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RESEARCH & CONSULTING

Raise the Glass - Summary

Summary of the 'Raise the Glass' report, providing the glass packaging industry with the evidence to inform debate on any proposed introduction of mandatory policies on food and drink containers in the EU-28 Member States

October 2018

Raise the Glass

*Value-driven
consulting*

*Science-led
research*

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Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Author	Editor
Draft				
Final				

Glossary

CEP	Circular Economy Package
DRS	deposit-return system
EFTA	European Free Trade Area
EPR	extended producer responsibility
EU-28MS	28 Member States of the EU
MS	Member State (of the EU)
PET	polyethylene terephthalate
PPWD	Packaging and Packaging Waste Directive 94/62/EC

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Ardagh Group – Robert-Jan ter Morshe

1 Executive Summary

On the 14th of June 2018, the EU Waste Package was published in the Official Journal. This included legally binding EU targets for the recycling of glass packaging across all 28 EU Member States (EU-28MS) as detailed within the Circular Economy Package (CEP) of:

- A minimum recycling rate of 70% for glass by 2025.
- A minimum recycling rate of 75% for glass by 2030.

This supercedes the previous mandatory recycling targets that formed part of the EU-28MS obligations under the 1994 Packaging and Packaging Waste Directive (PPWD) – 94/62/EC.

This study investigates two key questions:

- Are mandatory deposit return schemes (DRS)¹ for one-way glass the best policy option for meeting the glass recycling targets? If not;
- What alternative approaches to increasing recycling rates for glass can be used?

1.1 Deposit return schemes for one-way glass

There are currently eight Member States of the EU-28MS operating national DRS policies for one-way beverage containers, and Table 1 **Error! Reference source not found.** shows which materials have been included for each country. There is currently a strong political focus on DRS across Europe and countries such as England and Scotland have committed to implementing DRS and other countries are actively considering such policies.

Table 1: Deposit schemes for one-way beverage containers in use across the EU-28MS

Country	Mandate implemented	Materials included		
		Glass	PET	Cans
Croatia	2006	✓	✓	✓
Denmark	2002	✓	✓	✓
Estonia	2005	✓	✓	✓
Finland ²	1996 cans, 2008 PET, 2012 glass	✓	✓	✓
Germany	2003	✓	✓	✓
Lithuania	2016	✓	✓	✓
Netherlands	2005		✓	
Sweden	1984 cans, 1994 PET		✓	✓

Source: The Reloop Platform, deposit systems for one-way beverage containers: global overview 2016 and 2018.

¹ The mandatory DRS for one-way packaging is much like the long-running voluntary DRS operating in the refillable beverage container market, where the consumer is incentivised to return empty containers to reclaim their deposit, paid at the point and time of purchase.

² www.palpa.fi/beverage-container-recycling/deposit-refund-system/

This section of the study looks at three elements of the DRS:

- the impact the DRS policies in place across the EU-28MS have had on glass recycling rates
- the evolution of DRS policies for one-way beverage containers and
- the impact the introduction of a DRS can have on the market share of packaging.

1.1.1 Impact of the DRS on glass recycling rate

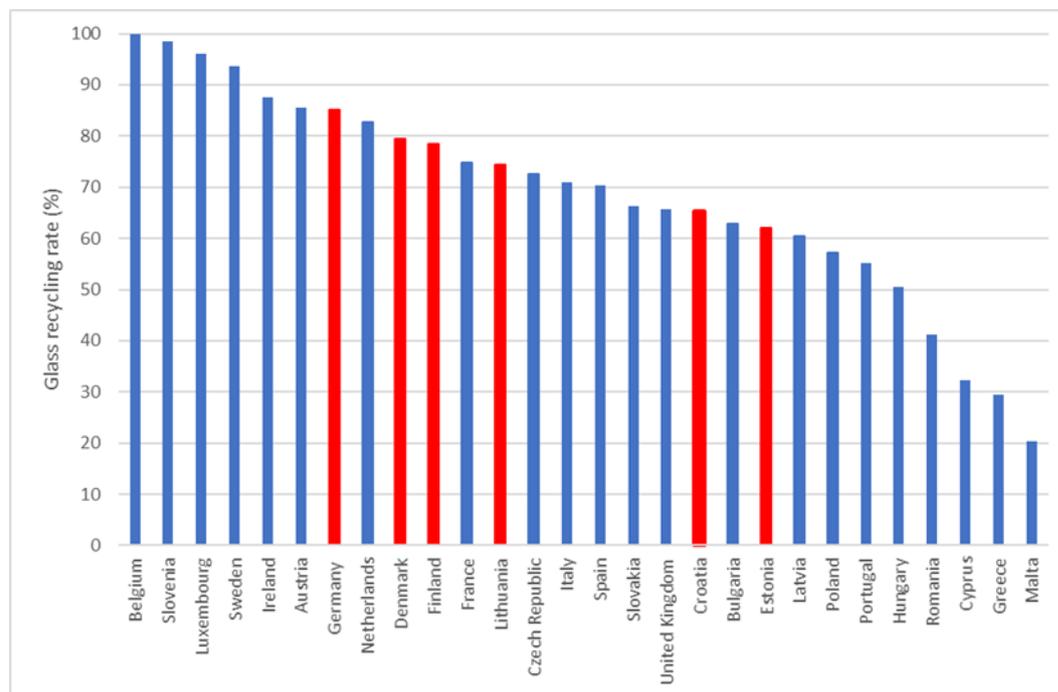
This section is split into two subsections:

- A review of the recycling rate for overall glass packaging.
- A review of the recycling rates in Member States operating a DRS for one-way glass packaging.

A review of the recycling rate for overall glass packaging

Figure 1 shows the recycling rates for overall glass packaging for the EU-28MS in 2015, with the Member States operating DRS for one-way glass beverage containers shown in red. This shows that the best performing MS operating a DRS is Germany. Although it has a recycling rate of 85.2%, which far exceeds the 2030 CEP target of 75%, it is only ranked 7th in the list. Estonia is the poorest performer operating a DRS, ranked 21st in the list with a recycling rate of 62.1%, just above their PPWD 2012 target of 60%.

Figure 1: Recycling rate for glass packaging in 2015 in the EU-28MS



Source: Eurostat. Cyprus and Malta = 2014 data.

Key: Red = MS operates a DRS for one-way glass; Blue = MS does not operate a DRS for one-way glass

Note: Lithuania is highlighted in red, but the DRS was not introduced until 2016, and hence the 74.3% recycling rate in 2015 pre-dates the introduction of the DRS.

A review of the recycling rate in MSs operating a DRS for one-way glass packaging

A review of the MSs operating DRS shows that the DRS is typically only applied to a select number of product categories, and hence alternative policies are used to increase recycling rates in the non-DRS mandated product categories. For example, Table 2 shows that the German DRS covers only beer, water and soft drinks and this accounts for just 4.6% of the total packaging glass collected for recycling in Germany. The majority of the glass (84.3%), which includes wine, spirits and food jars, is collected via the extended producer responsibility (EPR) schemes in operation.

Table 2: Product categories included in deposit schemes for one-way beverage containers across the EU-28MS

Country	Product categories included in the DRS
Croatia	Juices; mineral water; other waters; beer; wine; hard liquor and milk drinks in volume < 0.2l
Denmark	Beer (alcohol content > 0.5% by volume); carbonated soft drinks (alcohol content of 0–0.5%); energy drinks; mineral water; iced tea; ready-to-drink beverages (incl. lemonade, alcopops, energy drinks and cider products); mixer products where spirits, wine or other fermented products are mixed with other beverages such as soft drinks, cider, chocolate or juice (alcohol content 0.5% - 10%)
Estonia	Soft drinks; water; beer; cider; juice; juice concentrates; nectars; low-ethanol alcoholic beverages (up to 6% volume)
Finland³	Almost all soft drinks; water; beer; cider; long drinks; sport drinks; juice; liquor/spirits/wine sold by Alko
Germany	Water (mineral water carbonated or non-carbonated, spring water, healing water, table water, water with additives, e.g. aroma, caffeine, oxygen, all other drinkable waters); beer & mixed drinks containing beer (incl. alcohol free beer); carbonated / noncarbonated soft drinks; mixed alcoholic drinks
Lithuania	Beer and beer cocktails; cider and other fermented beverages; mixed alcoholic and non-alcoholic beverages; all types of water; juice and nectars sold in glass, plastic, and metal (tin) packaging. Fruit wines and wine-product cocktailers are included when sold in plastic and metal packaging.

Source: The Reloop Platform, deposit systems for one-way beverage containers: global overview 2016 and 2018

Table 3 shows a comparison, where available, of the glass return rates of the respective DRS versus the overall glass recycling rates (as shown in Figure 1). This shows the high rates of return (above 80%) in all MS where data was available, and this is typically much higher than the respective overall glass recycling rates. For example, in Estonia in 2015 the return rate from the DRS is 87% and the overall glass packaging rate is 62.1%. It is reported that the exclusion of strong alcoholic beverages (vodka, wine, etc) and glass jars is a significant contributing factor and it would require a significant investment to include these product categories within the DRS.⁴

³ <https://www.palpa.fi/beverage-container-recycling/deposit-refund-system/>

⁴ Earth Care Ltd. Personal communication 14 August 2018.

Table 3: Glass return rates versus overall glass recycling rates across the EU-28MS and EFTA

Country	Glass return rate (%)			Overall glass recycling rate in 2015 (%)
	2015	2016	2017	
Croatia		Not available		65.2
Denmark	89	90		79.5
Estonia	87		88	62.1
Finland ⁵	88	88	87	78.4
Germany		Not available		85.2
Lithuania			83	74.3

Source: The Reloop Platform, deposit systems for one-way beverage containers: global overview 2016 and 2018

A review of the DRS and EPR schemes operating in Finland highlights the significant cost differences. RINKI reports that in Finland the EPR glass recycling fee currently (2018) stands at 112 euro per tonne, a reduction from the 135 euro per tonne figure for both 2016 and 2017.⁶ The DRS recycles 130-140 million one-way glass units per year with recycling fees⁷ in the range of 0.0792 to 0.2205 euro per container, depending on the type of container. Therefore, the glass recycling fees in the Finnish DRS are much higher, at between 205.92 and 617.4 euro per tonne. RINKI suggests⁸ that this is due to the relatively high cost of DRS infrastructure - i.e. expensive reverse vending machines versus cheap 'bring banks' - and also the far greater number of collection points.

1.1.2 Evolution of DRS for one-way beverage containers

Table 1Error! Reference source not found. shows that the date in which the DRS for one-way containers was implemented varies significantly - from the introduction of the scheme for cans, implemented in Sweden in 1984, to the implementation of the DRS scheme for one-way containers in Lithuania in 2016. The review of the schemes shows that there are three main drivers for implementation:

- To protect the market for refillables.
- To support the recycling of one-way beverage packaging during the transition from refillables to one-way packaging.
- Anti-littering and collection of single-use PET beverage containers.

Market protection of refillables

The product categories for which current DRSs have been implemented, (beer, water and soft drinks) were traditionally in refillable (predominantly glass) containers operated via industry-managed voluntary schemes. In countries such as Germany, the refill market for the beer sector is still buoyant and has strong industrial support from the brewers; the DRS

⁵ www.palpa.fi/beverage-container-recycling/deposit-refund-system/

⁶ Finnish Packaging Recycling RINKI Ltd. EPR of non-deposit glass packaging in Finland. FERVER, General Assembly, 7th June 2018, Helsinki.

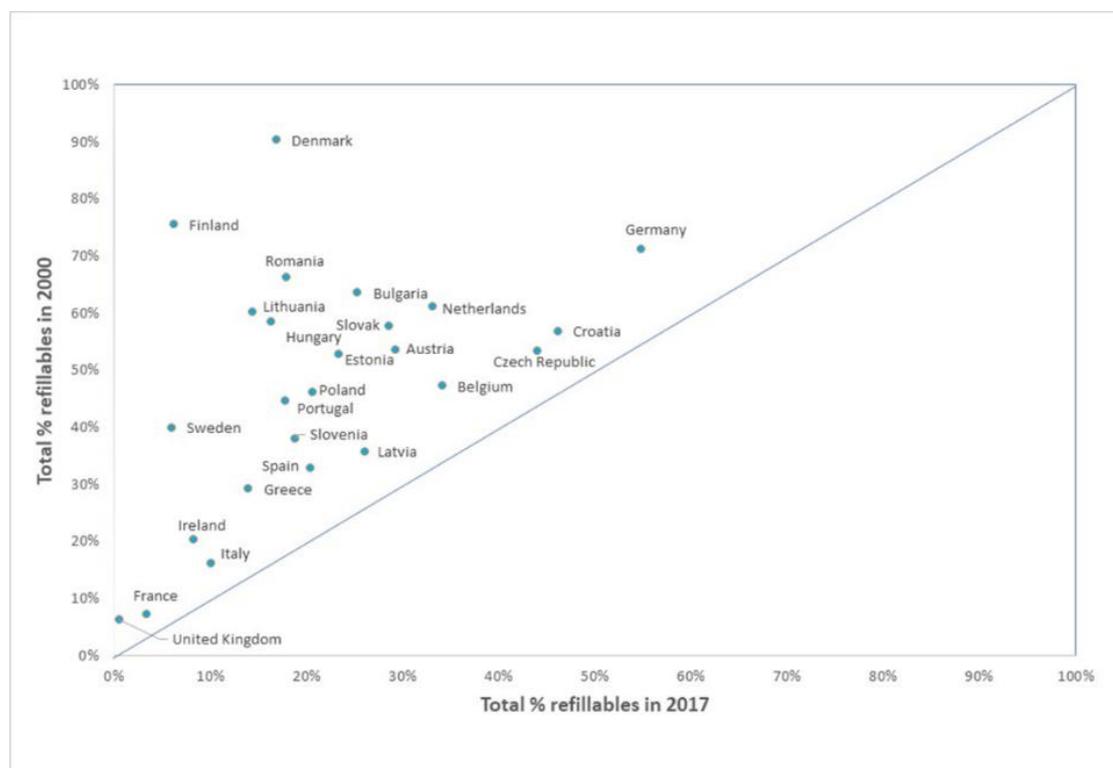
⁷ palpa.fi/static/studio/pub/Materiaalipankki/Hinnastot/Price+list_Glass+bottle_2018-01-01.pdf

⁸ Finnish Packaging Recycling RINKI Ltd. Personal communication 21 August 2018.

on one-way containers was introduced in 2003 to assist in maintaining a high market share of beverages in refillable containers. The deposit fee on the one-way containers is higher than that of the voluntary DRS on refillables, which gives the consumers the financial incentive to buy the refillables. From the consumer perspective, return mechanisms for both refillable and one-way containers appear identical, i.e. packaging and crates are returned to retailers and hence, unlike in other countries, there is no additional ‘convenience’ to the disposing of a one-way container over the refillable container.

Figure 2 compares the market share of refillable containers in the beer, carbonates and bottled water categories in 2000 and 2017. It shows that the decline in the use of refillables was less pronounced in Germany, from a market share of 71.1% in 2000 to 54.9% in 2017, and the introduction of the one-way DRS can be considered a significant causative factor.

Figure 2: Scatterplot of the market share of refillables in beverage containers (beer, carbonates and bottled water) in the EU-28MS



Source: Produced by Oakdene Hollins using data from Global Data

Supporting the recycling of one-way beverage packaging during the transition from refillables to one-way packaging

Conversely, in Denmark, Finland and Sweden, who also have a long history of using refillables via voluntary DRS, a mandatory DRS⁹ for one-way containers has been introduced in each country to transition from refillables to one-way containers. These use the existing infrastructure and require little change in consumer behaviour, while transitioning from predominantly refillable glass bottles to one-way glass, PET and cans.

⁹ The mandatory DRS for one-way containers in Sweden does not include glass, i.e. is only for cans and PET containers.

Other amendments to national mandatory policies, such as the abolition of the “can ban” in Denmark (2002) and the abolition of the eco-tax on one-way containers in Finland (2008), have also contributed significantly to the rapid decline in refillables in these countries. For example, Figure 2 shows that in Denmark, where the DRS on one-way containers was introduced in 2002, the market share of refills fell from 90.3% in 2000 to 16.9% in 2017 and in Finland, where the DRS on one-way glass was introduced in 2012, the market share in refillables fell from 75.5% to 6.2%.

Increasing recycling of one-way containers / anti-littering

Like Denmark, Finland and Sweden, Lithuania has a long history in the use of voluntary DRS for refillables and Figure 2 shows that in 2000 the market share in refillables stood at 60.2%. However, unlike in Finland and Sweden¹⁰ where material-specific DRSs were introduced when the market shares in each material reached a certain level, the Lithuanian scheme was specifically set up to increase the recycling rate of PET beverage containers. It is reported that the material-specific recovery rates from the deposit scheme at the end of 2017 were 83% for glass, 92% for PET and 93% for cans. The PET recovery rate is considered a particular success since the recovery rate was only 34% before the scheme was implemented.¹¹ The increase in recycling rate for glass is less pronounced since the overall glass recycling rate in 2015 was 74.3% (Figure 1).

Consultations currently underway in Scotland and England are focused primarily on the introduction of mandatory DRS on one-way beverage containers as an anti-littering initiative with a particular emphasis on PET beverage containers. From a one-way glass perspective, a key challenge in the implementation of a DRS in these countries - as with Italy, France and Ireland - is that they are countries that have predominantly single-use beverage packaging (please see Figure 2), and will therefore need heavy investment in developing the DRS infrastructure, changing consumer behaviour and raising consumer awareness, unlike the countries discussed above.

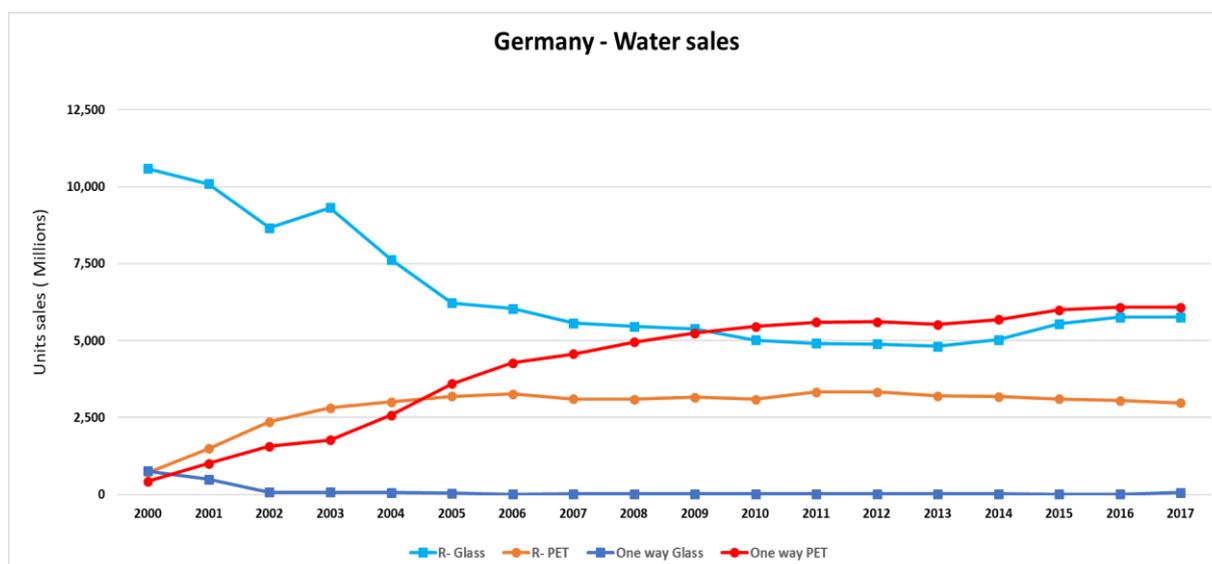
1.1.3 *Impact on the market share of packaging*

Figure 3 shows the market share of the water sales in Germany by packaging format. This shows that the market share of one-way glass dropped significantly pre-2003, before the one-way DRS was implemented. Originally retailers were only obliged to take back their own containers and this led to the so called ‘island solution’ in which retailers, especially the discounters, were heavily selective on the containers they would stock. This suggests that it is in the glass manufacturers’ interest to support the development of an effective glass collection scheme, since mandatory collection systems can affect market share.

¹⁰ For example, the can deposit system was introduced in law in Sweden after a multi-national producer started to manufacture cans in Sweden.

¹¹ www.openaccessgovernment.org/recycling-lithuania-deposit-system-exceeds-all-expectations/45003/ Accessed 17 July 2018

Figure 3: Germany – bottled water sales between 2000 and 2017.



Source: Produced by Oakdene Hollins using data from Global Data

1.2 Alternative approaches to increasing recycling rates

This section of the study investigated the waste management structure and national policies in two countries with the highest glass recycling rates in Europe that do not operate DRS for one-way glass; namely, Sweden and Austria (ranked 4th and 6th, see Figure 1). Spain was also investigated, not because it is currently one of the very high performers, but because of the significant growth in glass recycling since 2002.

Further analysis was undertaken on the total and the per capita quantity of glass that is not recycled.

1.2.1 Sweden

Sweden adopted EPR legislation in 1994 as a means of transposing the PPWD. Household packaging is mainly collected through a national network of 5,800 ‘bring’ sites, where clear and coloured glass are collected separately. Only one-third of households (mainly in apartment buildings) have access to ‘close to home’ collection but the plan is to increase this in line with higher recycling targets for 2020 set out by revised legislation in 2014.¹² The bring sites (recycling stations) are primarily financed by producer fees and supplemented with incomes from the sale of secondary raw materials.

Sveriges Bryggerier reports¹³ that the quantity and quality of glass recovered is extremely high due to the long-established habit (since the 1950s) of bringing waste packaging to bring banks for recycling.

¹² PMCA Economic Consulting. *A deposit-refund system for Ireland? Experiences from other European countries.* December 2017.

¹³ Sveriges Bryggerier. *Personal communication 29 August 2018.*

1.2.2 Austria

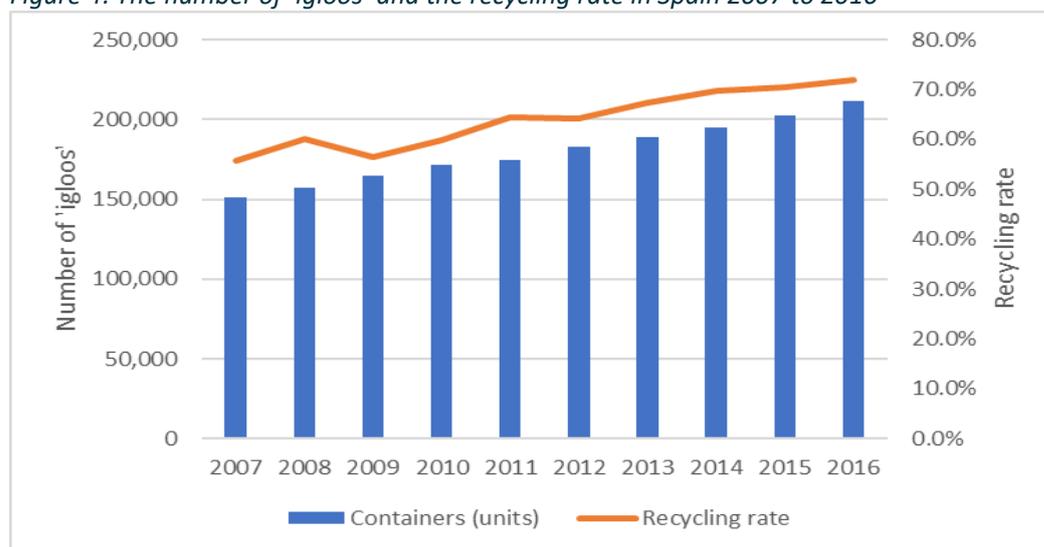
Currently 85% of glass (around 240,000 tonnes) is collected through the EPR scheme. Vetropack reports that there is no kerbside collection of glass from households, although a bring bank is, on average, located within 300-400 metres of every household. The glass is not typically colour-separated at bring banks, but Vetropack collects, colour sorts and reprocesses it at one of its two factories in Austria. Vetropack reports that the contamination rate is 5-6% in the glass collected from the bring banks.¹⁴ According to Austria Glas Recycling¹⁵ the high recycling rate and the low contamination rate in Austria is explained by very strong educational messages targeted at primary school level.

Additionally, in Austria, the Federal Ministry of Sustainability and Tourism has recently launched “*Reinwerfen statt Wegwerfen*” (English: “Toss it in the bin”), a voluntary initiative for businesses and social partners to improve the ecological performance of packaging (mainly beverage containers). This nationwide anti-littering campaign scheme receives between 700,000 and 1 million euro of annual funding from packers/fillers and retailers, and seeks to raise public awareness to prevent littering and promote the separate collection and recycling of packaging.

1.2.3 Spain

Unlike Sweden and Austria that have a long history of high glass recycling rates, Spain has seen a rapid growth in recycling from just 36.3% in 2002 to 70.4% in 2015. In 1997, the Packaging and Packaging Waste legislation (97/11) was introduced, which included the introduction of the EPR scheme. The EPR scheme operates like many of the Green Dot schemes operated across Europe, whereby packaging companies finance the scheme based on the weight of material they place on the market. The national EPR administrator for glass, Ecovidrio, has focussed on increasing the number of collection points (bottle banks called ‘igloos’). Figure 4 shows how the number of igloos have increased in Spain and the subsequent increase in glass recycling.

Figure 4: The number of ‘igloos’ and the recycling rate in Spain 2007 to 2016



Source: Produced by Oakdene Hollins using data from Ecovidrio

¹⁴ Vetropack Austria GmbH. Personal communication 27 August 2018.

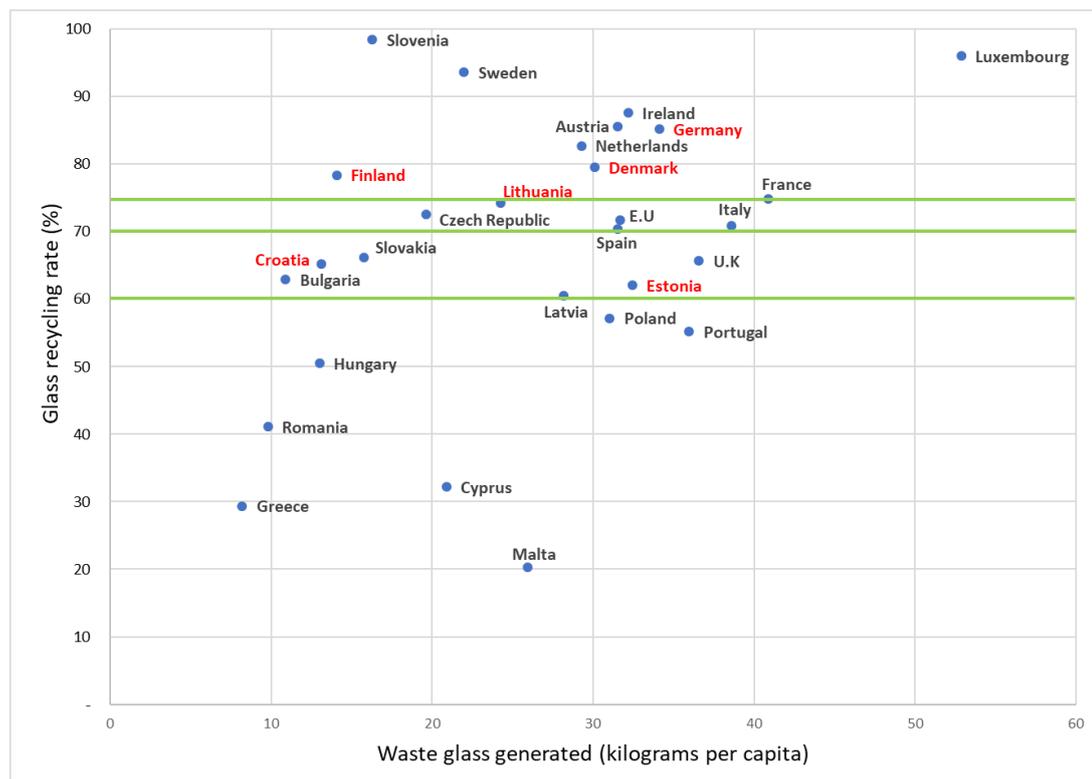
¹⁵ Austria Glas Recycling GmbH. Personal communication 27 July 2017.

1.2.4 Review of relative quantities of glass waste arisings

Figure 5 shows the scatterplot of recycling rate versus the waste glass generated per capita within the EU-28MS. The three horizontal green lines show the three aforementioned recycling targets and the six DRS schemes are shown in red. In Hungary, Romania and Greece, where the recycling rate is lower than the 60% PPWD target, less than 12kg per capita of glass waste is generated per annum. In these countries the economics of operating a glass collection scheme can be challenging. However, Portugal recycled less than 60% of its glass and generated 35.18 Kg per capita in 2015, and therefore represents a more significant issue in terms of the quantity of glass that is not currently being recycled. This, again, suggests that glass manufacturers maybe best placed to support the development of an effective glass collection scheme to gain access to additional cullet.

The September 2018 report by the European Commission¹⁶ 'on the implementation of EU waste legislation, including the early warning report for Member States at risk of missing the 2020 preparation for re-use/recycling target on municipal waste' highlights the following common issues associated with the poor recycling performance: lack of recycling infrastructure and collection systems, ineffective EPR, lack of financial incentives to improve recycling and the lack of incentives for households to participate in separate collection.

Figure 5: A scatterplot of the waste glass generated per capita versus the glass recycling rate in 2015 by EU-28MS



Source: Adapted by Oakdene Hollins using Eurostat data.

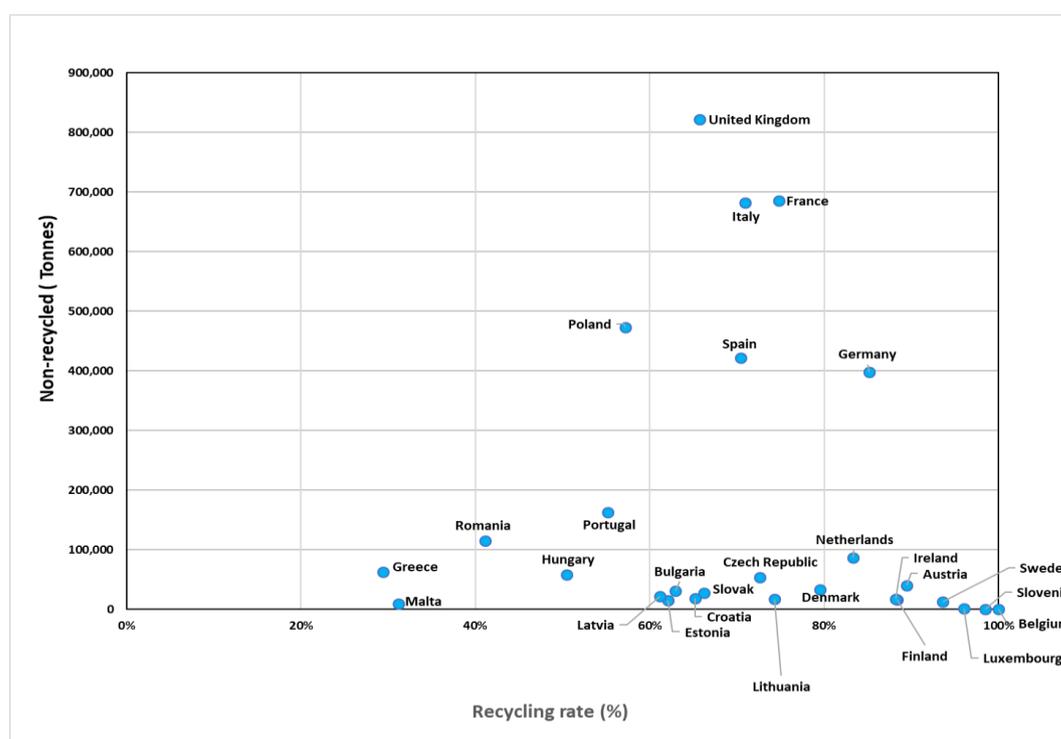
¹⁶ http://ec.europa.eu/environment/waste/pdf/waste_legislation_implementation_report.pdf

1.2.5 Review of absolute quantities of glass waste arisings

Up to now, this study has focussed on the appraisal of the policy instruments with respect to the CEP and PPWD targets. However, this section takes a more circular economy approach by investigating the ‘leakage’ from the system, i.e. the quantities of glass that are not recycled within the EU-28MS.

According to Eurostat, 4.28 million tonnes of glass was not recycled in the EU-28MS in 2015 and Figure 6 shows that three countries with the highest tonnage (UK 822,000 tonnes, France 685,000 tonnes and Italy 682,000 tonnes) account for 51.1% (2.19mt) of the total non-recycled glass across the EU-28MS. France and Italy have already met the 70% 2025 CEP target and the UK is on track, recycling 65.7% of glass in 2015. However, from a circular economy perspective this is a significant quantity of glass to be lost from the economy each year and raises the question of whether more can and should be done at a national level to increase recovery rates. For example, the tradeable permits scheme in place in the UK was developed to be the ‘least cost option’ in terms of meeting the PPWD recycling targets. However, the mechanism does not motivate any additional recycling beyond the targets, since the value of the tradeable permits becomes worthless once the target is reached. Increasing the recycling target above that of the European legislative targets would drive up the recycling rates using this mechanism.

Figure 6: A scatterplot of the quantity of non-recycled glass versus recycling rate (%) by EU-28MS in 2015



Source: Adapted by Oakdene Hollins using Eurostat data

1.3 Conclusions

Traditionally, the mandatory DRS on single-use packaging has been introduced in countries that had a well established voluntary DRS for refillable beverage containers. The existing infrastructure and established consumer 'bring-back' culture enabled the switch from collection of refillables to collection of single-use beverage containers.

Currently, national debates on DRS are no longer focused on refillables, but on solving the relatively poor recovery rates for plastic, especially with the rise of the on-the-go market for beverages. Some DRS schemes include one-way glass, others do not. It shows that there is no single ideal DRS system, and the case for each needs to be analysed separately.

The study shows that where one-way glass has been included in a deposit return scheme, it has not been a decisive measure in increasing the recycling rates. The highest recycling rates for glass are achieved where there is source-separated collection of glass packaging, good governance of waste management systems, and effective public communication initiatives.

While the average EU glass recycling rate is high, at 74%, there is still a huge potential for improvement on the overall performance in glass recycling. From a circular economy perspective, whether it is in absolute terms (volume of waste not recycled per country) or in relative terms (glass waste generated per capita), there remains a noticeable leakage of glass from the economy.

This study emphasises the need for glass packaging manufacturers to actively support source-separated collection systems in Member States.

This is a summary of the report FEVE-09 461-2, the authors of which were:



Peter Lee PhD, Head of Operations

Peter has project-managed and written major studies on resource efficiency, sustainability, carbon reduction and energy, with much of his focus being on the food manufacturing and retail sectors. His specialisms include: waste prevention, waste logistics and reverse supply chains, packaging and waste management in the food and drink industry, environmental impact assessments, and recycling technologies. An expert in Lean techniques, he has worked with manufacturing clients to implement waste prevention.



Dan Eatherley MSc

Dan has been associated with Oakdene Hollins for over a decade, carrying out research and technical & market studies on: food and drink manufacturing; environmental labelling schemes, materials recovery & recycling facilities; rubber, foam and leather recycling; the textiles and WEEE sectors; carbon footprinting & transport emissions; resource efficiency; sustainability policy; environmental economics; global materials security; clean technologies; reuse and remanufacturing.



Tania Garcia MAAT

Tania joined Oakdene Hollins' Finance team in 2015, and has since gained membership of the Association of Accounting Technicians. Her data analysis skills, and her expertise in graphics and infographics, have been invaluable in the production of this report.

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