Research favours separated collections for effective recycling

Michael Delle Selve* examines the results of research carried out by the Association of Cities and Regions for Recycling Management for FEVE, the European Container Glass Federation. The report highlights which areas of recycling are proving the most effective across Europe and what can be done to improve efforts.

Glass stands out as one of the most effectively recycled materials in Europe, not only because of the inherent characteristics of thematerial, but also thanks to well-established separated collection schemes. Currently, more than 25 billion bottles and jars are collected, corresponding to a 67% annual rate.

More can be done, however, to improve the already good records, since recycled glass (or cullet) represents a major resource for the glass industry. Its reintegration in a bottle-to-bottle production system can be maximised by disseminating the best method of collection and recycling, while enhancing collaboration between all the key players of the closed loop system, including consumers, municipalities, glass manufacturers and cullet treatment plants.

Comprehensive assessment

This article details some of the key findings of research carried out by the Association of Cities and Regions for Recycling Management (ACR+) for the European Container Glass Federation (FEVE). Based on a comprehensive assessment of eight case studies, the research identified separation collection schemes, namely the bottle bank, as the most functional to glass recycling growth. It therefore recommends these systems be optimised in countries where they are already in place, and be widely promoted in countries where co-mingled collection systems are still in use. A clear communication to citizens informing them about the sustainable, sound benefits of glass collection and recycling in a bottle-to-bottle (or cradle-to-cradle) system, as well as educating them to do it properly, is also of primary importance.

Co-mingled collection

The main finding conveyed from the ACR+ report is that multi-material collection is incompatible with colour

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▼ More than 25 billion bottles and jars are reportedly collected across Europe on a yearly basis.

separation and high-quality cullet. For the collection of used containers, some local authorities in Europe operate a multi-material collection system, which includes glass. Where this occurs, glass collection and recycling rates are very low (mainly in Eastern countries where glass recycling is still at the early stages).

With this system, glass is not colour-separated and is contaminated by the other materials that it has been mixed with during collection. This contamination increases cullet processing costs, which are not, ultimately, sustainable for society. Glassmakers therefore remain all the more attached to the bottle bank collection system, which allows colour separation. For glass at least, co-mingled collection is the antithesis of best practice.

Source separation

Separate collection with colour separation is reported as the most functional system for effective recycling, based on two prerequisites: Firstly, the recycled material must meet the minimum quality specifications necessary for the production process where recycling occurs; and secondly it must be available at a cost that is competitive in relation to the use of virgin raw materials.

The quality of the recycled glass is of paramount importance and all the more so when high recycling rates are the aim in a bottle-to-bottle system. Mixing wastes together intentionally to separate them later is inefficient, since it usually results in higher impurity levels and higher costs.

Separate collection maximises the proportion of collected glass, which can be used infinitely and without loss of quality, to make new bottles and jars in a circular system. According to the FEVE Life Cycle Assessment, an estimated 80% goes into glass container production, with the rest being lost from the production loop because of its pure quality and ends up going into other uses with no environmental benefit, such as making aggregates.

Other collection systems, such as co-mingled collection, sorted automatically through industrial processing, is either too costly or often only capable of delivering glass suitable for low-grade applications (for example as aggregate), which is not the most effective and sustainable use of cullet.

Bottle banks

According to the ACR+ report, the bottle bank system is a success story in Europe. The vast majority of glass packaging on the continent derives from bottle banks, although in some countries, kerbside is quite diffused.

In countries like Germany, deposit schemes for recycling are also implemented in some areas. The bottle bank's colour and shape have established a strong link with glass bottle recycling in the minds of citizens. While their aesthetics have been improved over time, the system has proved an efficient method of collection that involves minimal resources in terms of time, personnel, vehicles and fuel consumption. As it is noisy, collections have to be made during the daytime, but operations are often simple and swift. Its minimal maintenance, easy cleaning and durability make the bottle bank a suitable container for all kinds of climate and site location. No other packaging collection practice can happen in such an effective way.

▲ Door-to-door collection can also be used to collect glass for recycling.

There is, however, room for improvement, as it appears from the ACR+ research. The rapid growth of glass recycling over the years, combined with the sometimes radical development of urban areas, puts some limitations on the system. An awkward urban configuration in certain city areas makes it difficult to use large-capacity bottle banks. Access to the site by collection trucks can also be difficult.

The visual impact that containers may have in certain areas, namely in old city centres, brings a need for new, smarter solutions. Underground bottle banks, which are already used in cities in Austria or Belgium, could represent a viable option. Door-to-door collection can also be used to collect glass in zones where it would be impossible to do so via the bottle bank, although this would imply the absence of colour sorting at source and therefore more costly processing operations.

Colour matters

Another clear indication from the report is that colour matters. Glass containers are produced in three main colours - clear, green and amber - according to market demand. So-called mixed colour cullet is mainly used to produce green glass. On the other hand, the manufacturing of clear or flint glass and, to a lesser extent, amber glass, requires recycled glass or cullet to be of the same colour.

However, why is there colour separation in some countries and not in others? Where there is no colour separation, for example in France, developments in automated separation techniques (optical sorting) are helping to increase recycled glass quality to levels compatible with high collection rates in single-chamber bottle banks.

In other countries, such as Germany, Austria, Belgium, Switzerland and the UK, there is historically a higher consumption of coloured and transparent glass. Citizens are therefore invited to separate bottles and jars by colours at the source and drop them in double (white and coloured glass) or triple (white, green and brown) chamber bottle banks. Colour-coded sorting at source enables the production of a high quantity of white cullet, which has a higher market price. In the UK, where clear glass accounts for more than 65% of total glass production, it is very important to obtain clear cullet and therefore to separate glass by colour.

Where glass is not separated by colour, cullet is mixed and available to use only for green glass production, which may result in cullet surpluses, where the capacity of green glass furnaces to absorb them is limited. In the UK, The British Glass Manufacturers' Confederation has urged councils to collect glass separately

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from other materials in order to reduce the so-called down-cycling of glass.

Meanwhile, glass container manufacturers have joined together with other material re-processors to promote source separation as the most effective method for generating quality cullet to be recycled locally. They are calling for an increase in the density of bottle banks as an incentive for closed-loop recycling, while it seems that many local authorities and waste management companies have invested in collection systems (co-mingled collection sorted automatically through industrial-sized optical systems), which are often only capable of delivering glass suitable for aggregate use.

As a general rule, colour separation results in an effective and sustainable use of cullet, an improvement of the glass recycling rate and no mixed cullet surpluses, which would be likely to have a negative impact on the market demand for glass recycling. With the steady increase in the quantity of glass collection in Europe, colour separation becomes general practice and at the same time, a strategic issue of major importance where increasing availability of cullet results in less waste, reduced use of raw materials, energy savings and the reduction of CO_2 emissions.

Citizen support

One of the most important parts of the closed loop system is the citizen. It is essential to consider the habits and attitudes of citizens when studying different glass waste collection schemes. It is also important to inform people of recycling benefits and encourage them to recycle. The ACR+ report shows how the municipalities have been focusing on communicating the importance of glass recycling to younger generations, for example in schools and community groups.

▼ Glass containers are produced in three main colours: Clear, green and amber, according to market demand.

The container glass manufacturers of Europe, through FEVE, support Friends of Glass; a self-fed European consumer community of more than 30,000 people that supports and promotes consumers' rights to choose food and drink products in glass packaging. The objective is to increase consumer awareness that glass is 100%, infinitely and locally recyclable in a bottle-to-bottle system, and promote glass recycling as sustainable and sound. Friends of Glass was initiated in 2009 in response to a pan-European survey commissioned by FEVE to the research institute InSites, which found that 74% of European consumers prefer glass packaging for their food and drinks.

The hope is that this report enhances awareness among European, national and local authorities, as well among waste management organisations, for which recycled glass is a precious resource that must be collected it in the most effective way. ■

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The ACR+ report will be made available on the FEVE website: www.feve.org