda ash, limestone and dolomite, which are all carbonates giving off carbon dioxide when melted. Recycling also reduces the amount of solid waste going to landfill, and generally reduces the use of natural resources, including sand. Each tonne of cullet used, for example, saves around 1.2 tonnes of raw materials in the batch. Assuming that silica/glass sand accounts for 60 per cent of the batch raw material, each tonne of cullet replaces around 0.72 tonnes of such sand.

4. Public policy and legislation, including the UK Waste Strategy and Packaging Waste Regulations, aim to increase recycling rates, which for glass is currently just over 30 per cent in Great Britain, although patterns in recycling differ substantially. Across Continental Europe, several countries report glass recycling rates of 60 to 80 per cent; and the European Commission is understood to be considering proposals for a 75 per cent target for all member states.

Demand for clear cullet and its technical features

5. One of the reasons why recycling rates in Great Britain appear to be much lower than elsewhere in the EC is the shortage in the supply of clear and amber cullet in Great Britain relative to the scale of demand. There are few imports into Great Britain of filled clear-glass containers—but substantial imports of filled coloured-glass containers, particularly wine bottles. Some 40 per cent of the glass market constitutes clear-glass-container manufacture, with clear-flat-glass manufacture accounting for a further 33 per cent. But only around 20 per cent of the waste glass collected in the UK is clear cullet. Hence, there is an imbalance between the mixes of cullet demanded and supplied in Great Britain.

6. This is further exacerbated by technical limitations. Ideally, cullet should be free from any foreign bodies such as paper, plastic, metal and non-fusible (refractory) elements, once processed. There are similar purity concerns in the case of float-glass manufacture. Pilkington, the largest float glass maker, told us that it requires clean and consistent cullet to avoid product quality problems, and hence is reluctant to use externally-generated material. With a view to increasing the recycling rate, it has developed arrangements with some of its customers to re-use as much of their waste as possible.

Demand for coloured cullet and its technical features

7. When it comes to coloured glass manufacture, cullet is easier to use. Impurities cannot easily be seen in the end-product and green glass can absorb large amounts of mixed cullet. Also, Great Britain is a net importer of wine and beer bottles, which means there is ready availability of green cullet. In one particular year, the UK exported about 100,000 tonnes of coloured cullet, though this figure is usually much lower. Green cullet constitutes over 50 per cent of waste glass collected. These factors mean it would be possible to substitute waste glass for up to 80 per cent of the batch in coloured glass manufacture.

Supply of cullet

8. The largest purchaser of cullet in the Great Britain is British Glass Recycling (BGR), which is jointly owned by United and Rockware. British Glass Recycling collects around 225,000 tonnes of waste glass a year, controls bottle bank glass collection for about 70 per cent of the container manufacturing sector, and has long term contracts with local authorities. It competes for such contracts with other suppliers such as Berrymans, Richardsons and Glass Recycling UK.

Pricing

9. Market prices for cullet (about £45 a tonne for clear cullet) are set by comparison with the combined price of the raw materials displaced. Although this price is affected by the underlying costs of handling, collection/transport and processing,¹ most glass manufacturers told us that it is sand prices (and those of soda ash) that influence cullet prices rather than vice versa. As a result, an increase in sand prices would be unlikely to give rise to supply-side substitution, since there would be a corresponding increase in the price of cullet. In the short to medium term, therefore, cullet supply and usage is likely to remain unresponsive to price signals, and will not therefore impose any downward pressure on sand prices.

Future scenario

10. In the near future, government strategy on waste recovery targets² aims to increase use of cullet through the use of additional funding to local authorities for recycling and a landfill tax. To deal with the problem of current market barriers to recycling, the Government and the devolved authorities have set up a £40 million Waste and Resources Action Program which will address the glass market this year as one of its four priority materials. The new packaging proposals would encourage a doubling of glass recycling over the next five years. The DETR believe that the market for cullet as an aggregate could increase in the future and firm up cullet prices, thus making it more economical for glass manufacturers to recycle waste glass.

11. In the short and medium term, cullet will continue to act as a technical substitute to coloured glass and a complement in the case of clear- and float-glass manufacture where sand cannot be replaced entirely due to technical limits. But as long as the market price of cullet is largely set by comparison with that of sand (and soda ash), instead of responding to market conditions, it will not constrain the price of sand for glassmaking.

¹According to the DETR, the current cost of collecting cullet is £25 to £100 per 3-tonne container. Glass was previously sold at a profit, but in recent years prices have flattened, with green cullet being sold at a zero price. However, increasing use of green cullet as an aggregate for road surfacing has now pushed the price back up to £5 a tonne in most areas in Great Britain.

²According to the DTI, municipal solid waste recycling targets are 33 per cent by 2015, compared with the figure of 9 per cent recorded in 1998/99. The Landfill Directive will boost the sorting of household waste and the Waste Strategy 2000 has a policy in place to increase diversion of waste from landfill. There will be increases in landfill tax by £1 per tonne per year until 2004.