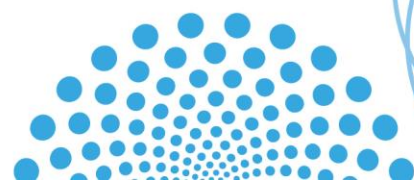




Report on the appraisal of the
cost and benefits of three policy
options for increasing the
recycling rate for container glass
in England

Prepared for British Glass

May 2021



Report on the appraisal of the cost and benefits of three policy options for increasing the recycling rate for container glass in England

Written by: Peter Lee

Final check by: Fiona Dawkins

Approved by:

Date: 26th May 2021

Contact: peter.lee@oakdenehollins.com

Reference:

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Glossary

C&D	Construction and Demolition
C&I	Commercial and Industrial
DRS	Deposit Return Scheme
EPR	Extended Producer Responsibility
MSW	Municipal Solid Waste is non-liquid waste collected by Local Authorities. This includes household waste (through for example kerbside or HWRC (Household Waste & Recycling Centre) and any other wastes collected by a Waste Collection Authority (or its contractors) from parks, gardens, beaches and other public spaces.
MRF	Material Recovery Facility is a location where components of a mixed waste stream are extracted by the use of mechanical and manual separation techniques.
PERN	Producer Export Recovery Note
PRN	Producer Recovery Note
RIA	Regulatory Impact Assessments
TEEP	Technically, Environmentally and Economically Practicable <i>The Waste Regulations (England and Wales) 2012 requires organisations to undertake separated waste material collection to ensure it can be recovered or recycled where it is technically, environmentally and economically practical to do so. The TEEP test / assessment, may demonstrate that separated collection is unviable for organisations to undertake.</i>
WCA	Waste Collection Authority
WfH	Waste from Households
WG	Welsh Government

Contents amendment record

This report has been amended and issued as follows:

Version	Date	Description	Author	Editor
1			PL et al.	MM
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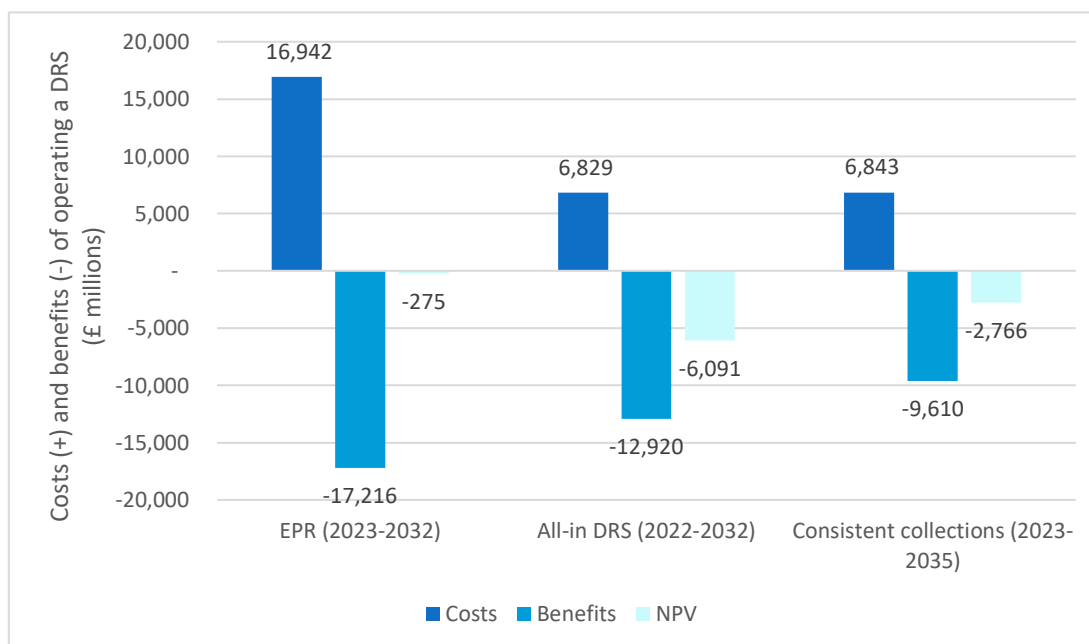
1 Executive summary

This study involved an appraisal of three policy options that are currently being assessed for packaging and that are collectively known by Defra as ‘the collection and packaging reforms’, namely:

- The introduction of consistent collections for municipal solid waste in England;
- The reform of the UK packaging producer responsibility scheme; and;
- The introduction of a deposit return scheme (DRS) for beverage packaging for England, Wales and Northern Ireland.

The study included a detailed appraisal of the consultation and impact assessment documents and ‘*The Collection and Packaging Reforms – a summary of the impacts*’ report Defra has produced for the three alternative policies. Figure 1 provides a summary of the costs, benefits and Net Present Value (NPV) for each reform, presented in the Defra summary of impacts report¹. This shows that the All-in DRS is projected to realise £6,091 million of the total £9,132 million NPV from the three reforms, consistent collections £2,766 million and EPR £275 million.

Figure 1: Summary of the costs, benefits and NPVs associated with each reform



Source: Adapted by Oakdene Hollins from the Defra ‘*The Collection and Packaging Reforms – a summary of the impacts*’ report.

The appraisal shows that the most significant data uncertainties are associated with the projected costs and benefits of the All-in DRS and these are discussed below.

1.1 The appraisal of DRS

The appraisal of the All-in DRS focused on three key factors and Table 1 provides a summary of the differences in the projected impacts of these three factors. The appraisal estimates result in

¹ All figures are discounted to a 2020 Present Value and are in 2019 prices.

a shift from a projected annual net benefit of £841 million in the DRS impact assessment to a projected net cost of £903 million in the appraisal estimate.

Table 1: A summary of the key findings from the appraisal of the annual costs/benefits of an All-in DRS

Factor	Projected cost or revenue in the DRS impact assessment (£ millions)	Projected cost or revenue in this appraisal (£ millions)	Difference between projections (£ millions)
Rent / rates cost to retailers	19.7	430	410.3
Lost opportunity costs to retailers	25.2	360	334.8
Revenue from the reduction in disamenity of litter	1,452	452.73	999.3

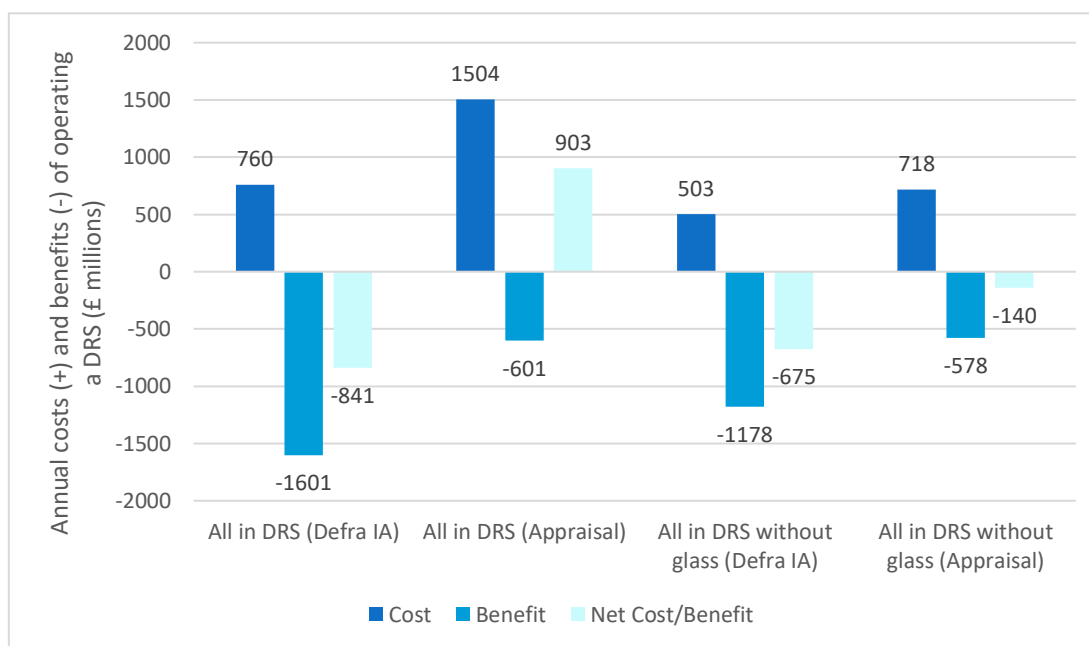
The appraisal of the All-in DRS without glass focused on four key factors and the results can be seen in Table 2. The appraisal projections result in the annual net benefit of the All-in DRS without glass reducing from £675 million to £140 million.

Table 2: A summary of the key findings from the appraisal of the annual costs/benefits of an All-in DRS without glass

Factor	Projected cost or revenue in the DRS impact assessment (£ millions)	Projected cost or revenue in this appraisal (£ millions)	Difference between projections (£ millions)
Rent / rates cost to retailers	15	310	295
Lost opportunity costs to retailers	20.4	130	109.6
Transportation costs	246.8	52.4	194.4
Revenue from the reduction in disamenity of litter	1,049	452.73	596.3

Figure 2 provides a graphical representation of the results, which shows the significant variants between the DRS impact assessment projections and the appraisal estimates. Overall, the appraisal projections result in the DRS without glass being the most cost-effective DRS option, resulting in a net benefit of £140 million rather than a cost of £903 million in the DRS including glass. Since the appraisal estimates for the DRS without glass still results in a net benefit this is considered the least risk option.

Figure 2: A summary of the findings of the appraisal of annual DRS costs and benefits.



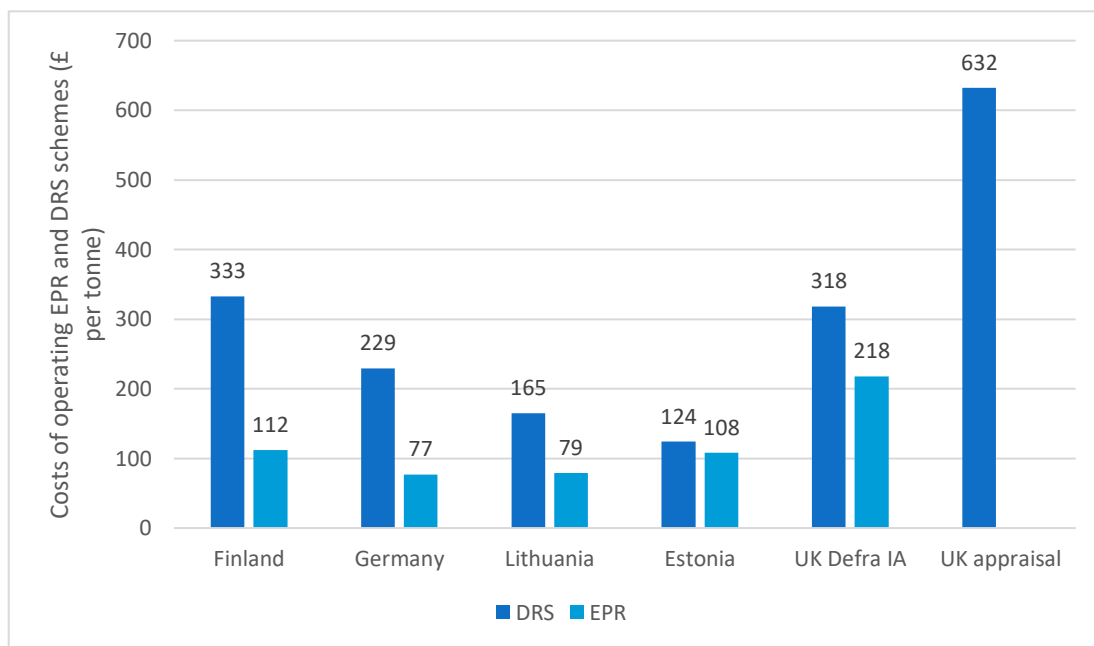
Additionally, the implications on glass reprocessors were not considered within the impact assessment and the financial costs are likely to be significant. Glass reprocessors have invested heavily in sorting technologies both in terms of removing contaminants and sorting the glass by colour. The business model works on the premise that the feedstock is mixed dry recyclate, i.e. the typical format when collected from kerbside systems. However, glass collected from DRS would command a higher price but would still have to go through the same processes to remove labels, caps, etc and to colour sort the glass.

1.2 A comparison of the costs of DRS and EPR

Figure 3 provides a comparison of costs of DRS and EPR schemes. This shows that the costs associated with the existing DRS in Europe (Finland, Germany, Lithuania and Estonia) vary significantly from £333 per tonne in Finland to £124 per tonne in Estonia. This is due to the type of scheme in operation. For example, the scheme in Finland is heavily automated with RVMs and the scheme in Estonia is heavily reliant on manual takeback. The projected cost of the scheme in the UK DRS impact assessment puts it at the higher end, but when the appraisal estimates are used the costs are nearly double that of the existing schemes.

The EPR costs can be seen to be much more consistent across the four existing schemes (£77 per tonne to £112 per tonne) but the projected cost of the scheme in the UK is much higher (£218 per tonne). In an EPR scheme, the major cost is the packaging waste management costs. The Defra 'summary of impacts' report shows the projected average annual packaging waste management costs under the EPR to be £1,224 million, which equates to £113 per tonne (the Defra summary of impacts projected annual cost of £1,224 million / the Defra impact assessment projected 10.87 million tonnes of in scope packaging). This £113 per tonne estimate equates to just 52% of the total £218 per tonne estimate, and hence, the key question is, what is the cost breakdown of the remaining £105 per tonne? Unfortunately, no detailed breakdown was provided in the Defra documents.

Figure 3: Comparative costs of operating a DRS or EPR scheme



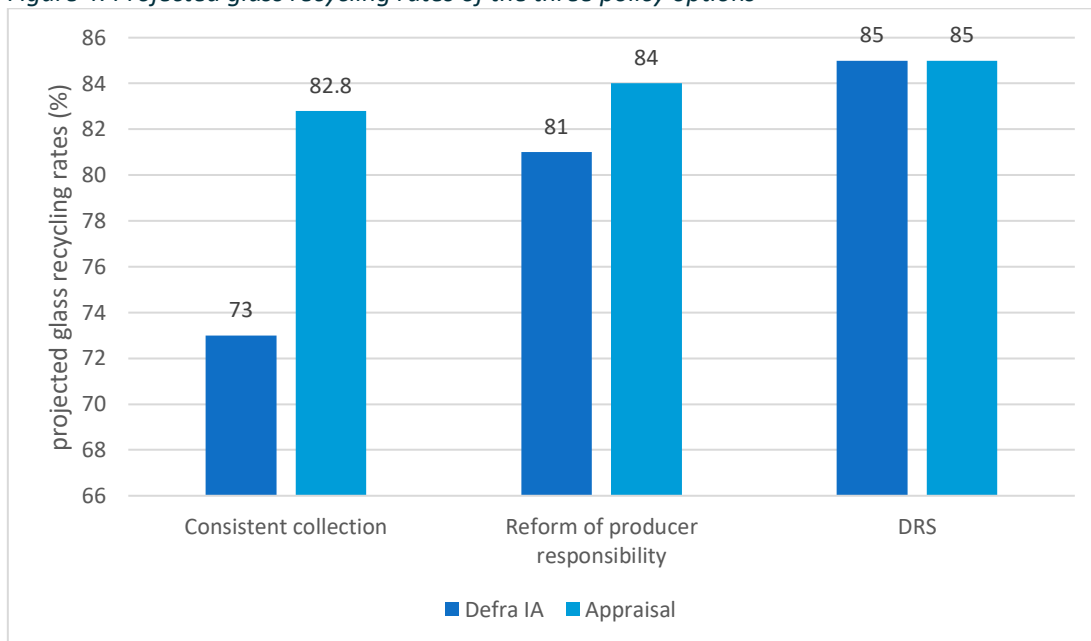
Please note: the following calculations were used to derive the UK estimates:

- The estimated £318 per tonne cost of DRS = the Defra impact assessment projected annual cost of £760 million / the projected 2.38 million tonnes of in scope packaging.
- The estimated £218 per tonne cost of EPR = the Defra impact assessment projected annual cost of £2,371.9 million / the projected 10.87 million tonnes of in scope packaging.
- The estimated £632 per tonne cost of DRS derived in this appraisal = the revised projected annual cost of £1,504 million / the projected 2.38 million tonnes of in scope packaging.

1.3 Glass recycling rate

Figure 4 provides a summary of the projected recycling rates in the three policy options. This shows that the most significant difference between the Defra IA and Appraisal projections was for consistent collections. In the Appraisal the actual performance of a similar scheme in place in Wales, as part of their overall Waste Strategy, was used to validate the findings. In the Appraisal for the reform of producer responsibility the findings from EPR schemes in Europe were used, which shows 8 countries operating an EPR scheme to have a recycling rate for glass of 84% or higher.

Figure 4: Projected glass recycling rates of the three policy options



1.4 Quality of recycle

From a quality perspective, a DRS collection scheme provides no distinct advantage to the glass industry in England since the reprocessing capabilities are in place to sort glass to the specification required for closed loop recycling. Additionally, the proposed DRS includes the process of a 4-to-5-fold compaction of the glass, which is unproven in terms of its impact on material handling, transportation, the operation of the RVMs, i.e. noise, breakdown frequencies, etc, and the quality of the glass, e.g. will it result in high levels of ‘fines’ (small glass particles) that will reduce the yield rates of recovered glass? Conversely, consistent collection and / or the reform of the producer responsibility scheme can significantly enhance the existing ‘real’ recycling rate and support the glass industry commitment under the European wide ‘closing the glass loop’ initiative of a 90% collection rate for all glass (not just the glass in the scope of a DRS) by 2030.

For the plastic industry and, more specifically, the PET beverage container sector, a DRS is beneficial since the sorting of the multitude of various polymers is still problematic and the process is extremely sensitive to contamination. Therefore, the DRS, whereby the PET beverage containers are segregated at source either via an automated RVM or manual system, provides high quality feedstock, which can enhance bottle to bottle recycling.

Table 3 provides a summary of the appraisal results.

Table 3: Summary table

Policy	Defra or this appraisal?	In-scope material	Overall cost (+) or benefit (-)	Projected increase in recycling	Glass recycling rate – Baseline 67%	Cost per tonne	Net cost (+) or benefit (-) per tonne	Glass quality
Consistent collection	Defra	Municipal Solid Waste	-£3.0 billion	9.8 million tonnes	73%	£2.4	-£11.8	Improved due to better communication to consumers and increased segregation of materials
	Appraisal				82.8%. Based on a revised baseline estimate and the performance of a similar scheme in Wales			
Reformed producer responsibility	Defra	Packaging	-£0.4 billion	0.76 million tonnes	81%	£218	-£21	Improved due to mandatory recycling labels making it easier for consumers to choose the right bins resulting in less contamination at MRFs
	Appraisal				84%. Based on the performance of similar schemes in Europe	<£218?		
DRS	Defra	Beverage packaging	-£7.0 billion	0.38 million tonnes	85%	£318	-£370	Improved due to separate collection, but the impact of compaction is still to be determined in practice
	Appraisal			0.11 million tonnes	85%	£632	£379	

2 Introduction

There is much debate on what policy interventions are needed to increase recycling rates for packaging waste in England. The current Packaging Recovery Note (PRN) system is now considered outdated, having succeeded in its objective of enabling the UK to meet its Packaging and Packaging Waste Directive (PPWD) recycling targets at the minimum cost. Defra reported in 2019 that:²

'like any system that is over 20 years old, it is in need of reform. Stakeholders have expressed concerns over the transparency of the system including how income from the sale of evidence has supported packaging waste recycling, that local authorities receive limited direct financial support for managing packaging waste, and that there is not a level playing field for domestic reprocessing'.

Policies that are more ambitious in tackling the environmental impacts of packaging are now being sought.

The English Government has been involved in three consultations and Impact Assessments (IAs) that can have a significant impact on the recycling rate of packaging and, more specifically in the interest of this study, glass packaging:

- Consistency in household and business recycling in England³;
- The reform of the UK packaging producer responsibility scheme⁴; and;
- The introduction of a deposit return scheme (DRS) for beverage packaging for England, Wales and Northern Ireland⁵.

Additionally, Defra has produced a report that summarises the collective impacts of the three reforms entitled *'The Collection and Packaging Reforms – a summary of the impacts'*⁶. Figure 5 shows the projected impacts of the three reforms on recycling rates. This shows that the recycling rate of total packaging is projected to increase by 17% in 2030 (from a baseline of 61% to 78%) with the implementation of the three reforms. Glass is the material that is projected to increase the most with an increase of 24% (from a baseline of 69% to 93%).

² https://consult.defra.gov.uk/extended-producer-responsibility/consultation-on-reforming-the-uk-packaging-produce/supporting_documents/packagingprconsultdoc.pdf

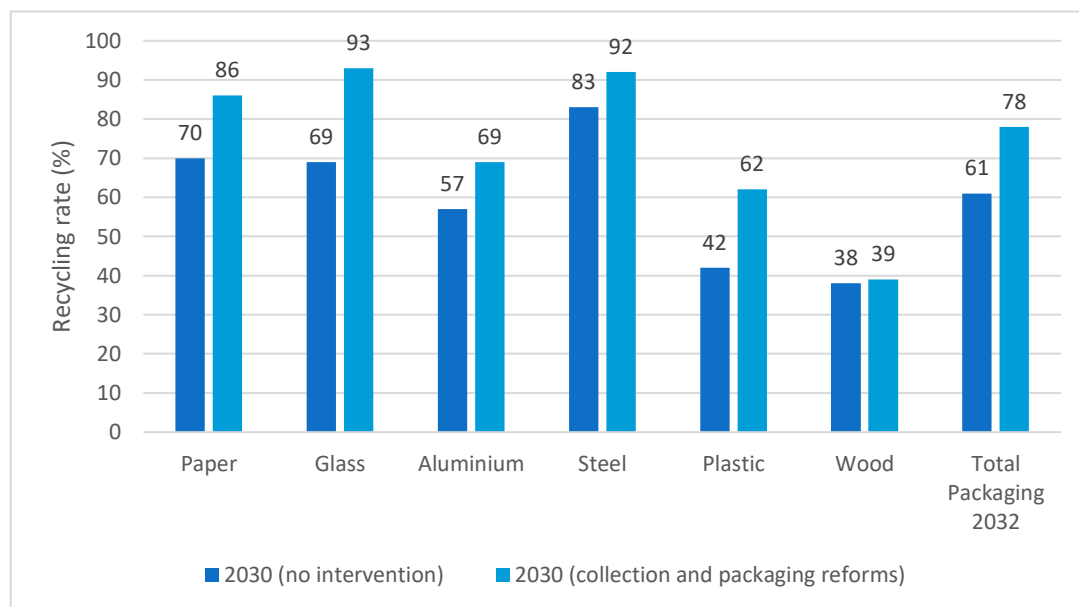
³ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Consistency%20in%20recycling%20impact%20assessment.pdf

⁴ https://consult.defra.gov.uk/extended-producer-responsibility/consultation-on-reforming-the-uk-packaging-produce/supporting_documents/packagingprconsultimpactassessment.pdf

⁵ https://consult.defra.gov.uk/environment/introducing-a-deposit-return-scheme/supporting_documents/depositreturnconsultia.pdf

⁶ https://consult.defra.gov.uk/waste-and-recycling/consistency-in-household-and-business-recycling/supporting_documents/Collection%20and%20packaging%20reforms%20summary%20of%20impacts.pdf

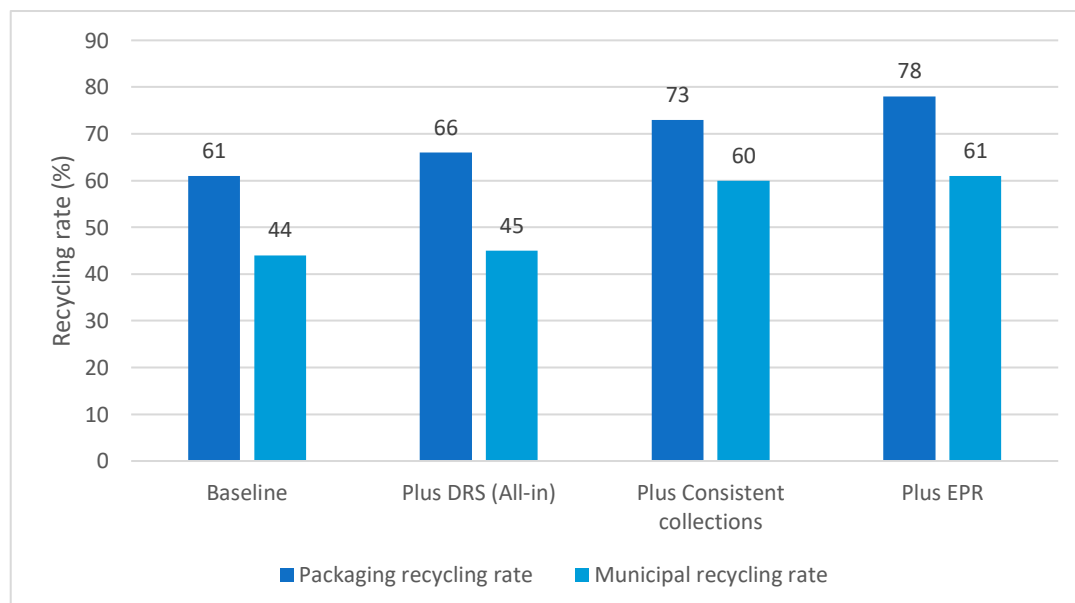
Figure 5: A comparison of the projected packaging recycling rates for 2030 with and without intervention



Source: Adapted by Oakdene Hollins from the Defra 'The Collection and Packaging Reforms – a summary of the impacts' report.

The Defra summary of impacts report modelled the impact of the three reforms in order of the highest net present value, i.e. starting with the All-in DRS with a projected NPV of £6,091 million, then Consistent collection with an NPV of £2,766 million followed by EPR with an NPV of £275 million. Figure 6 shows the results of the modelling exercise looking at the impact the reforms will have on the recycling rates for both packaging and municipal waste. This shows that for packaging, the impact of the three reforms is very consistent, ranging from 5% to 7%. However, for the recycling of municipal waste it is 'consistent collections' that have the most impact, increasing the recycling rate by 15%, as opposed to 1% for both All-in DRS and EPR.

Figure 6: A breakdown of the increase in recycling rates by reform



Source: Adapted by Oakdene Hollins from the Defra 'The Collection and Packaging Reforms – a summary of the impacts' report.

Figure 6 shows that the baseline recycling rate for municipal waste was 44% and in the Defra consultation on EPR it is reported that:

'Household recycling rates in England have plateaued at 44/45% for the past five years, with few local authorities expanding and some even stopping services such as food waste collection or introducing charges for garden waste collection. Additionally, we estimate that less than 40% of municipal waste generated by businesses is recycled with few incentives currently for firms to recycle'.

In England, the Resources and Waste Strategy committed the country to meeting ambitious targets, such as increasing municipal waste recycling rates to 65% by 2035.

To add complexity to the debate, packaging forms a significant part of the household and municipal waste streams. Therefore, it is an integral part in meeting the commitments laid out in the 'A Green Future: Our 25-year plan to improve the environment' for England (2018) and the recycling targets for municipal waste set out in the European Circular Economy Package (CEP) (2018).

Additionally, by association, glass and metal beverage containers are included in discussions on the policy interventions required to meet the obligations under the Single Use Plastics Directive (SUP) such as the collection and recycling targets for SUP beverage containers.

2.1 Project objectives

The objective of this study is to undertake an appraisal of the three potential policy options that could be adopted in England.

2.2 Terms of reference

It is important to note that throughout this study we have used the term 'recycling rate'. However, this should be taken to mean the collection / return rate and not the actual 'real' recycling rate post reprocessing.

3 Consistent collection

3.1 Introduction

The Defra summary of impacts report defines the reform as ‘*Local authorities (LAs) will be mandated to collect a consistent range of dry materials from households across all localities in England, a weekly separate food waste collection and garden waste collection. Non-household organisations that produce consumer waste (e.g. schools, businesses, offices) will also be required to recycle the same consistent range of dry materials, and where feasible separate food waste*’.

The Defra consistent collection IA identified the following option as having the highest NPV:

- Household sector - collection of recyclable materials through ‘optimised’ collection systems (Local Authorities use the least cost option for their recycling collections (between multi-stream, twin-stream and co-mingled collection services); separate weekly food waste; and free garden waste. This means that some Local Authorities rely on one of the exceptions (that it is not economically or technically practicable or there is no significant environmental benefit) and are unable to collect all the recyclable waste streams separately from each other, taking into account any statutory guidance.
- Non-Household sector - requiring collection of dry mixed recyclables (DMR), separate glass and separate food waste. Micro businesses exempt from separating their waste into the required waste streams

Table 4 provides a summary of the projected change in collection methods resulting from the implementation of this reform with a significant increase in multi-stream or single material collections and a major reduction in co-mingled and two-stream collections.

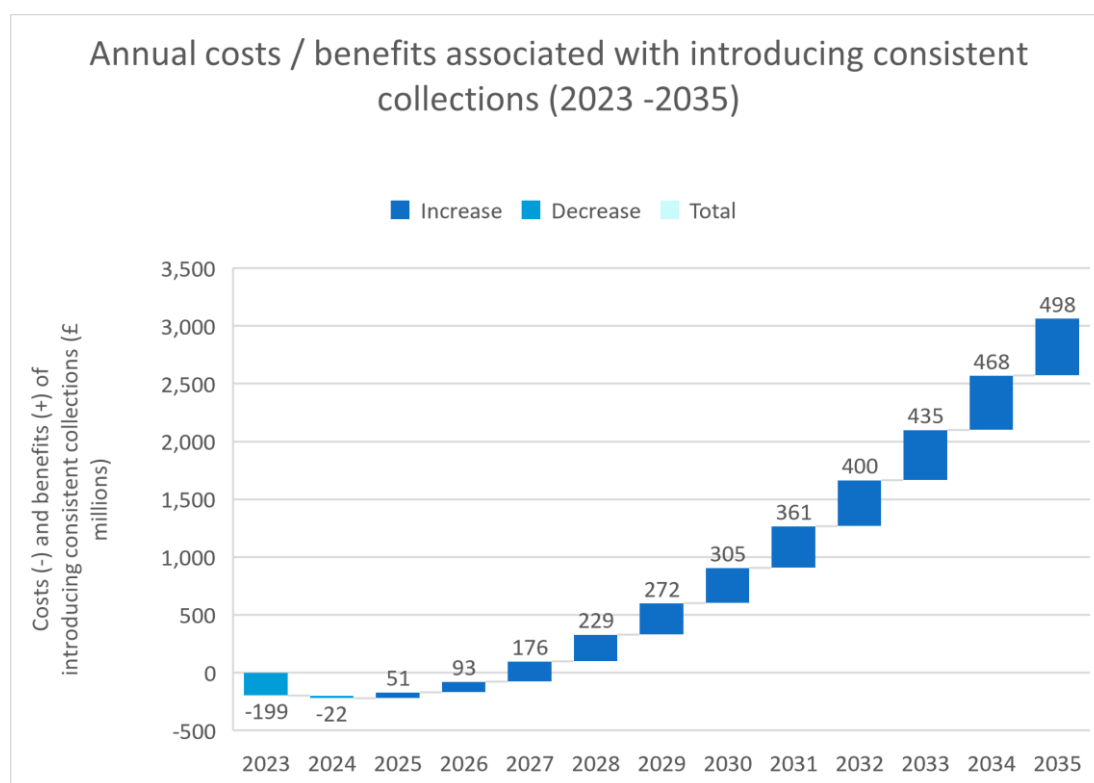
Table 4: A summary of the change on collection methods by Local Authority

Collection method	Number of Local Authorities using the dry kerbside collection schemes for low rise properties	
	2017/18 base data	Projected collection schemes
Multi-stream: Dry recycling materials are presented for collection by the household in three separate containers	66	221
Co-mingled: Dry recycling materials are presented for collection in one container	172	48
Two-stream: Dry recycling materials are presented for collection in two separate containers. For example, fibres (paper and cardboard) and other dry materials in another	120	44
Single material: All dry recycling materials are presented for collection in their own individual containers	3	48*

Source: Adapted by Oakdene Hollins from the Defra Impact Assessment on consistent collections in England.
Please note*: manually calculated

The IA modelled costs and benefits, in £ millions 2023 to 2035, and Figure 7 **Error! Reference source not found.** provides a summary of the findings. This shows that the net societal benefits across the whole timeframe (2023 to 2035) is over £3 billion (£3.067 billion). However, it can be seen that there will be a significant upfront transition cost, which results in the breakeven point not being reached until 2027 or 4 years into the scheme.

Figure 7: Summary of the modelled costs and benefits of implementing consistent collections in England 2023 to 2035



Source: Adapted by Oakdene Hollins from the Defra Impact Assessment on consistent collections in England.

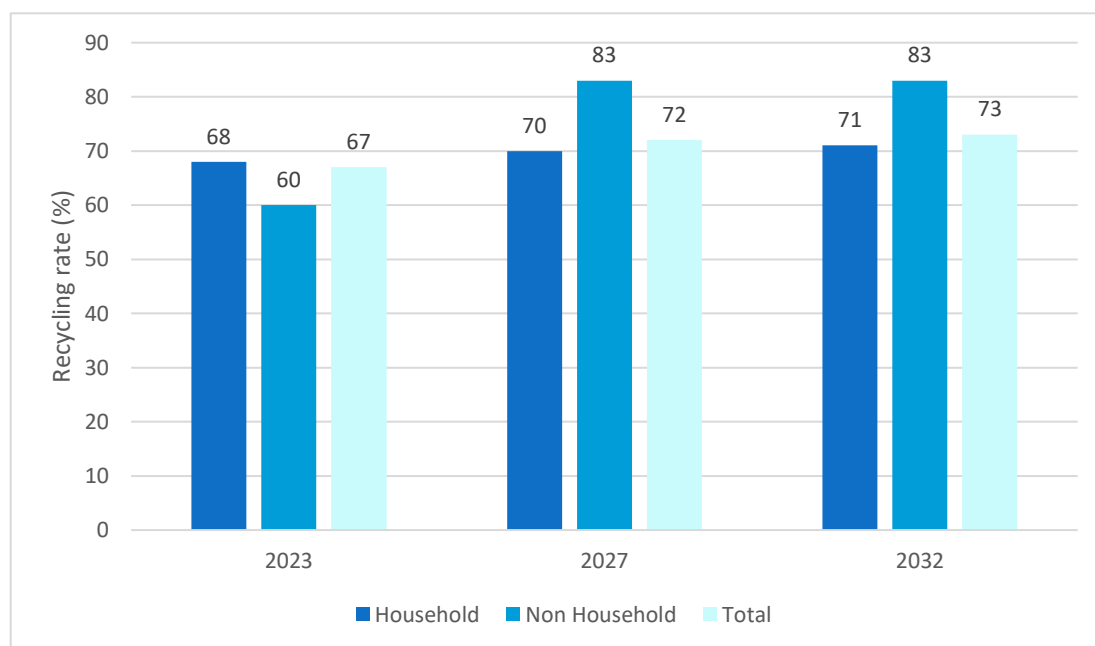
3.2 Impact on recycling rates

3.2.1 Glass recycling

The Defra ‘reforming the UK packaging producer responsibility system’ impact assessment (2021), reports that the projected glass recycling rate would increase from 67% in 2023 to 73% in 2032, Figure 8⁷. The analysis shows that it is the recycling rate from ‘non households’ that is projected to show the most significant increase, from 60% in 2023 to 83% in 2032. Whereas the recycling rate from ‘households’ is projected to increase by just 3%, from 68% in 2023 to 71% in 2032.

⁷ [Impact Assessment \(defra.gov.uk\)](https://www.defra.gov.uk/impact-assessment)

Figure 8: Projected glass recycling rates in a Consistent Municipal Recycling Collection scheme



3.2.2 MSW recycling

Looking more broadly, the written evidence submitted by Defra to the Parliamentary Committee of Evidence on 'implications of the waste strategy for local authorities' reported that in terms of the consultation on consistent collections alone (excluding EPR and DRS):

'Overall, we anticipate the proposals set out in the consultation will contribute an additional 12 percentage points to our current household recycling rate (by weight), taking it from c. 44% to 56% and as much as an additional 39% points to the recycling rate achieved by businesses (from best estimate of 35% to 74%)'.⁸

The WRAP⁹ 'National municipal waste composition' study for England (2020) provides a summary of household, business (commercial or non-household) and total municipal waste generated and recycled in England in 2017, Table 5. This shows that 17 million tonnes of the total generated 42 million tonnes was recycled in 2017.

Table 5: National waste composition estimates for England, municipal waste, in 2017

	Household	Commercial	Total Municipal
Waste generated (tonnes)	23,792,872	18,376,899	42,169,771
Waste recycled (tonnes)	10,656,069	6,431,914	17,087,984
Waste recycled (%)	44.7	35.0	40.5

⁸ <http://data.parliament.uk/writtenevidence/committeeevidence.svc/evidencedocument/housing-communities-and-local-government-committee/implications-of-the-waste-strategy-for-local-authorities/written/101542.html>

⁹ WRAP-National municipal waste composition_ England 2017.pdf

Table 6 provides an estimate of the impacts the introduction of consistent municipal collections would have on recycling in England, based on the projections made by Defra to the Parliamentary Committee of Evidence on 'implications of the waste strategy for local authorities'. This shows that the overall 'municipal' recycling rate is projected to increase from 40.5% (Table 5) to 63.8% (Table 6), an increase of 23.3%.

Table 6: The impact of the implementation of consistent collections in England using Parliamentary Committee of Evidence projections

	Household	Commercial	Total Municipal
Waste generated (tonnes)	23,792,872	18,376,899	42,169,771
Waste recycled (tonnes)	13,324,008	13,598,905	26,922,913
Waste recycled (%)	56.0	74.0	63.8

Table 7 provides a comparison of the two estimates and shows that the introduction of consistent municipal collections is projected to increase annual recycling by nearly 10 million tonnes (9,834,930 tonnes). This is in line with the estimated increase in municipal waste recycling projected in the Defra summary of impacts report of 7,300,670 tonnes, which would exclude some commercial wastes that are included in the estimate shown in Table 7.

Table 7: National waste composition estimates for England, using Parliamentary Committee of Evidence projections

	Household	Commercial	Total Municipal
Waste recycled in 2017 (tonnes)	10,656,069	6,431,914	17,087,984
Projected increase in waste recycled due to introduction of consistent collections (tonnes)	13,324,008	13,598,905	26,922,913
Increase in waste recycled as a result of the introduction of consistent collection (tonnes)	2,667,939	7,166,991	9,834,930

3.3 Review of costs / benefits

The cost/benefit analyses undertaken within the impact assessment is rather unique in that seldom are the benefits disclosed since they are spread over numerous stakeholders throughout the chain, many of whom would consider the information as commercially sensitive. It is more typical for the focus to be on the costs of the scheme, especially where these costs are attributed to local authorities. Taking this into consideration, the impact assessment shows that the costs associated with consistent collection in 2035 are £102 million. Therefore, the overall cost per tonne in 2035 is: Total cost (£102 million) / waste generated (42,169,771 tonnes, Table 6) = £2.41 per tonne.

However, when the benefits of £1,567 million is deducted from the costs, then a net benefit of £498 million is projected for 2035, Figure 7. Therefore, the overall benefit per tonne in 2035 is: Total net benefit (£498 million) / waste generated (42,169,771 tonnes, Table 6) = £11.80 per tonne.

3.4 Review of impact assessment projections

3.4.1 Review of the glass projections

The WRAP¹⁰ 'National municipal waste composition' study for England (2020) shows that the recycling rates for glass in England was already above the baseline estimate, shown in Figure 8, in 2017, Table 8. For example, the recycling rate for waste glass from households was estimated at 76.3%, over 8% higher than the 68% projection, for commercial (non-household) the difference was over 17% (77.4% as opposed to 60%) and the overall estimate for municipal waste glass was 76.8% as opposed to 67%.

Table 8: National waste composition estimates for England, glass recycling, 2017

	Household	Commercial	Total Municipal
Waste glass generated (tonnes)	1,621,034	1,210,521	2,831,555
Waste glass recycled (tonnes)	1,236,968	938,101	2,175,069
Waste glass recycled (%)	76.3	77.4	76.8

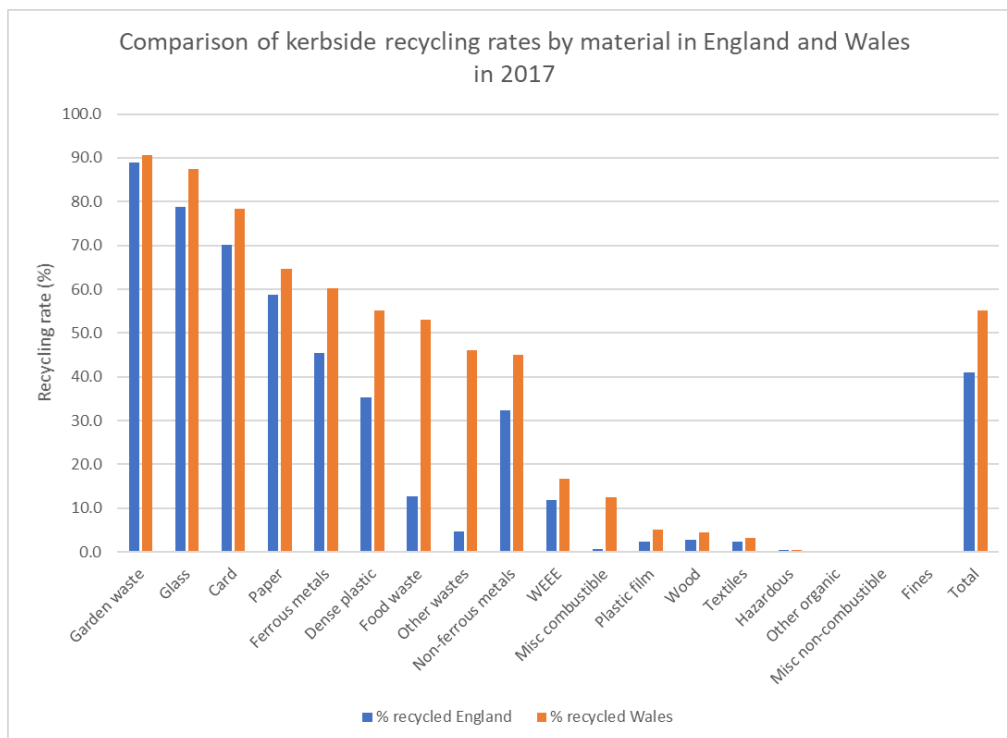
Assuming that the Defra impact assessment projected increase in glass recycling is correct and taking the WRAP estimates as the baseline, the overall recycling rate in 2035 would be 82.8%, i.e. the WRAP baseline estimate of 76.8% (Table 8) with the Defra projected increase of 6% (Figure 8). Based on the WRAP estimate of glass waste generation (2,831,555 tonnes) the 6% increase equates to an increase in glass recycling of 169,893 tonnes.

3.4.2 Review against the consistent collection schemes in place in Wales.

Figure 9 shows that the estimated increase in the household recycling rate to 56% in England, stated in Section 3.2, is aligned with that currently being achieved for kerbside recycling in Wales. Figure 9 also shows that such an intervention is likely to have an impact on all materials within MSW, since the recycling rate is higher in Wales in every case. For glass, with the second highest recycling rate behind garden waste, the kerbside recycling rate in England in 2017 was 78.7% and in Wales 87.5%. The difference between the recycling rates in England and Wales of 8.8% is in line with the projected 6% increase shown between 2023 and 2032 in the impact assessment.

¹⁰ WRAP-National municipal waste composition_ England 2017.pdf

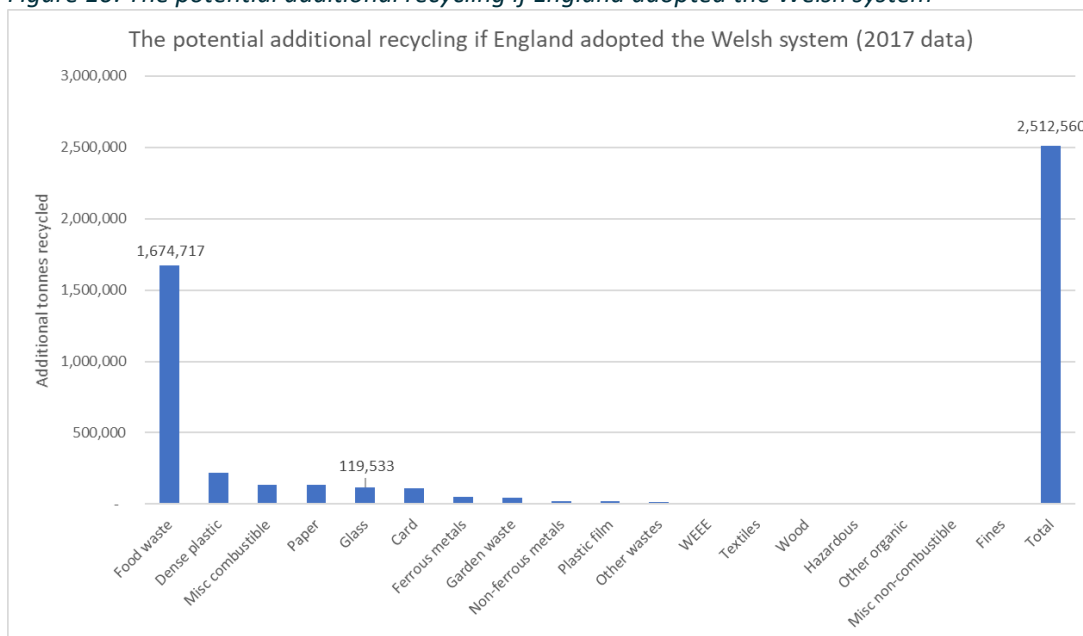
Figure 9: Comparison of kerbside recycling rates by material in England and Wales in 2017



Source: Adapted by Oakdene Hollins from: National household waste composition 2017 WRAP January 2020

Figure 10 shows an estimate of the additional recycling if England performed similarly to Wales. It shows that overall, a further 2.5 million tonnes per year would be recycled, of which, nearly 1.7 million would be food waste and 120,000 tonnes would be glass. This is clearly below the estimate using the WRAP data of 169,893 tonnes (Section 3.4.1.) and this is due to the fact that there are still significant improvements to be made in the collection of glass from commercial premises in Wales, something the Welsh Government is currently looking to address.

Figure 10: The potential additional recycling if England adopted the Welsh system



Source: Adapted by Oakdene Hollins from: National household waste composition 2017 WRAP January 2020

3.5 Investment in infrastructure

3.5.1 Wales

In June 2010, the Welsh waste strategy document, *Towards Zero Waste*⁸, set out the ambition for all sectors (including households) in Wales to recycle at least 70% of their waste by 2025. As well as the quantity targets, the document also identified the need to collect high levels of clean recyclates in order to meet quality objectives too – stating the Welsh Government's belief that this would be achieved most sustainably by “*source separation*’ - where each material is collected separately”. The strategy document clearly favoured closed-loop recycling⁹ in order to help achieve its over-arching principle of ecological footprint reduction and recognised Glass (closed-loop) recycling as having one of the lowest per tonne footprints.

The move towards increasing overall recycling in Wales has required significant investment in terms of capital investments and also across strategic, technical and behaviour change activities. The Welsh Government reports that £1 billion has been invested since the year 2000.

Some of the funding and investment has been made available to LA's via The Sustainable Waste Management Grant (SWMG) which was introduced in 2001-02 to help support municipal collections – the funding pot underwent a name change and amalgamation in 2017/18 to become part of the Environment and Sustainable Development Directorate's Single Revenue Grant (SRG) and then in 18/19, transferred into the Revenue Support Grant.

The WG's Collaborative Change Programme (CCP) have been responsible for delivering strategic and technical support to local authorities on an ongoing basis (since 2011, WRAP Cymru has largely been responsible for this element) and has also been a mechanism with which capital investment funding has been distributed. In 2016, a fund of £5.75m was made available for Welsh LA's to improve their recycling performance. Shared between 10 LA's, grants appear to have been awarded for a mix of capital costs (such as new split vehicles, household recycling containers & bailing equipment) and communications & behaviour change campaigns which would improve household waste services (both kerbside and HWRC's).

In 2018, a £500,000 behaviour change, and enforcement campaign was launched by WRAP Cymru, who working with LA's aimed to increase public awareness of household recycling.

In addition to supporting LA's, funding has also been made available to Welsh business. This has largely been to support recycling and reprocessing businesses and to work with Welsh manufacturers to increase the amount of recycled content in products and packaging. Through this, WRAP has provided capital funding for investment in equipment for this through its European Regional Development Fund (ERDF) financed Accelerated Reprocessing and Infrastructure Development (ARID) programme and technical support for this to businesses through its ReMade programme.

3.5.2 England

Unlike in Wales where the focus has been placed on improving the collection infrastructure, in England, the focus has been on improving the reprocessing infrastructure to handle co-mingled materials, e.g. sorting systems at MRFs or glass reprocessing plants, etc. High end MRFs can process dry mixed recyclates with a total yield loss or contamination rate of circa 8%. The recovered glass is sorted by size with the '6mm to 15mm' and '15mm to 70mm' grades, which accounts for circa 80% of the recovered glass, meeting the remelt specifications and the '6mm to dust' grade being suitable for alternative recycling¹¹. Unfortunately, this does represent best

¹¹ Personal communication with a UK glass reprocessor

practice rather than average practice, and hence, there are a significant number of plants that perform much worse than this.

A key issue for the operators who have invested in this equipment is gate fee prices. For mixed dry recyclates they currently pay approximately £4 per tonne and separated glass commands a price of £10 per tonne. With the business model being built on high volumes low profit margins, the additional £6 per tonne for the purchase of separated glass can be cost prohibitive and with the plant being set up to process mixed dry recyclates there is no benefit to them for purchasing separated materials.

3.5.3 *Barriers to implementation in England*

The key barrier to the introduction of consistent collections, and more specifically, separate collections, in England is that currently local authorities would have to make the investments and the high upfront transition costs are prohibitive. Local authorities are obliged to undertake TEEP (technically, environmentally and economically practicable) assessments to determine the viability of changes to waste collection services and the results from these assessments typically show that a switch to separate collection is not economically viable. For example,

An Environment Agency survey in 2016 found that of 196 Waste Collection Authorities (WCAs) that had undertaken a TEEP assessment only 8 WCAs or 4% identifies any changes to collection methods as a result¹².

A means of mitigating against this issue is to include the introduction of consistent collections within the reformed producer responsibility scheme, whereby the costs are incurred by producers as opposed to LAs. This is discussed in the following section.

¹²

https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/493192/WCA_separate_collection_arrangements_-_survey_results.pdf

4 Reform of the UK Packaging Producer Responsibility system

4.1 Introduction

The Defra summary of impacts report defines the reform as '*Obligated producers will be mandated to reimburse LAs and businesses/organisations that dispose of packaging waste, for the costs of managing the packaging that they place on the market. This payment will be facilitated via a modulated fee system which will be set using specific criteria relating to the packaging's environmental impact and treatment cost. Modulated fees will be designed to reward producers who use packaging that contributes positively to scheme outcomes (e.g. recyclable packaging) and to penalise producers who use packaging that does not*'.

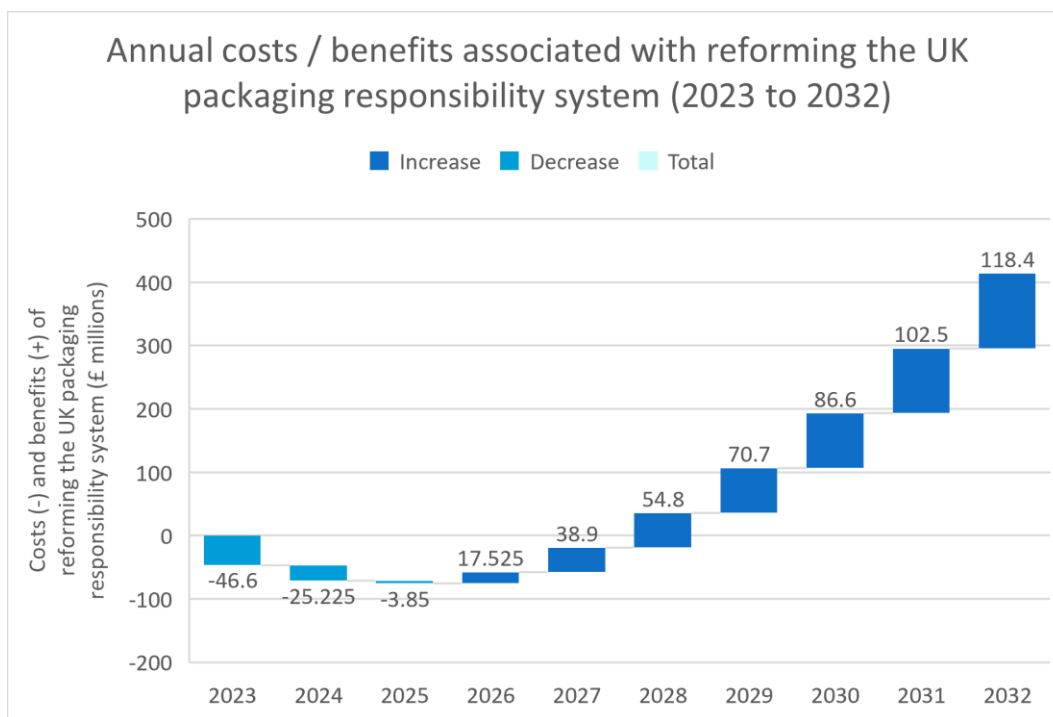
Defra produced the Impact Assessment (IA) for '*Reforming the UK packaging producer responsibility system*' in 2021, and the preferred option based on overall net societal benefit was:¹³

- Reform the packaging producer responsibility system towards full net costs covered by producers and introduce modulated fees on packaging and mandatory recycling labelling of packaging.
- Including plastic film packaging collected for kerbside collections from households and non-household municipal waste collections.
- With single use paper cups collection, with additional reporting requirements.

The IA modelled costs and benefits, in £ millions in 2023, 2027 and 2032. Figure 11 provides a summary of the findings. Please note: the annual costs / benefits have been extrapolated based on the 2023, 2027 and 2032 projected costs shown in the impact assessment. The analysis shows that over the time period of 2023 to 2032 the scheme is projected to generate a benefit of over £400 million. However, there is a transition cost that results in the breakeven payback not occurring until year 5 (2028).

¹³ [Impact Assessment \(defra.gov.uk\)](https://www.defra.gov.uk/impacts)

Figure 11: Summary of the modelled costs and benefits of reforming the UK packaging responsibility system 2023 to 2032



Source: Adapted by Oakdene Hollins from: Defra ‘reforming the UK packaging producer responsibility system’ impact assessment 2021.

4.2 Impact on recycling rates

Table 9 provides a summary of the projected increases in recycling rate the introduction of a reformed packaging producer responsibility system would have, according to the Defra Impact assessment. This shows that the significant increase would be in the recycling rate for plastic packaging with an increase of 18%. This is due to the introduction of a modulation fee, encouraging companies not to place poorer environmentally performing products onto the market, e.g. products made from non-recyclable materials, and the improved labelling that would assist consumers in making the right decision on whether the plastic is recyclable or not. Glass recycling can be seen to increase by 8% on the baseline. However, recalibrating the impact the implementation of consistent collections will have, i.e. setting the baseline at 76.8% in line with the findings shown in Table 8, will either reduce the projected impact of the reform to 81% - 76.8% = 4.2% or will increase the overall recycling rate to 76.8% + 8% = 84.8%.

Table 9: Overall recycling rates by packaging material across all sectors in 2032

Packaging type	Baseline – consistent collection (recycling rate %)	Reformed UK packaging producer responsibility system (recycling rate %)	Increased recycling rate (%) due to reformed packaging producer responsibility system
Plastic	43	61	18
Wood	38	39	1
Aluminium	38	40	2
Steel	85	93	8
Paper/card	82	86	4
Glass	73	81	8
Total	68	75	7

Table 10 shows the projected packaging within the baseline scenario in 2032, excluding the material that would be in the scope of the DRS. This shows that a projected 10.87million tonnes would be in the baseline case. Therefore, the increase in recycling of 7% equates to an additional 0.76 million tonnes.

Table 10: Total packaging in baseline scenario in 2032 (million tonnes)

Packaging type	Household	Non-Household	Other commercial & industrial	Total
Recycling	2.283	2.630	2.409	7.322
Residual	1.954	837	757	3.548
Total	4.237	3.467	3.166	10.870

4.3 Review of costs / benefits

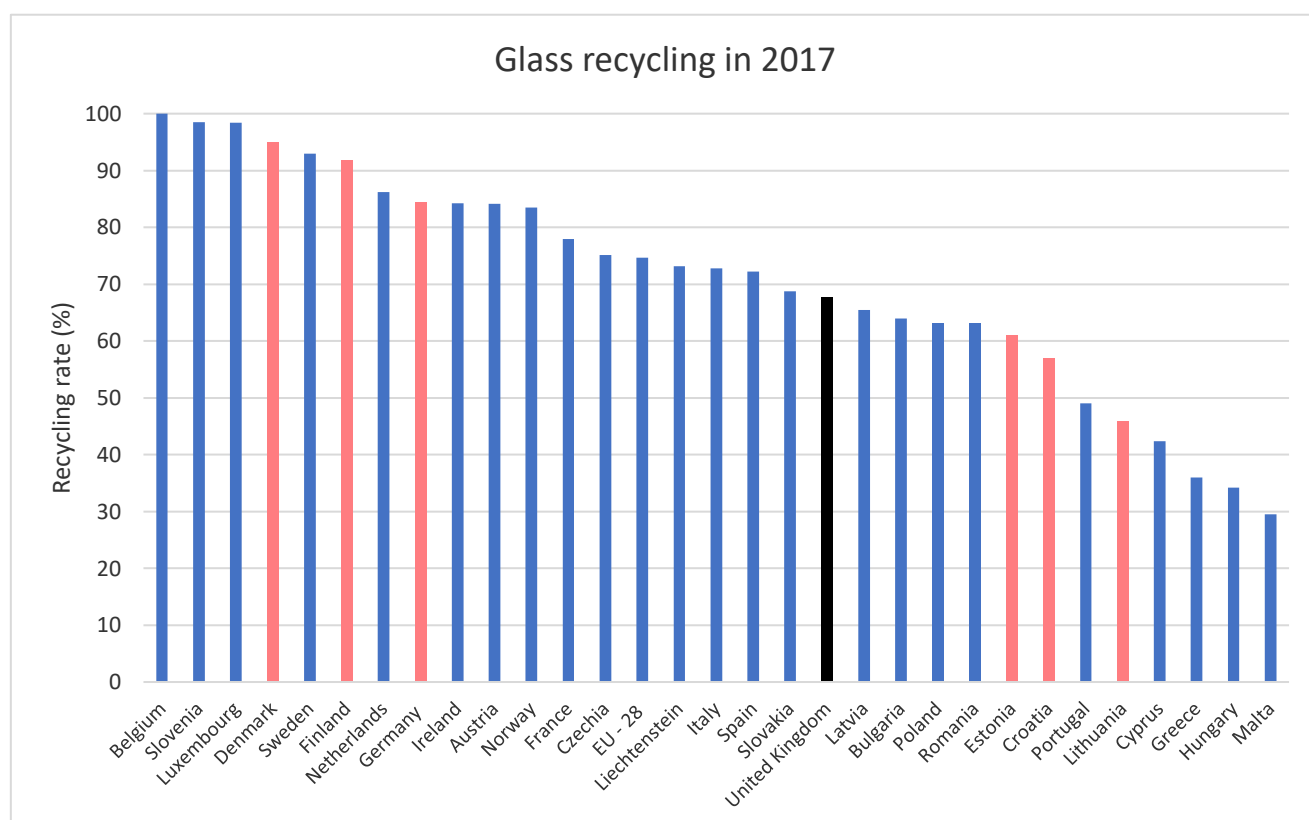
Taking the projected 10.87 million tonnes of packaging shown in Table 10 as the in-scope material and the impact assessment projected annual costs of £2,371.9 million, the estimated cost per tonne is £218 per tonne. A significant part of this cost is the £1,676.4 million compliance cost to producers, which equates to £143.2 per tonne.

However, when taking the overall benefits into consideration of £2,490.3 million the net benefits are £118.4 million. Therefore, the implementation of the reforms provides a benefit of £21 per tonne.

4.4 Review of impact assessment projections

Figure 12 shows that EPR schemes can result in very high levels of recycling, with the top 3 countries and 8 of the 11 countries having a glass recycling rate of 84% or above, operating an EPR only scheme. This is clearly in line with the upper estimate of 84.8% shown in Section 4.2. On the other hand, if the EPR does not cover the full net costs then it can have minimal impact on recycling and countries such as Malta, Greece and Cyprus are case in points.

Figure 12: Glass recycling rates in the EU-28MS and EFTA Countries in 2017. Countries in blue = non-DRS and in red (lighter shade) = dual systems (DRS and EPR)

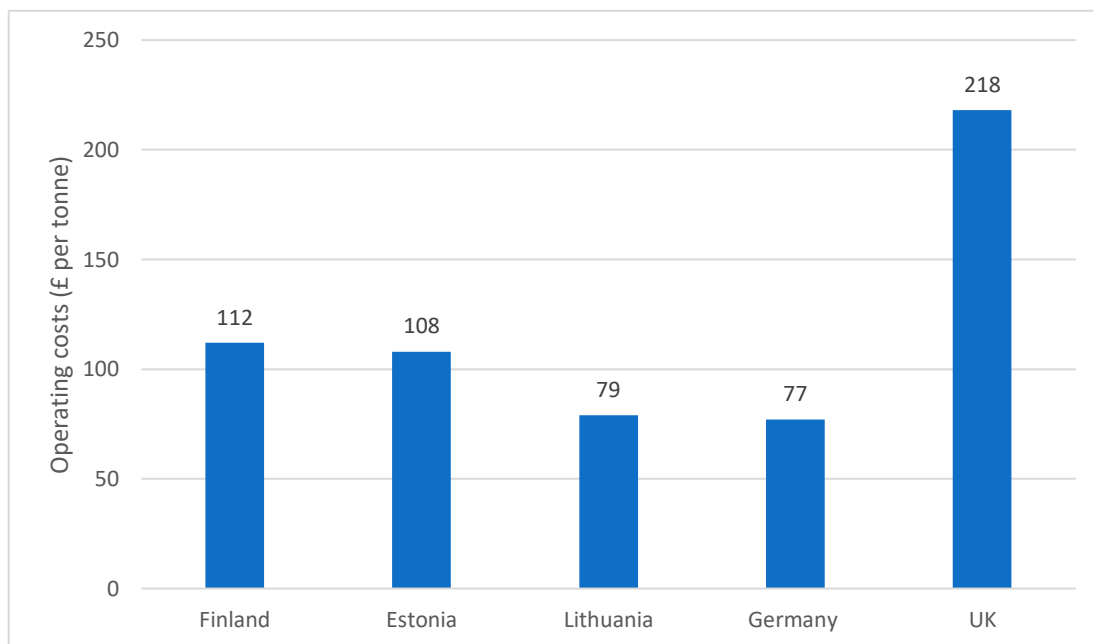


Source: Adapted by Oakdene Hollins from Eurostat data. Please note: Iceland is omitted from the chart since it is reported to have a recycling rate of 0% on Eurostat. Switzerland is omitted since it does not provide data to Eurostat.

4.5 Cost comparison

Figure 13 provides a comparison of the EPR costs of four countries currently operating a dual (DRS/EPR) scheme in Europe and the UK estimate. This shows that the UK estimate of £218 per tonne is much higher than the other estimates. The high producer contribution costs, which equates to £143.2 per tonne, is a key factor since it is higher than any of the other four countries total EPR costs per tonne. Additionally, the Defra ‘summary of impacts’ report shows the projected average annual packaging waste management costs under the EPR to be £1,224 million, which equates to £113 per tonne (the Defra summary of impacts projected annual cost of £1,224 million / the Defra impact assessment projected 10.87 million tonnes of in scope packaging). This £113 per tonne estimate equates to just 52% of the total £218 per tonne estimate and leads to the question of what is the cost breakdown of the remaining £105 per tonne. Unfortunately, no detailed breakdown was provided in the Defra documents.

Figure 13: Comparison of operating costs for EPR for glass in countries operating a dual system in 2017



Source: FEVE

4.6 Quality of material

Defra provides evidence that the introduction of the reforms would result in an increase in the quality of the recyclates. For example,

The Impact assessment states that:

‘As consumers respond to mandatory recyclability labels and they become more effective recyclers (i.e. they correctly put recyclable items in the recycling bins and put non-recyclables into residual waste), contamination levels at material recovery facility (MRFs) are expected to reduce.’

The 2019 consultation reports that:

‘Reprocessors can expect to have greater confidence in the supply of materials resulting from the adoption of more consistent approaches to collecting recyclable materials. They can expect the materials they receive to be of a better quality owing to changes in packaging design, particularly plastic packaging, and less confusion on the part of the public on what they can and cannot recycle. This will help reduce risks related to the supply of materials’.

5 Deposit Return scheme for beverage containers

5.1 Introduction

The Defra summary of impacts report defines the reform as ‘A DRS will require consumers to pay a deposit at the point of purchase, and then return their drinks container to a specific return point for recycling, in order to redeem their deposit. The financial incentive offered to consumers for returning their drinks containers to designated return points, provides the incentive to increase the recycling of drinks containers, and will improve the quality of the recycled material and minimise the number of littered drinks containers in the environment’.

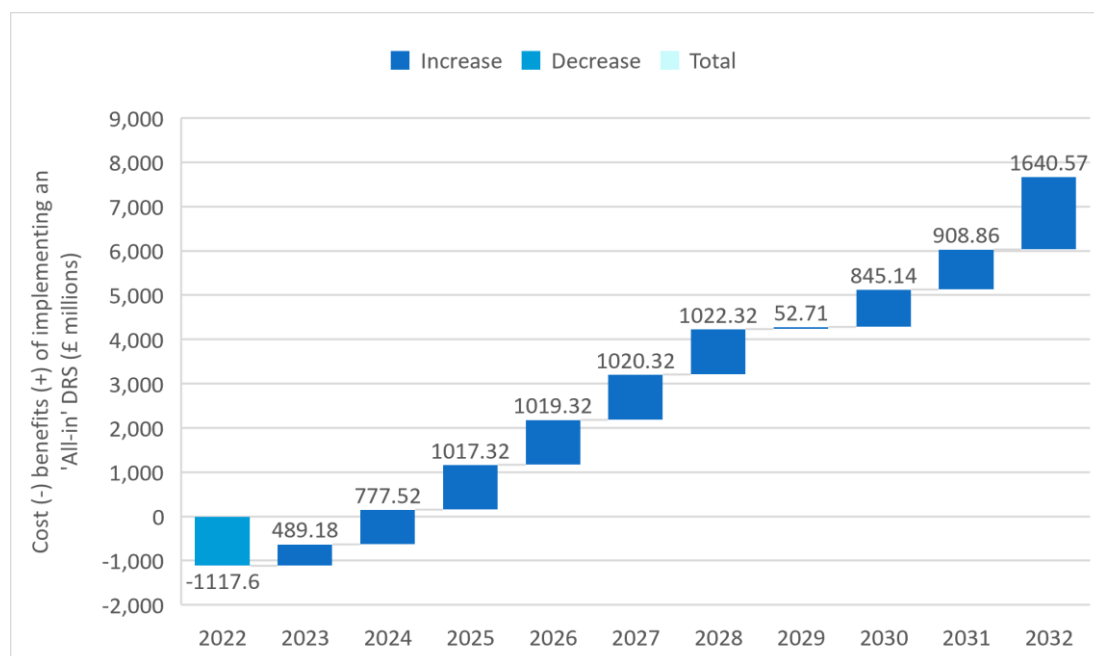
The Defra impact assessment ‘introducing a deposit return scheme on beverage containers’ modelled four options:

- Option 1: Do nothing
- Option 2: Introduce an All-in DRS
- Option 3: Introduce an ‘On-the-go’ DRS
- Option 4: Introduce ‘All-in’ DRS with no glass intake

The IA identifies ‘Option 2’ as the preferred option and hence this section focuses predominantly on this option.

Figure 14 provides a summary of the costs and benefits of introducing an ‘All in’ DRS as projected in the IA. This shows that the heavy investment costs in year 1 are soon recovered with the breakeven point falling in year 3 (2024). It is estimated that over the timeframe 2022 to 2032 that the introduction of a DRS will result in a net benefit of over £7 billion.

Figure 14: The cost benefit analysis of introducing an ‘All in’ DRS



Source: Produced by Oakdene Hollins using data from the ‘DRS on beverage containers’ IA

The ‘DRS on beverage containers’ IA reports that the following containers placed on market (POM) are in scope of DRS, Table 11. This shows that 2.38 million tonnes of placed on the

market (POM) packaging in the UK would be in scope of the DRS, with glass accounting for 1.9 million tonnes or circa 80% (79.8%) of in-scope packaging. From a glass perspective, the 1.9 million tonnes, equates to 74% of total glass packaging (2,488,000 tonnes). Additionally, the ‘WRAP GlassFlow 2025’ study reports that bottles account for 85% of total glass containers (14% jars and 1% other), and hence, 90% of all glass bottles will be in scope of the DRS.

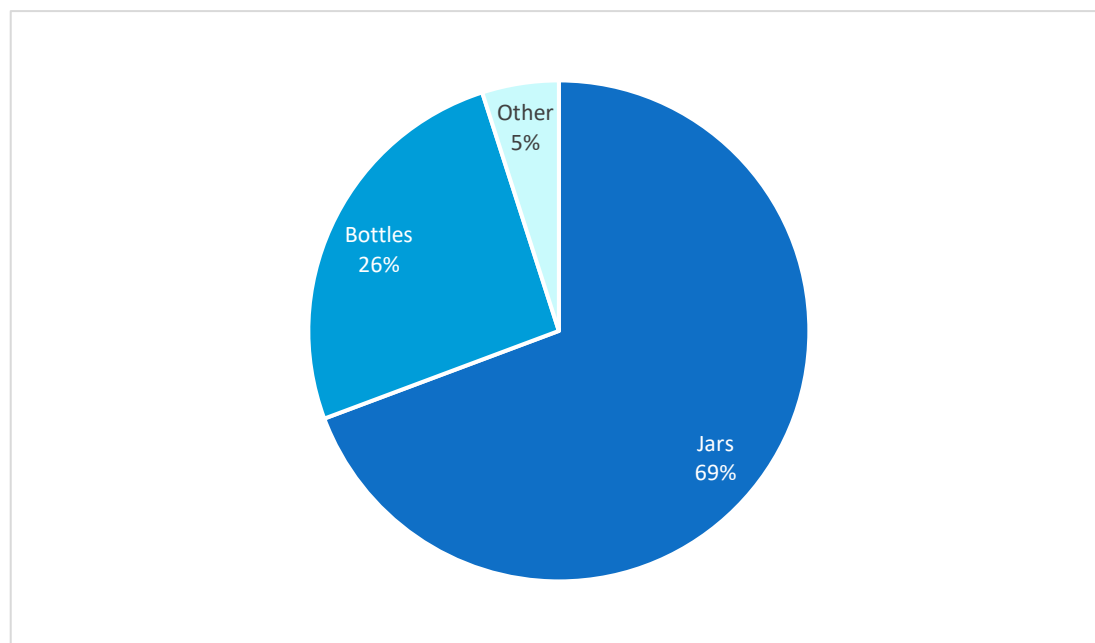
Table 11: Containers placed on market in scope of the ‘All-in’ DRS

Container type	POM (tonnes per year)	Percentage of in-scope material
Glass bottles	1,901,263	79.8%
Aluminium cans	127,537	5.4%
Steel cans	34,704	1.5%
PET bottles	320,256	13.4%
Total	2,383,760	100%

Source: Produced by Oakdene Hollins using data from the ‘DRS on beverage containers’ IA

Figure 15 provides a breakdown of the glass packaging that will be outside of the scope of the proposed DRS. This could represent a recycling challenge for local authorities since jars, such as food jars, are not as widely recycled as the bottles contained within the scope of the DRS.

Figure 15: Breakdown of glass packaging that is out of scope of the proposed DRS



For comparative purposes, Table 12 shows the impact the removal of glass from the scheme would have, with PET bottles accounting for nearly two-thirds (66.4%) of total in-scope material. The overall tonnage of packaging within the scope of the DRS drops considerably, with only 4.1% of total packaging being in-scope.

Table 12: Containers placed on market in scope of the 'All-in' DRS with no glass intake

Container type	POM (tonnes per year)	Percentage of in-scope material
Aluminium cans	127,537	26.4
Steel cans	34,704	7.2
PET bottles	320,256	66.4
Total	482,497	100%

Source: Produced by Oakdene Hollins using data from the 'DRS on beverage containers' IA

5.2 Impact on recycling rate

Table 13 shows that the All-in DRS is projected to increase the recycling of the in-scope material by 380,157 tonnes against the current baseline. It is important to highlight that this does not consider any benefits that will be realised through the introduction of policies such as consistent collections or a reformed EPR nor the benefits that voluntary agreements such as the Plastic Pact and Closing the Glass Loop will have on the current baseline.

Table 13: Summary of the projected increase in recycling rates due to the introduction of the 'All-in' DRS

Container type	Baseline average recycling		DRS return rate	DRS recycling		Increase in recycling
	%	Tonnes	%	Tonnes	Tonnes	
Glass bottles	67.8	1,288,888	85	1,611,004	322,116	
Aluminium cans	70.5	92,584	85	121,262	28,678	
Steel cans	70.6	24,495	85	29,442	4,947	
PET bottles	70	225,170	85	277,148	51,978	
Total		1,658,700	85	2,038,857	380,157	

Source: Produced by Oakdene Hollins using data from the 'DRS on beverage containers' IA

5.3 Review of costs / benefits

Taking the projected 2.38 million tonnes of packaging shown in Table 11 as the in-scope material and the impact assessment projected costs of £760 million in 2032, the estimated cost per tonne is £318 per tonne.

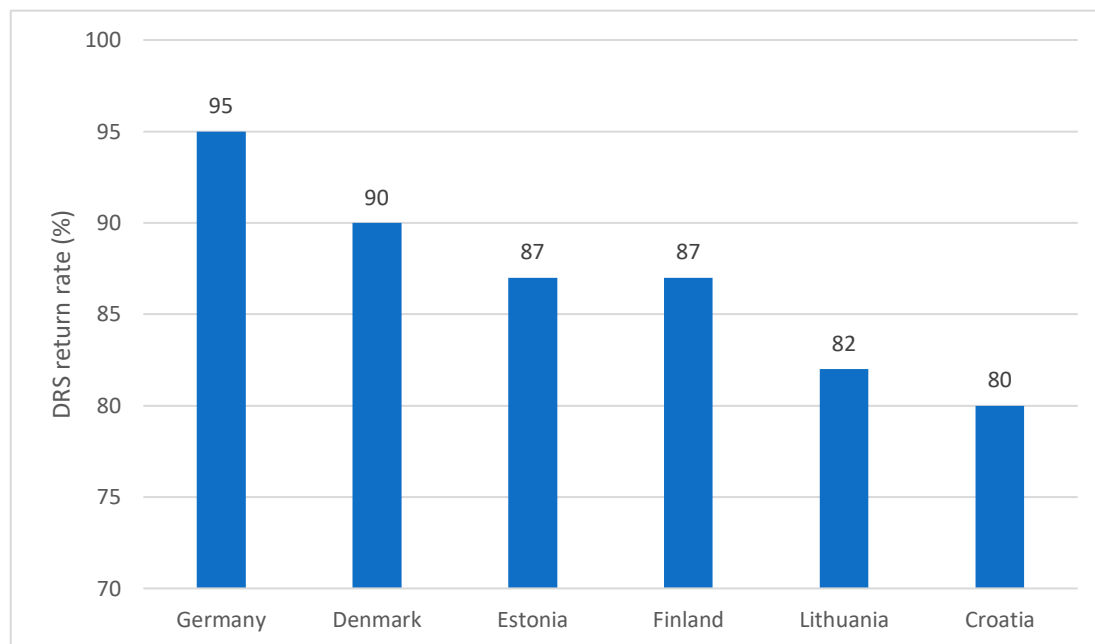
However, when taking the overall benefits into consideration of £1,640.57 million the net benefits are £880.57 million. Therefore, the implementation of the reforms provides a benefit of £370 per tonne.

5.4 Review of impact assessment results

Figure 16 shows that for glass, four of the six DRS schemes operating in the EU-27MS have a return rate above the specified 85% modelled in the IA, and hence, 85% can be considered a fair and reasonable assumption. However, the estimates of the 'baseline average recycling' of

67.8% is considered the worst-case scenario, especially if the assumption is that consistent collection and a reformed EPR forms part of the baseline estimate. Taking the same approach as the DRS IA and looking to Europe for guidance on achievable recycling rates, it is considered appropriate to assume an EPR can achieve a glass recycling rate of 84% and the 'consistent collection' approach is estimated to reach 82.8% (Section 3.4.2.). Figure 12 shows 8 European countries operating an EPR only scheme have already achieved this.

Figure 16: Comparison of the DRS return rates for the management of waste glass packaging in 2017



Additionally, Alupro reports that a DRS would capture 75% of consumed aluminium beverage cans which is closely aligned to Sweden's capture rate of 77% and that a 'DRS will deliver a 4% increase in the amount recycled vs what will be achieved in the baseline current situation'¹⁴.

For PET bottles the baseline figure of 70% appears to be very high. In the WRAP Plastics market situation report for 2019 (2020)¹⁵ it is stated that:

- 'An estimated 443kt of PET bottles is placed on the UK market of which 317kt is drinks bottles'. This aligns with the estimate of 320kt shown in Table 11.
- '70% of PET drinks bottles are consumed at home'. This accounts for an estimated 221.9kt of the 317kt POM.
- '380kt of plastic bottles collected by kerbside schemes in 2017/18 of which 200kt were plastic drinks bottles and an estimated 2/3rd are PET'. This therefore suggests that 134 kt of PET drinks bottles were collected by kerbside schemes. This provides an estimated collection rate of 60% through the kerbside scheme (134kt collected / 221.9kt total household PET).

This '60%' is considered the best-case scenario in terms of existing (baseline) recycling since the collection rate for non-household PET drinks containers, such as the 'on-the-go' channel is most likely to be much lower than this.

¹⁴ Achieving an 85% recycling rate within two years by Alupro - issue

¹⁵ WRAP_Plastics_market_situation_report

Table 14 shows the impact the four changes, discussed above, would have on the overall recycling rates. It can be seen that the overall increase in recycling due to the DRS drops from 380,157 tonnes to 111,119 tonnes. The two most significant changes are the projected increase in glass recycled, which drops from 322,116 tonnes to just 18,952 tonnes, and the increase in PET bottles recycled, which increases from 51,978 tonnes to 81,514 tonnes.

Table 14: Amended summary of the projected increase in recycling rates due to the introduction of the 'All-in' DRS

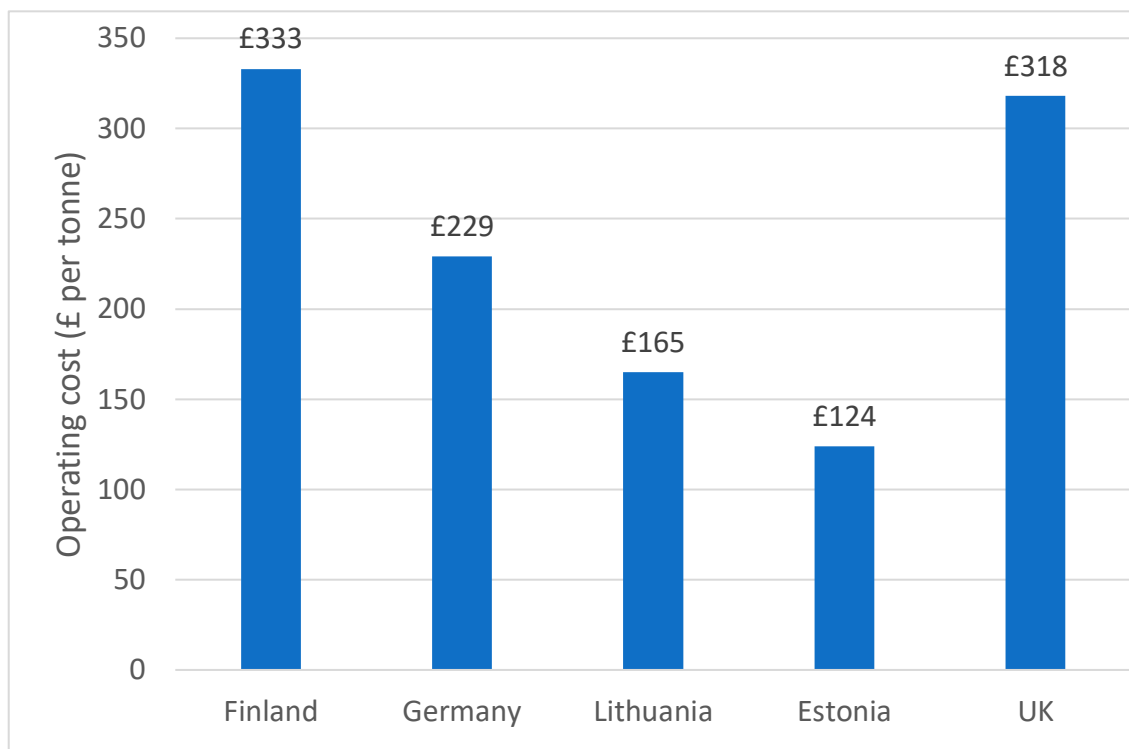
Container type	Baseline average recycling		DRS return rate	DRS recycling	Increase in recycling
	%	Tonnes	%	Tonnes	Tonnes
Glass bottles	84	1,592,051	85	1,611,004	18,952
Aluminium cans	71	101,290	75	106,996	5,706
Steel cans	70.6	24,495	85	29,442	4,947
PET bottles	60	195,634	85	277,148	81,514
Total		1,914,896	85	2,024,590	111,119

5.5 Review of impact assessment projections

5.5.1 Review of projected annual costs

Figure 17 provides a comparison of the cost of operating DRS in Finland, Germany, Lithuania and Estonia and the projected costs in the proposed UK scheme. It can be seen that the costs vary significantly and this is due to the different DRS models used. For example, Finland has a large number of automated collection points, but have a relatively low per capita generation of waste packaging, Lithuania adopted a 'leasing model' for the reverse vending machines which reduced the Capital costs and Estonia operate a predominantly manual scheme, which keeps the costs to a minimum. The UK at £318 per tonne can be seen to be near the very top, alongside Finland at £333 per tonne.

Figure 17: comparison of DRS operating costs

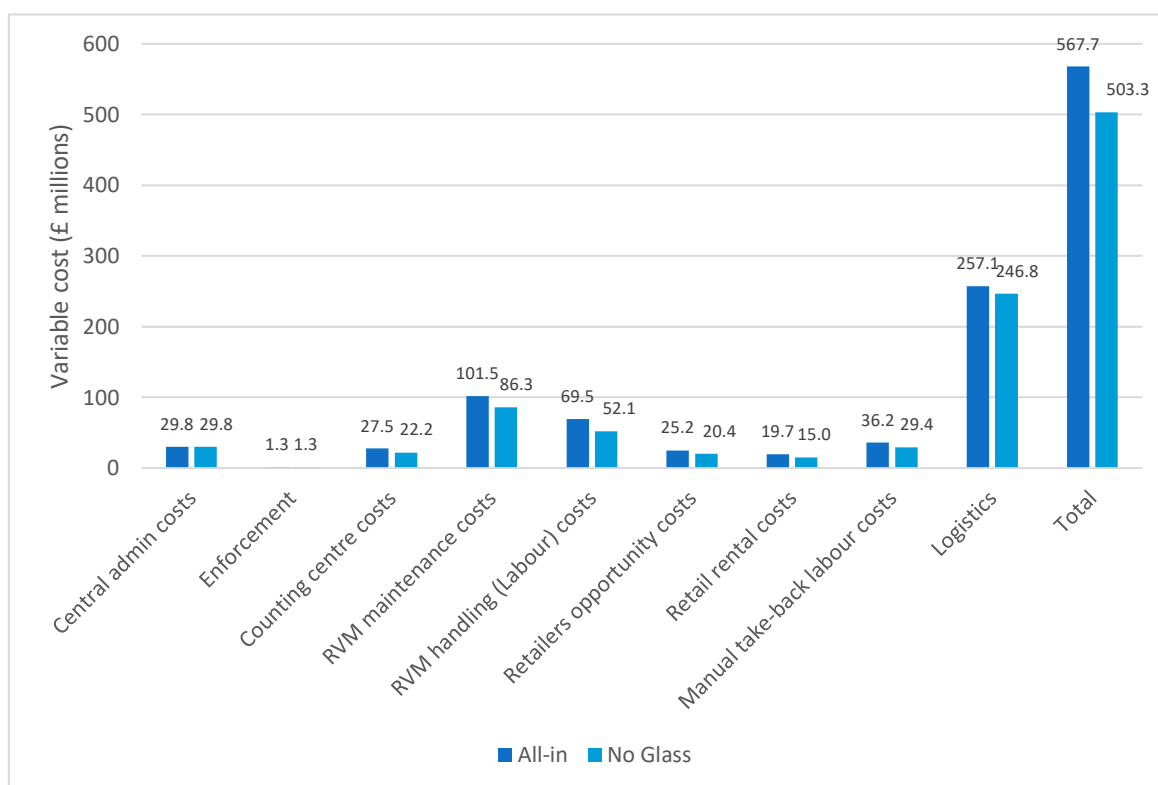


Source: Adapted from work undertaken by Oakdene Hollins for FEVE

Figure 18 provides a breakdown of the variable costs projected in the IA for 2025. This shows that logistics and RVM maintenance are the two main cost elements accounting for £358.6 million of the £567.7 million (63%) of the variable costs in the 'All-in' scheme and £333.1 million of the £503.3 million (66%) of the variable costs in the 'All-in without glass'. Additionally, Figure 18 shows that a significant number of the cost elements relate to retail, namely:

- RVM maintenance costs
- RVM (handling) labour costs
- Retailer opportunity costs
- Retail rental costs
- Manual take-back labour costs

Figure 18: A breakdown of the variable costs in 2025 of the 'All-in' and 'All-in without glass' options



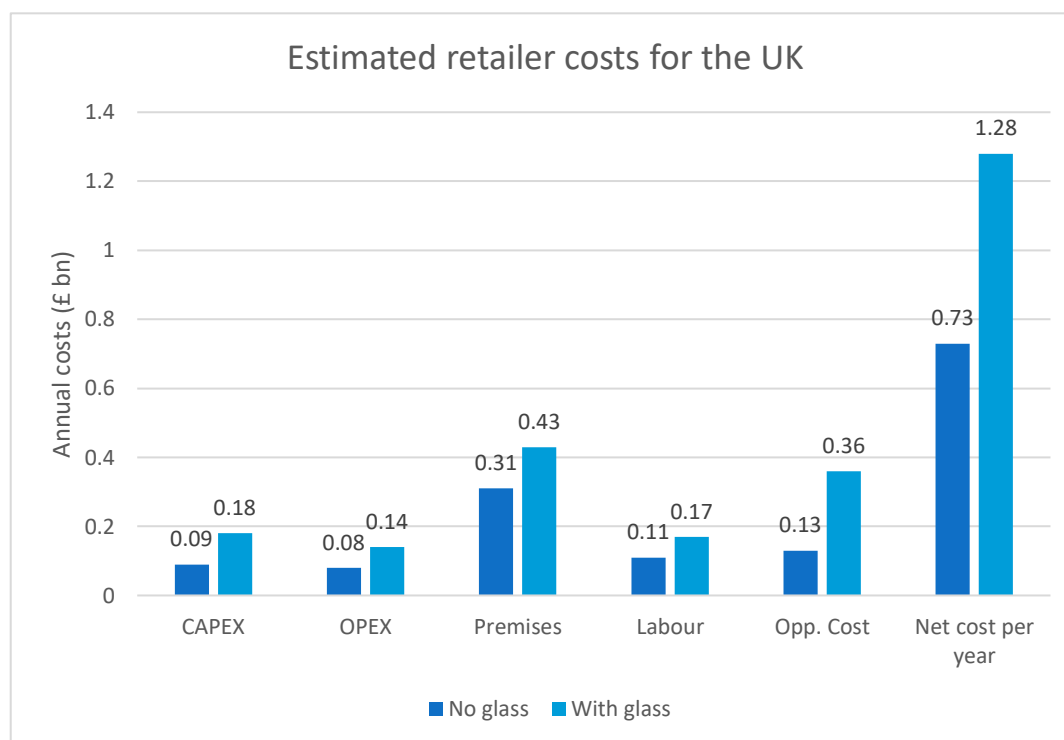
Source: Produced by Oakdene Hollins using data from the 'DRS on beverage containers' IA

In the 'All in' DRS the retailer costs amount to £252 million and in the 'All in without glass' £203.2 million. These estimates are much lower than those of a study undertaken by the British Retail Consortium (BRC). The BRC¹⁶ puts the (central estimate) annual cost to retail in the UK of operating a DRS at £730 million in a scheme without glass and £1,280 million in a scheme with glass, Figure 19. These numbers are not only much higher than the DRS IA, the difference between the glass in and glass out models are significant, i.e. £64.4 million difference in the DRS IA as opposed to £550 million in the BRC study. The BRC study states that:

'The inclusion of glass could add £0.6 billion to the costs because glass is bulky, so it adds storage, handling and transportation costs. Inclusion of glass also creates additional operational challenges and Health & Safety risks'

¹⁶ <https://brc.org.uk/media/597230/brc-drs-research-2018-final-report.pdf>

Figure 19: BRC estimated retailer costs for operating a DRS in the UK



Source: <https://brc.org.uk/media/597230/brc-drs-research-2018-final-report.pdf>

The two most significant differences between the DRS IA and BRC projections are the retailer opportunity costs or Opp. Cost and the retail rental cost or premises costs. Table 15 shows that for the All-in DRS the BRC estimate is £745 million higher and for the All-in without glass, the estimate is £400 million higher.

Table 15: Comparison of the retail rent and rates costs and retail lost opportunity costs

Cost element	DRS with glass estimated cost (£ millions)			DRS without glass estimated cost (£ millions)		
	DRS IA	BRC	Difference	DRS IA	BRC	Difference
Retail rent and rates	19.7	430	410.3	15	310	295
Retailer lost opportunity cost	25.2	360	334.8	20.4	130	109.6
Total	44.9	790	745.1	35.4	440	404.6

Although transportation costs are cited in the BRC quote above, they are not included in the projected retailer costs. Figure 18 shows that within the DRS IA the projected logistics costs reduce from £257.1 million in the 'All-in' DRS to £246.8 million in the 'All-in without glass', i.e. a reduction of just 4%. This is in spite of the fact that glass accounts for 1,611,004 tonnes of the

overall 2,024,590 tonnes (79.6%) of the material being recycled. If a ‘volumetric’ rather than ‘weight’ based approach is taken, the DRS IA states that: ‘The reduction in the storage space required from not having glass, whose volume constitutes 32% of that for total DRS scope materials, was factored into the analysis’. It must be noted that a significant reason for the difference between the weight and volumetric estimates is that it is assumed within the DRS IA that ‘the All-in DRS would normally treat glass by compacting it so that its volume would be reduced by a factor of around 4 or 5’. Currently, there are very few examples of glass being crushed or compacted within a DRS, for example, Lidl in Germany crush the glass they collect from their DRS. However, they only takeback their own glass containers which are all clear glass, and hence there is no issue with colour sorting the crushed glass.

Table 16 synthesises the findings discussed above, in terms of the different approaches to quantifying the transportation costs within the All-in DRS without glass. This shows that the projection outlined in the DRS IA, i.e. the 4% reduction against the base line, is significantly lower than the estimated reduction if a weight based or volumetric approach is used.

Table 16: Analysis of the transportation costs in the All-in without glass DRS option

Scenario	Estimated cost of transportation in the All-in without glass option (£ millions)
Base case (All-in DRS)	£257.1
DRS IA estimated 4% reduction	£246.8
Transportation costs based on volumetric analysis – a reduction of 32%	£174.8
Transportation costs based on weight – a reduction of 79.6%	£52.4

To add an additional level of complexity, a comparison of the projected GHG emissions from additional transport shown in the DRS IA, Table 17, shows a reduction of 13.7% between the All-in and the All-in without glass DRS options.

Table 17: A comparison of the increase in additional transportation (GHG) between the DRS All-in and DRS All-in without glass options

Option	Increase from additional transportation (GHG) in £ millions
All-in DRS	4.32
All-in DRS without glass	3.73
Difference	0.59

Since the practical viability of compacting glass in the DRS is not yet proven, it is considered appropriate to revert to the methods used in the well-established DRSs in operation across Europe, i.e. the ‘soft drop’ system where whole glass bottles are retained, and hence, the weight-based option is most representative of current best practice. This therefore results in a significant difference between the projected transportation costs outlined in the DRS IA (£246.8 million) and the weight based projected costs in this appraisal (£52.4 million), i.e. an estimated reduction in the projected annual transportation costs of an All-in DRS without glass of £194.4 million.

5.5.2 Review of projected annual benefits

Table 18 shows that the annual projected benefits are dominated by the reduction in disamenity from litter, i.e. accounting for £1,452 million or 91% of total benefits in the All in DRS and £1,049 million or 89% of the benefits in the All in without glass DRS.

Table 18: Analysis of the annual projected annual benefits in 2025

Benefit	Projected reduction in disamenity value in the All-in DRS (£ millions)	Projected reduction in disamenity value in the All-in DRS without glass (£ millions)
Reduction in disamenity from litter	£1,452	£1,049
Direct cost of litter clean-up savings	£85.78	£62.02
Net material revenue	£42.6	£62.23
GHG Emissions (savings from recycling – increase from additional transportation)	£4.26	£4.16
Total	1,585	1,178

Focusing on the reduction in disamenity value, Table 19 shows the comparison between the estimated benefits of the two DRS options, the All-in and 'on-the-go' options. It can be seen that the estimates are vastly different with the 'All-in' DRS accounting for 27% more litter at an additional benefit of very nearly £1 billion (£999.27 million). However, the DRS IA appears to contradict itself by stating that '*the litter composition studies reveal that more On-the-Go drinks containers are present in litter than large drinks containers*'. This would suggest that the current estimate represents the best-case scenario, i.e. highest level of benefits. Additionally, it is noted that the projected reduction in disamenity in the 2019 IA was £986 million and there is no justification in the current DRS IA as to why the projected disamenity benefits increased by £466 million.

Table 19: Comparison of the reduction in disamenity valuation for the All-in and on-the-go DRS

DRS options	Definition of in-scope material	Litter that is in-scope of the DRS	Reduction in disamenity value (£million)
Introduce 'All-in' DRS alongside EPR reform for other packaging	PET bottles, steel cans, aluminium cans and glass bottles, with no restrictions of the size/format of drinks containers in-scope.	40%	£1,452
Introduce 'On-the-go' DRS alongside EPR reform for other packaging	Covering the same materials as the 'All-in' DRS but restricting drinks containers in-scope to those less than 750ml size and sold in single format containers, in order to target those most often sold for consumption outside the home ('on-the-go')	13%	£452.73
Difference between the two estimates		27%	£999.27

Source: Adapted by Oakdene Hollins from the Defra Deposit Return Scheme IA.

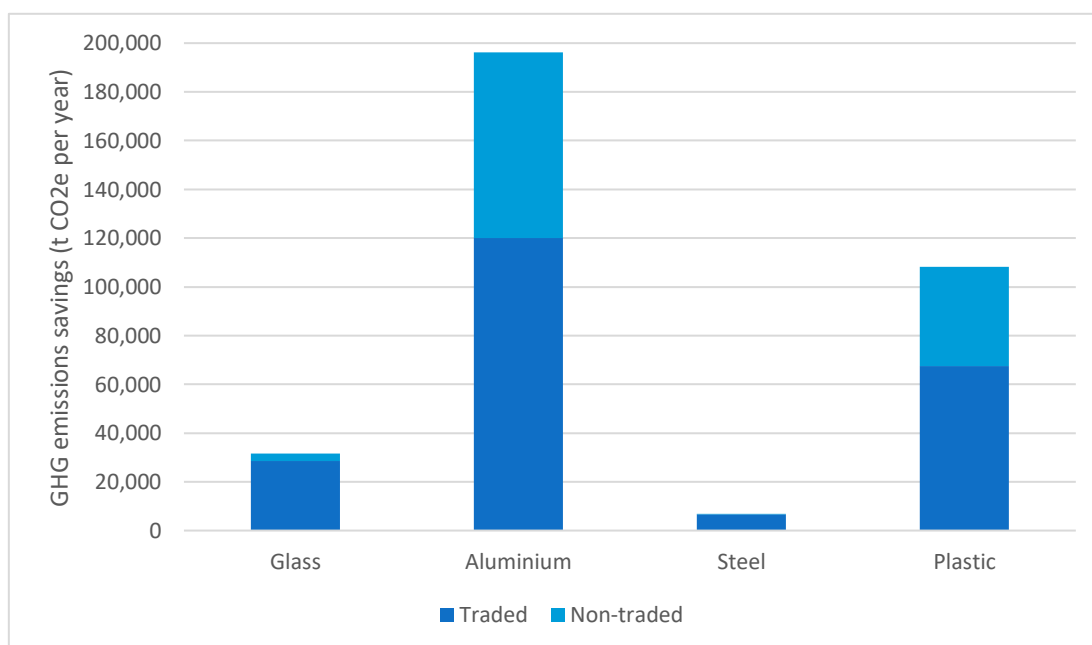
A 2016 PwC report in Australia, calculated 'Society's willingness to pay for litter avoidance'. Based on a 2010 survey of 3,342 households from 15 regions (8 capital cities and 7 regional

areas) it was estimated that the 8.5 million households in Australia would be willing to pay AUD \$5.7 million. Converting this to GBP and the 27.8 UK households provides an estimate of £10 million¹⁷.

Since the applicability of the PwC findings to the UK context is difficult to justify, we consider it reasonable to consider the on-the-go estimate as being the worst-case scenario for the All-in DRS, that is, if disamenity value is to be considered a merited economic benefit of a DRS.

Additionally, Figure 20 shows the projected GHG emissions savings from the introduction of the All-in DRS. The Impact Assessment states that the projected ‘traded emissions’ savings are calculated based on the ‘per tonne emissions of closed loop recycling’ and the non-traded is the ‘avoided emissions from materials no longer going to residual waste treatment’. It must be noted that it is highly unlikely that all the collected glass will be recycled via closed loop recycling due to the locality of the glass processing plants, predominantly in the north of England and the prohibitive cost of transport.

Figure 20: GHG emissions savings (t CO2e per year) in the All-in DRS in 2025



5.6 Analysis of findings

Table 20 shows the cost benefit analysis for the All-in and All in without glass options when taking the appraisal analysis into account for the following four key factors:

- Rent / rates cost to retailers
- Lost opportunity costs to retailers
- Transportation impacts
- Disamenity of litter

¹⁷ <https://www.socialvalueuk.org/app/uploads/2016/03/standing%20council%20on%20water.pdf>

Table 20: Cost benefit analysis based on analysis for 2032

Cost benefit analysis	All in DRS (£millions)	All in without glass DRS (£millions)
Costs		
Base cost projected in the DRS IA	£760	£503
Additional rent / rates cost to retailers	+£410	+295
Additional lost opportunity cost to retailers	+£334	+110
Reduction in transportation costs	0	-190
Revised costs projections	£1,504	£718
Benefits		
Base benefits projected in the DRS IA	£1,601	£1,178
Reduction in impact on disamenity of litter	-£1,000	-£600
Revised benefit projections	£601	£578
Revised cost / benefit	Cost of £903 million	Cost of £600 million

Figure 21 provides a graphical representation of the results, which shows the significant variants between the DRS impact assessment projections and the appraisal estimates. Key observations are:

- In the case of the DRS all in option, the appraisal estimates result in a shift from a net benefit of £841 million in the impact assessment to a net cost of £903 million in the appraisal estimate.
- In the case of the DRS all in option without glass, the net benefit reduces from £675 million to £140 million.
- Overall, the appraisal estimates result in the DRS without glass being the most cost-effective option, resulting in a net benefit of £140 million rather than a cost of £903 million in the DRS including glass. Since the appraisal estimates for the DRS without glass still results in a net benefit this is considered the least risk option.

Figure 21: A summary of the findings of the appraisal of DRS costs and benefits

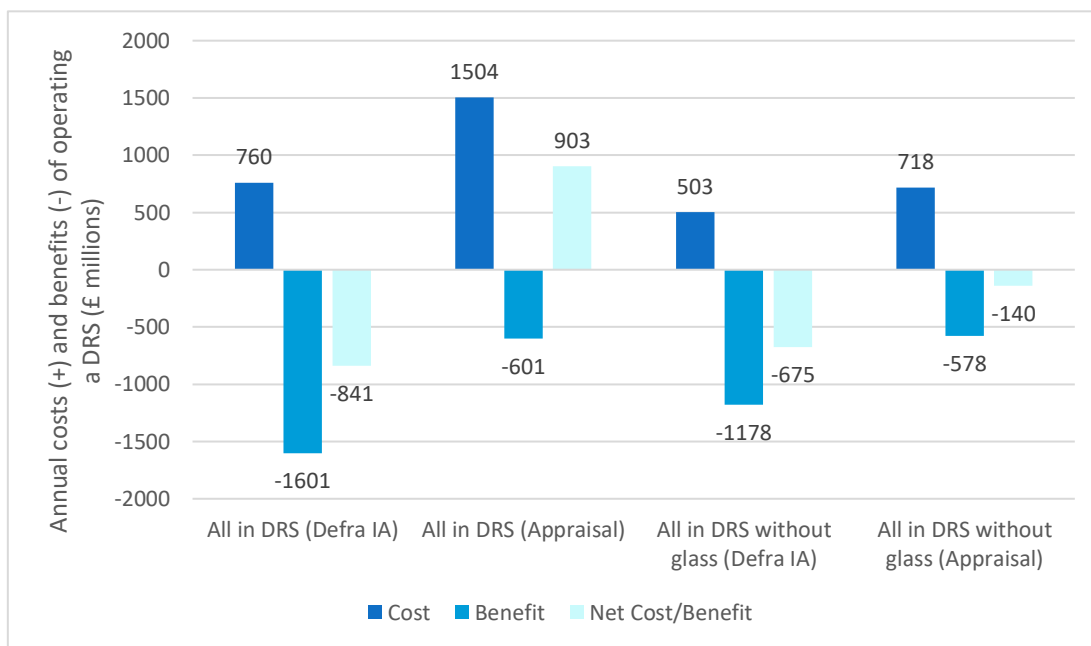
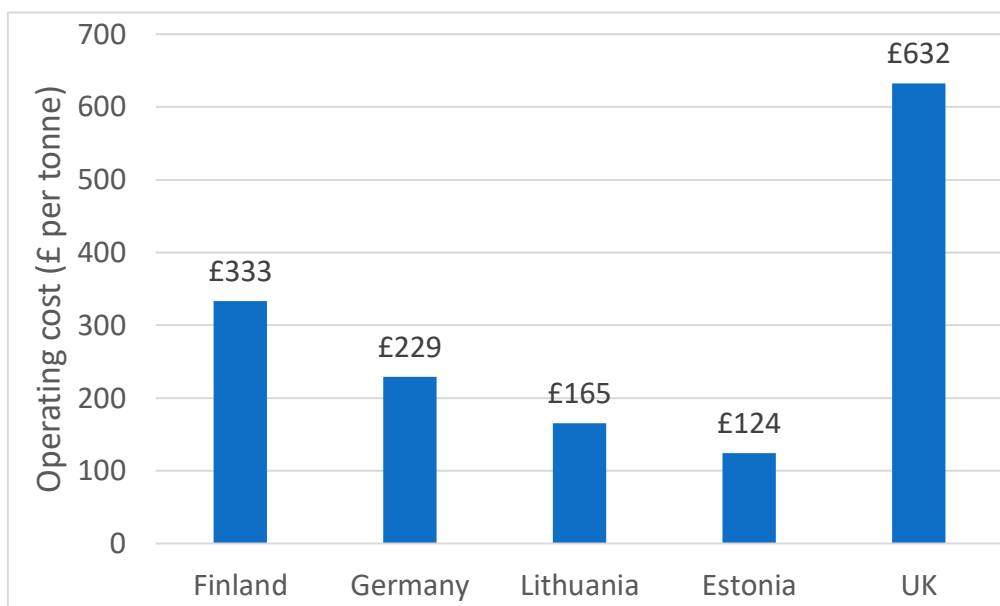


Figure 22 shows the revised comparison of operating costs. Taking the projected 2.38 million tonnes of packaging shown in Table 11 as the in-scope material and the revised costs of £1,504 million in 2032, the estimated cost per tonne in the UK is £632 per tonne. Additionally, the revised cost / benefit equates to a cost of £379 per tonne.

Figure 22: revised comparison of DRS operating costs



Source: Adapted from work undertaken by Oakdene Hollins for FEVE

6 Conclusions

The three policy options reviewed in this appraisal are all currently in place and operating successfully in regions and countries across the globe. For example, consistent collections are in place in Wales, and DRS and EPR, are in place across Europe and more globally. This enabled a benchmarking exercise to be incorporated within this appraisal. The key findings were:

- For consistent collection, who funds the transition? In Wales, the Welsh Government has been instrumental in funding and providing additional support to local authorities, etc, in the transition from a predominantly co-mingled kerbside scheme to separate collection of key recyclates. However, in England the funding decision has traditionally been left with local authorities and due to the 4/5-year political cycle and ever increasing budgetary constraints, many have ruled the transition as economically unviable. A means of overcoming this issue is to combine the consistent collection and producer responsibility reform policies, to enable the transition to be funded by producers and not local government.
- The appraisal shows that the projected cost of operating a reformed producer responsibility scheme (EPR) in the Reform IA, is significantly higher than those in place in Europe. A key factor is the valuation of the non-waste management costs at £105 per tonne, which are higher than the overall costs of operating an EPR in some other countries reviewed. Unfortunately, there is no breakdown of how these numbers were derived within the Reform IA and hence a detailed cost comparison cannot be undertaken.
- A number of the projections that were made within the DRS IA can be challenged and a sensitivity analysis undertaken within the appraisal shows that four critical factors can influence whether the DRS is a significant cost burden or a benefit. This is therefore considered a high-risk option.

The appraisal shows that the benefits of the DRS are dominated by the reduction in littering. With this in mind, it is suggested that first and foremost the DRS should be compared against other litter strategies to determine the most cost-effective way of tackling littering. In terms of recycling rate, it can be seen that the DRS will have very little impact on the rate of collection for glass, especially if the two other policy options are implemented. However, it would result in a significant increase in the collection of source separated PET, that is in high demand from the soft drinks and bottled water sectors, to increase the recycled content of their packaging. Therefore, a key question from a recycling perspective is, does DRS represent value for money as a PET recycling strategy and should glass be included to support this.

Due to the uncertainty over the costs and benefits of a DRS, the authors are in support of the implementation of consistent collection and the reform of producer responsibility scheme prior to the implementation of a DRS. This will remove a number of the current 'unknowns' which are resulting in the DRS being considered a potential high-risk strategy.

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Authors



Peter Lee - Head of Operations

22 years consulting experience at Oakdene Hollins designing lean systems and waste management and prevention strategies. Currently project managing:

- The delivery of the suite of studies for FEVE on DRS
- Canadian waste prevention research to feed into federal strategy.
- Worked with British Glass on numerous glass recycling, lightweighting and policy studies

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Oakdene Hollins Ltd
Ardenham Court
Oxford Road
Aylesbury
Buckinghamshire
HP19 8HT

+44(0)1296 423915
admin@oakdenehollins.com

www.oakdenehollins.com
www.remancouncil.eu
www.eu-ecolabel.uk

Registered in England&Wales
no: 2937129

From its offices in Aylesbury and Brussels, Oakdene Hollins provides research and consulting services to clients under three main themes:

- Circular Economy
- Sustainable Products
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Oakdene Hollins Ltd
Ardenham Court
Oxford Road
Aylesbury
Buckinghamshire
HP19 8HT

+44(0)1296 423915
admin@oakdenehollins.com

www.oakdenehollins.com
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www.eu-ecolabel.uk

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