



“Good Practices in collection and closed-loop glass recycling in Europe”

Report prepared by the Association of Cities and Regions for Recycling and
sustainable Resource management (ACR+) in partnership with
the European Container Glass Federation (FEVE)

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Table of Contents

TABLE OF CONTENTS	2
GLOSSARY	3
EXECUTIVE SUMMARY	6
1. INTRODUCTION	16
2. OBJECTIVES	17
3. METHODOLOGY	18
4. CURRENT LEGISLATION - EUROPEAN POLICY	19
4.1. THE LANDFILL DIRECTIVE (1999/31/EC)	19
4.2. THE PACKAGING WASTE DIRECTIVE 2004/12/EC	19
4.3. WASTE FRAMEWORK DIRECTIVE (WFD 2008/98/EC)	20
4.4. PACKAGING COMPLIANCE ORGANISATIONS (ACROSS THE EU)	20
5. CONTAINER DEPOSIT SCHEMES	21
6. GLASS CURRENT PERFORMANCE	24
6.1. RESULTS IN THE EU	24
6.2. STUDY ON CHOOSING AND IMPROVING GLASS COLLECTION SERVICES	27
7. CASE STUDIES - GLASS SELECTIVE COLLECTION	29
SUMMARY OF KEY INDICATORS OF THE SELECTED 8 CASE STUDIES:	29
7.1. BELGIUM	34
7.2. AUSTRIA	47
7.3. PORTUGAL	57
7.4. NETHERLANDS	70
7.5. GERMANY	79
7.6. SWITZERLAND	89
7.7. FRANCE	96
7.8. DENMARK	103
8. CONCLUSIONS	111
9. APPENDICES	115

Glossary

Bottle bank:

a large container into which the public may throw glass bottles for recycling

Source: Collins English Dictionary (<http://www.thefreedictionary.com/bottle+bank>)

Civic Amenity Centre / Site:

A guarded, fenced-off area where local residents can dispose of and sort their recyclable, hazardous or bulky waste. Civic Amenity Centres can take both flat and containers glass waste. However for the purpose of this study when we refer to glass disposed in a Civic Amenity Centre we mean container glass waste.

Source: Suez Environnement

Contamination:

The addition of the result of the addition, or presence of a material or materials to, or in, another substance to such a degree as to render it unfit for its intended purpose.

Source: ARC21

Container Deposit scheme:

Container-deposit legislation is any law that requires collection of a monetary deposit on soft-drink, juice, milk, water, alcoholic-beverage, and/or other containers at the point of sale. When the container is returned to an authorized redemption center, or to the original seller in some jurisdictions, the deposit is partly or fully refunded to the redeemer (presumed to be the original purchaser). The deposit schemes can serve for recycling or reuse (refill).

Source: Wikipedia

Closed loop recycling:

Means the glass is recycled back into the same product type.

Source: WRAP

Door-to-door:

Waste packaging collected from one house to the next.

Source: Collins English Dictionary

Glass Cullet:

Scraps of broken or waste glass gathered for remelting, especially with new material.

Source: <http://www.thefreedictionary.com/cullet>

Household Waste:

Means waste from households as well as other waste, which because of its nature or composition, is similar to waste from households.

Source: OECD/Eurostat Joint Questionnaire on Waste

Municipal Solid Waste:

Waste originating from households, commerce and trade, small businesses, office buildings, institutions and from selected municipal services, (waste from parks and garden maintenance and street cleaning services); collected by or on behalf of municipalities.

Source: Eurostat

One – way packaging container:

One way glass packaging: Packaging such as bottles, jars, flasks, etc. that cannot be refilled after use.

Source: <http://www.ara.at/>

Selective Collection (of glass waste):

It is the separation of materials intended for recycling. It means that recyclable materials should not be disposed together with residual waste. It can be an initiative of a single citizen or organized in communities : apartment buildings, companies, schools, clubs, cities, etc.

Source: <http://www.natureba.com.br/nature/selective-collection.htm>

Separation at source:

Actions taken by a household to keep certain materials separate from others.

Source: VNG International

Underground bottle bank:

It is a bottle bank whereby the waste is then sucked through underground pipes by a fan system to a central bulking point where it is stored in airtight containers, which can then be sent on for further reprocessing by the waste contractor.

Source: www.letsrecycle.com

Waste generation:

The weight or volume of materials and products that enter the waste stream before recycling, composting, landfilling, or combustion takes place. Also can represent the amount of waste generated by a given source or category of sources.

Source: EPA US

Executive Summary

Objectives and content of the study

An efficient glass collection and recycling scheme is an important driver to move towards a circular economy where waste is not dumped but become the essential raw materials used to manufacture new products.

In this study the aim is to identify good practices in selective collection and closed-loop recycling of glass packaging waste from Municipal Solid Waste (MSW) across European regional and local authorities. ACR+ on behalf of the European Container Glass Federation (FEVE) conducted this research to identify good practices on glass packaging waste recycling and highlight some key results. The strategic objective established for this project is to increase awareness and disseminate information on good practices of glass recycling with the aim to increase the quantity and quality of the cullet available.

Operational Objectives

The following objectives were identified for this project:

- What are the different types of glass recycling collection schemes operating across Europe?
- Which factors affect the success of an effective glass collection scheme?
- Evaluate the performance of the different glass collection schemes
- Identify best practices for glass collection schemes leading to closed loop recycling (bottle to bottle)

The methodology of selective collection; quantity and quality of the glass waste ensuring closed – loop recycling were amongst the most important criteria to select the good practices. The case studies were selected via different means such as: desk- based research, dissemination of case study template among ACR+ members, electronic questionnaires and literature reviews.

Eight case studies were selected for the purpose of this study. The Authorities chosen were:

Intradel – Liège Province (Belgium), Municipality of Graz (Austria), LIPOR, Greater Porto Intermunicipal Waste Company (Portugal),Municipality of Maastricht (Netherlands), Municipality of Lippe (Germany), Canton of Geneva (Switzerland), City of Grand Besançon (France), Municipality of Odense (Denmark).

For each case study, the following aspects were analysed based on the available information:

- Legal context and responsibilities.
- Geographical content (urban, semi-urban, rural, touristic and / or historical centres).
- Financial context and incentives.
- Identification of the statistical methodologies and indicators used to assess the recycling performances
- Efficient collection schemes (kerbside, bottle banks, deposit schemes and other types of schemes) including sectorial differences for glass collection (commercial, household) and/or colour-separate glass collection vs mixed glass collection.
- Innovation in glass collection schemes and processes.
- Costs and funding
- Quality criteria for glass waste sent to recycling (contamination levels).
- Value chain from glass waste collection to recycling process (interaction between collectors, EPR schemes and recyclers)
- Communication: Education, raising awareness amongst households and other targets

Glass recycling in Europe

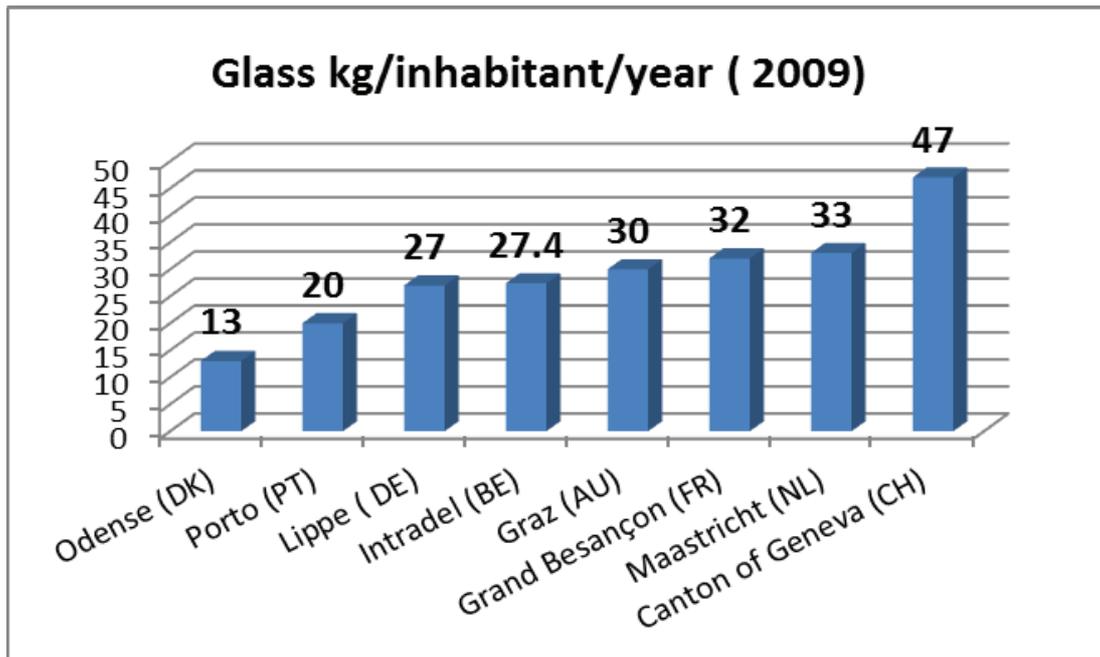
Within the framework of the EU Strategy 'Europe as a Recycling Society' each Member state is mandated to follow the Waste Framework Directive and meet the statutory recycling target of 50% of municipal solid waste. Also as part of the Packaging Waste Directive, each member state should meet separate packaging waste targets. For glass packaging waste, the recycling target is 60%.

According to the latest glass packaging recycling estimates more than 67% of glass bottles and jars were collected for recycling in the European Union in 2009. The figures released by FEVE, the EU Container Glass Federation, translate into about 11 million tonnes or 25 billion glass bottles and jars being collected throughout the European Union, confirming the steady and positive trend of the last years (66% in 2008). According to our 8 case studies the average recycling rate for glass containers reaches: 81%.

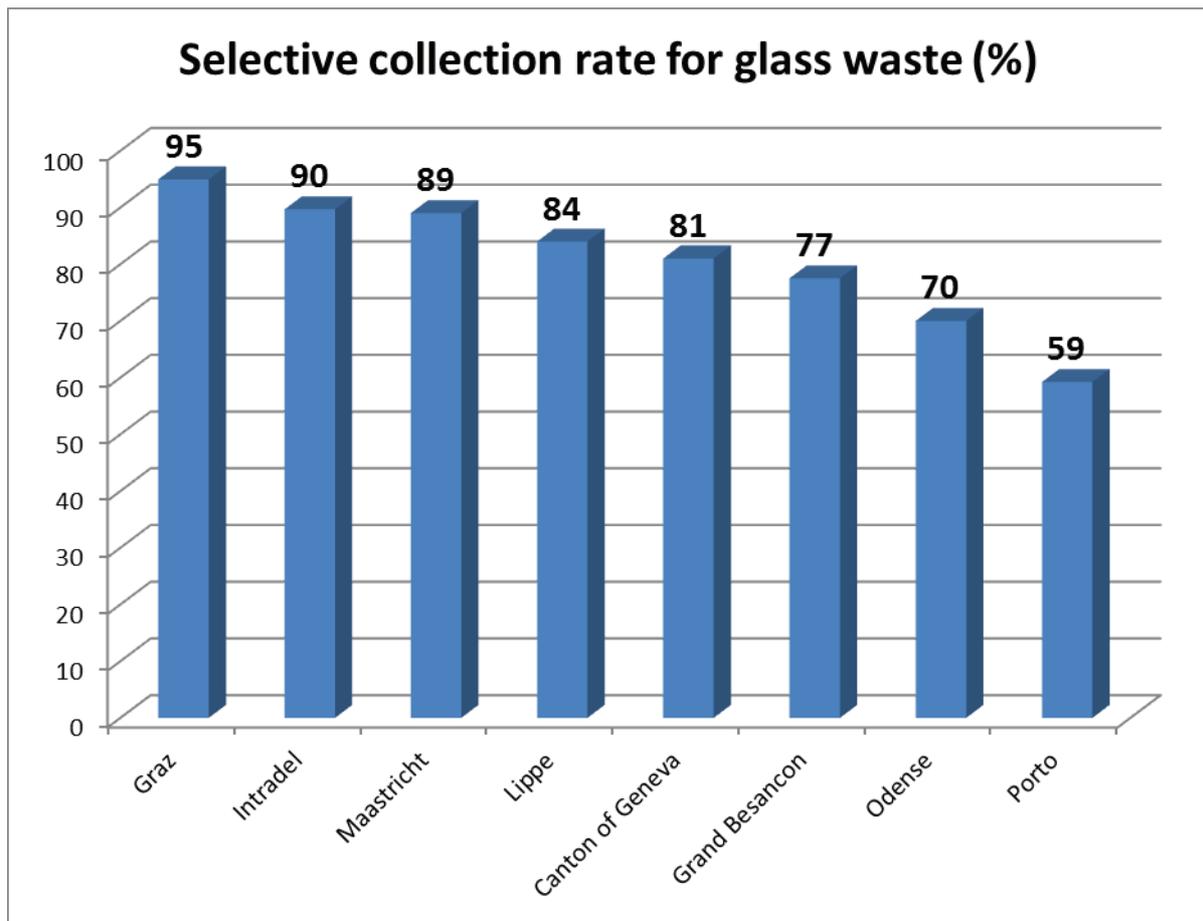
The selected case studies are based on the quality outputs i.e. the glass packaging waste originating from the selective collection systems that is of sufficient quality to be easily recycled and not on the volume of inputs i.e. the total amount of glass recovered. The research demonstrates that by sorting glass packaging waste from other waste flows, generally provides a high quantity and quality material for recycling and these cases were prioritised in this study. In the study, the glass waste

selectively collected varies from case to case: 13 kg/inhabitant/ year (in Porto) – 47 kg/inhabitant/year (in Canton of Geneva), underlying the differences not only in performance but also in glass packaging use as well as the existence of deposit schemes competing with municipal collection.

The following graph provides a summary benchmark of the amount of glass waste selectively collected per inhabitant in 2009 for each of the eight municipalities (some low values may be due to the existence of deposit schemes):



Whereas the graph below represents the glass waste recycling rate (%) in each case study. The selective collection for glass waste ranges from 59% to 95% for the selected case studies. The local glass recycling rate figures have been calculated by dividing the amount of glass waste selectively collected by the amount of glass waste generated in each region or city selected (based on tonnes). The latter figure is however not always available or difficult to estimate. Transboundary imports and exports not registered (e.g. consumers bringing back in one country bottles bought in another country) may also influence the result.



The selective collection methods vary across Europe

The study identified 4 main selective collection schemes: door-to-door, bottle banks, civic amenity centers and glass deposit schemes. Additionally, for marginal quantities mainly from hospitality sector, some collection on request schemes were identified.

The collection is either separated by colour or mixed. A sample of this variety is shown in the 3 following examples.

In Porto, glass collections commenced in 1980 and today the inter-municipality provides a selection of ways for residents to recycle their glass packaging, through: door-to-door, bring banks or 'Ecopontos', Civic Amenity centres and glass on request. In 2010, around 1,148.48 tonnes of glass were collected on request (for non-household origin).

The municipality of Lippe in Germany which started glass collection in the early 1980's operates a '3 tier' colour-sorted waste glass system for: amber, clear, green is effectively applied, whereby bottles

banks are available for each colour type of glass bottle. Lippe reaches a glass selective collection of 27 kg per inhabitant per year.

The Canton of Geneva in Switzerland operates a glass recycling scheme since 1986 and today it provides 567 bottle banks located in the 45 communes (1 bottle bank/ 820 inhabitants). Glass selective collection reaches 47 kg per inhabitant per year. The total amount of glass packaging collected in 2009 was 20,935 tonnes from both the commercial and household premises. The type of glass collection is dual for: clear and coloured glass.

In Denmark, on average glass bottles are collected mixed as the glass is separated by colour mechanically at the treatment plants. The Danish government and the municipalities believe this is more cost-efficient and economically viable solution.

Container Deposit schemes across Europe

There are two types of container deposit schemes existing in Europe:

- a) Refillable container deposit scheme (on reusable drink container)

A refillable deposit scheme is a scheme whereby the glass container , once emptied is returned to an authorised shop or deposited in a container, that will be then be sanitised and refilled to be placed back again in the market.

In Denmark, Germany and Sweden, refillable glass drink containers represent a significant share of the glass drink container market with: Denmark at 80%, Germany at 51%, and Sweden at 47% in 2006.¹

- b) Recycling container deposit scheme (on one-way containers)

^{1,5,6} Ernst & Young Study for ADEME ' *Assessment of Results in the reuse and recycling of packaging in Europe*'.
March 2009

Recycling deposit schemes cover only a minority of container tonnage, the highest being Germany at 3% until recently.² The share of these schemes in the overall packaging recycling rate varies from 1% (in the Netherlands, where the system is recent) to almost 5% (in Sweden).

During this study we identified 3 different container deposit schemes in:

- Lippe (DE):

A compulsory deposit scheme is in operation for different types of bottles. Once put through the deposit system, the consumer receives directly 8 or 15 cents per bottle (0.08 or 0.15 Euro).

- Maastricht (NL):

Deposit systems are in use for beer bottles, drink containers in Maastricht. The price of bottled beers and soft drinks includes a small deposit that is refundable on returning the empty containers (0.10 Euro).

- Odense (DK):

In Denmark, the container deposit refund for the consumer is³:

- Cans, glass and plastic bottles under 1 litre (Pant A) : 13 cents (DKK 1.00)
- Plastic bottles of 0.5 litres (Pant B):20 cents (DKK 1.50)
- Cans, glass and plastic bottles of 1 litre and over (Pant C): 40 cents (DKK 3.00)

The take back is mainly organised by reverse vending machines, except in the smaller outlets.

Machines also accept labeled packaging even if the shop in which it is located does not itself sell the product.

³ <http://www.pro-e.org/Denmark>

Funding & Finance: The collections costs and their coverage are key parameters

The financing of glass waste collection systems varies from one country to another and plays a key role in glass waste recycling performance, generally with the support of Extended Producer Responsibility (EPR) schemes.

For example the Belgian EPR system for packaging is coordinated by Fost Plus which is a private organisation that promotes and finances the selective collection, sorting, and recycling of household packaging waste in Belgium including glass. Fost Plus, has the legal obligation to cover the full costs incurred by the municipalities for packaging collection including:

- Cost for glass collection – value of the material
- Cost for follow up by inter-municipalities
- Cost for communication material

In Portugal the EPR System is coordinated by Sociedade Ponto Verde, S.A., an organisation responsible for the collection and recycling of household, commercial and industrial packaging waste. All glass received by LIPOR is sent for recycling by Ponto Verde;

In the case of Odense in Denmark, the Extended Producer Responsibility is not applied as it has not been adopted by national legislation.

Across all good practice case studies, the glass selective collection costs vary from 51 euro (Intradel) to 125 euro (Canton of Geneva) per tonne and this is due to different parameters taken into consideration when calculating those costs: The collection costs for the municipality includes administrative (including communications), collection/handling and transportation of glass packaging waste to the recycling facility.

Permanent innovation for glass selective collection

Though glass waste was one the first waste flows to be selectively collected already in the 80's, there have been major improvements and innovation in order to improve the quantity and quality of the glass waste collected as well as increase the comfort of citizens-sorters. Innovation plays a key role to ensure high levels of selectively collected glass packaging waste.

In Belgium and Austria the underground bottle banks located in parks, near shopping centres, by residential establishments have shown to increase the quantity and quality of glass waste collected. In the UK, new technologies have been developed in the hospitality sector (restaurants, hotels, bars and pubs) such as glass crushers in order to reduce the volume of waste glass being generated due to lack of space in the premises. One solution to the storage problem is to compact the glass on site (using a glass compactor unit). This reduces the amount of space required to store the empty bottles and/or the frequency of collections required.

Cultural habits must be taken into account when analysing results as they play a key role in the performance of glass waste collections. Germany and Austria have historically higher consumption levels of both coloured and clear glass: colour-coded sorting at source was implemented to enable the production of a sufficient quantity of white cullet.

Glass waste selective collection can count on original and efficient communication at local level

Communication material act as a catalyst for the effectiveness of the glass selective collection schemes and additional illustrations and photos on guides and brochures ensure for better quality of the glass waste collected on a local level. The municipalities have also been focusing on communicating the importance of glass recycling to schools (i.e. *'Bottle Recycling Heroes'* in Austria) and community groups.

European container glass manufacturers – through FEVE – support “Friends of Glass” – a self-fed European consumer community of more than 20,000 people that supports and promotes consumers’ rights to be able to choose food and drink products in glass packaging. A number of enticing tools are available on the multi-language website www.friendsofglass.com – like Hank the Singing Bottle, the Bottle Bank Test and the Pass the Bottle Facebook game. They have the objective to increase consumer awareness on the fact that glass is 100%, infinitely and locally recyclable in a ‘bottle-to-bottle’ system, and that glass recycling is therefore sustainably 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.

Low contamination rates and involvement of recyclers

From a technical and market perspective, glass manufacturers set up key criteria for glass waste with either the municipality or the glass packaging association and waste contractors to ensure higher efficiencies which effectively adds more pressure to the regional and local authorities to ensure a high quality of glass waste is achieved. In most of the cases, it is strongly advised that ceramic, stone (heat-resistant glass), light bulbs and other types of glass are strictly not disposed in the bottle banks as they have a higher melting point than glass containers.

Throughout the study it has been noticed that the traceability of the glass packaging waste can be difficult as the glass waste collected from the municipalities gets delivered to the glass manufacturer (sometimes via transit stations) in bulk. Thus, to obtain information about potential origins of contamination from specific loads of glass waste can be limited.

Based on the study, it is evident that the following factors are encouraging a higher glass selective collection rate:

Parameters
Accessibility and high number of bottle banks (e.g. Maastricht)
Cleanliness and maintenance of bottle banks (e.g. Intradel)
Information, clear and simple messages to residents (e.g. Graz)
Frequent collection by the Municipality and avoidance of over filling of bottle banks (e.g. Canton of Geneva)
Separate glass collection by colour type (e.g. Lippe) or implementation of state-of-the-art technology to separate colours after collection
Glass bottle banks placed/located in 'popular' central areas (e.g. Porto)
Better handling of glass bottles at collection point, will secure higher quality of glass waste (e.g. Odense)
LRAs to introduce advanced systems: underground street bottle banks (e.g. Intradel)

Conclusions

The study confirms that glass collected separately from other materials provides the highest quality feedstock. Colour separation at source or implementation of state-of-the-art technology to separate colours after collection are the best options to achieve the required standards ready for recycling by a glass maker. New technology also exists which allows for colour separation after collection..

The collection system varies from region to region and the study calls on all relevant stakeholders to work closely together to develop guidelines that will assist the municipalities, waste contractors and glass manufacturers to achieve a better quality cullet, so as to reduce the amount of virgin raw materials used in glass making.