Local Government Association

Valpak by Reconomy

Deposit return scheme for drinks containers

Waste implications for local authorities in England

Report

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Disclaimer

Glossary

An Taisce
The National Trust for Ireland, involved in environmental and heritage conservation, which undertakes anti-litter campaigning and litter surveys.

Capture rate
The percentage of a specific type of waste material that is successfully collected for recycling out of the total amount of that material generated. Capture rate is a measure of the effectiveness of waste collection systems in capturing recyclable materials.

Circular economy
An economic system aimed at eliminating waste and the continual use of resources. It contrasts with a traditional linear economy, which follows a 'take, make, dispose' model. In a circular economy, resources are kept in use for as long as possible, extracting the maximum value from them while in use, then recovering and regenerating products and materials at the end of their service life. This approach involves recycling, reusing, refurbishing, and remanufacturing to create a closed-loop system, minimising the use of resource inputs and the creation of waste, pollution, and carbon emissions.

Commingled
Commingled collections involve different recycling streams being collected together in a wheeled bin, box, or bag, and taken for sorting at a materials recovery facility (MRF).

Consumer POM
Refers to 'Placed on the Market'– the act of making goods available for sale through retail to the members of the public (household consumers).

Deposit Management Organisation (DMO)
The organisation responsible for managing the DRS.

Deposit return scheme (DRS)
Under a DRS, customers pay a deposit for particular containers that is refunded when the container is returned intact to a redemption point. The proposed DRS in England will cover single-use drinks containers made from polyethylene terephthalate (PET) plastic and aluminium and steel cans.

ETS traded carbon values
The market price of carbon emissions allowances under a cap-and-trade system.

Emissions Trading Scheme (ETS)
The UK ETS is a cap-and-trade system in which businesses in specific energy-intensive sectors must keep their emissions below a certain level but can trade in carbon allowances below that level. It will be expanded to cover energy from waste and other incinerator operations from 2028.

Energy from waste (EfW)
Burning of waste materials, with heat or other energy returned.

Extended producer responsibility (EPR)
A policy approach where producers are given significant responsibility – financial and/or physical – for the treatment or disposal of post-consumer products.

Flow diagrams
Visual representations of the movement of materials, energy, costs or information through a system.

HWRC
Household Waste Recycling Centre, often referred to as a 'tip'.

Household recycling rate
The percentage of household waste that is recycled.

Household waste
Waste generated by households and managed by local authorities including waste from litter bins, street sweepings, parks and grounds waste as well as waste and recycling disposed of in kerbside services, recycling banks, or at household waste recycling centres (HWRCs) as defined in national statistics.

Kerbside collections
Recycling or waste collection services provided directly at the kerb outside residences.

Kerbside sort
See Segregated collections.

kg/hh/yr
An abbreviation for kilograms per household per year.

Local authority waste streams
Waste management systems operated by local government authorities, including kerbside collections, recycling banks, HWRCs and litter bins.

Materials recovery facility (MRF)
Facilities that receive commingled recycling and, via a series of mechanical processes, and some manual interventions, separate this into different material streams, such as ferrous and non-ferrous metals, paper, card, glass, and plastics.

Mechanical biological treatment (MBT)
A process that reduces the water content of residual waste and produces a compost-like output from the organic waste fraction and a refuse-derived fuel (RDF) or solid recovered fuel (SRF).

Mini-MRF
A small-scale materials recovery facility that separates a plastics and metals stream collected together under segregated collections, separating out ferrous metals (steel) and non-ferrous metals (aluminium) to leave a plastics stream. They are generally located at a depot or waste transfer station for local authorities operating kerbside-sort collections.

Model inputs
Data and assumptions used to create a model for predicting outcomes.

Model outputs
Results generated from a model based on the inputs provided.

Net income
The income remaining after all costs have been deducted.

PET
Polyethylene terephthalate, a plastic polymer. Drinks bottles made of PET are in-scope for the proposed DRS, whereas drinks bottles made of other polymers such as polypropylene or high-density polyethylene are not.

Recyclate
Recyclable materials that have been separated out for recycling.

Refuse derived fuel (RDF)
A type of solid fuel produced from various types of waste, including plastics, paper, and cardboard in a residual waste stream. It is used as an alternative to fossil fuels in some industries and in specialist power plants.

Residual waste
Waste that is not recycled and is typically sent to landfill or incineration.

Return rate
The percentage of containers returned for a refund under a deposit return scheme.

Sankey diagrams
Flow diagrams that use connecting lines to show the flow of materials or energy, with the width of the lines being proportional to the flow quantity.

Segregated collections/streams
Collections where householders and/or recycling collection crews separate recycling into different material streams that are deposited into assigned compartments on a recycling collection vehicle or onto different vehicles.

Sensitivity analyses
Analyses used to determine how different values of an independent variable affect a particular dependent variable under a given set of assumptions.

Simpler Recycling
A requirement for local authorities in England to provide more standardised recycling collections, with a mandated core set of materials that must be collected at the kerbside from every household.

Solid recovered fuel (SRF)
An alternative to fossil fuels produced from residual waste that is processed to be of a higher quality than refuse derived fuel.

Tonnage flows
The movement of a quantity of waste materials measured in tonnes.

Waste from households
Waste generated by households and managed by local authorities, but excluding waste considered not to have come directly from households, such as litter bins, street sweepings, parks and grounds waste as defined in the national statistics published by Department for the Environment, Food and Rural Affairs (Defra). It includes waste and recycling disposed of in kerbside services, recycling banks, or at Household Waste Recycling Centre (HWRCs). In contrast, 'household waste' includes waste from litter bins, street sweepings, parks and grounds waste.

WasteDataFlow
A web-based system for municipal waste data reporting by UK local authorities.

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1 Executive summary

1.1 Brief

This report assesses the impact of the introduction of the deposit return scheme (DRS) for drinks containers on local authorities in England. The DRS aims to increase recycling rates and reduce litter by incentivising the return of single-use drinks containers made from Polyethylene terephthalate (PET) plastic, steel, and aluminium. The scheme is expected to be implemented as planned by Defra, targeting containers ranging from 150ml to three litres. Customers will pay a deposit for these containers that is refunded when the container is returned intact to a redemption point. This report provides a high-level assessment of the impact on local authorities, covering household recycling rates, financial impacts, and operational and service impacts.

1.2 Approach

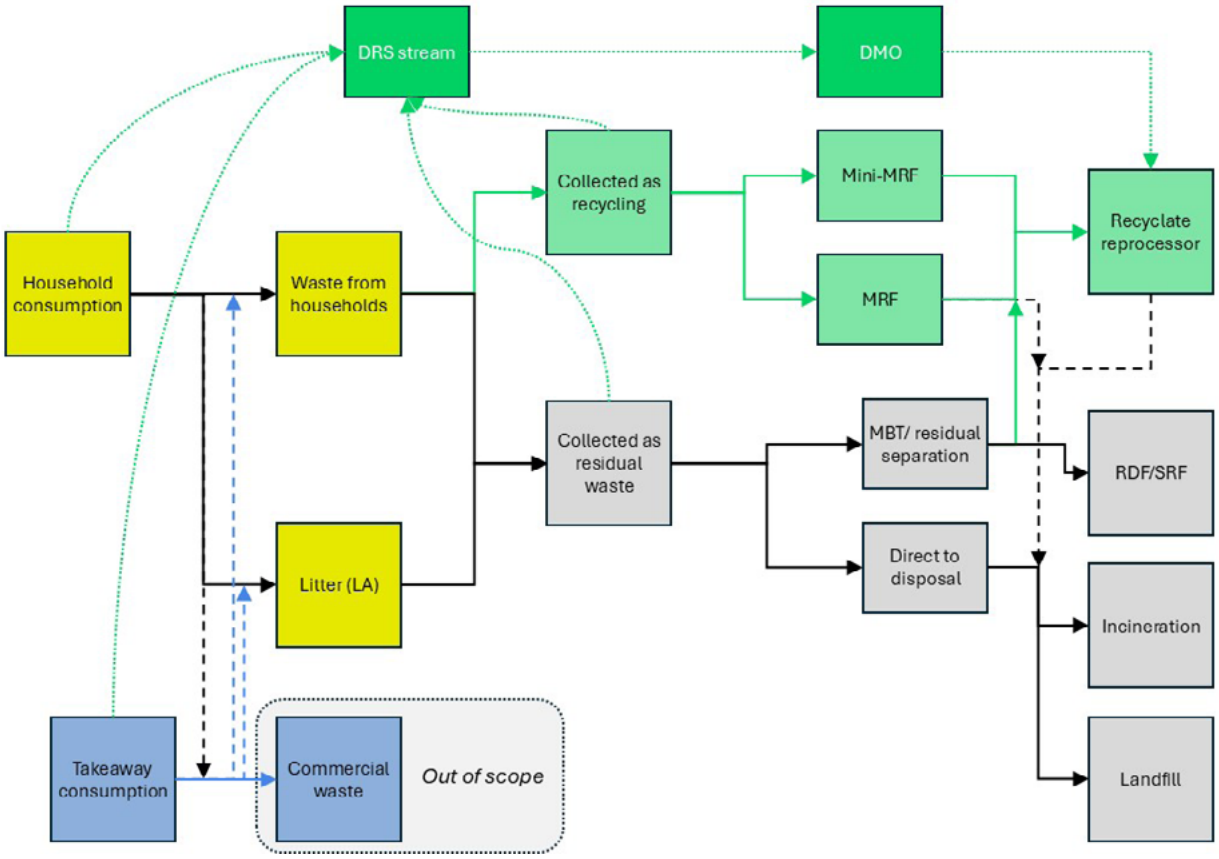
The approach involved modelling the tonnage flows of DRS materials without and with the DRS scheme, assessing the impact on household recycling rates, evaluating direct financial impacts, and analysing service and other impacts. An overview of the modelled flows is shown in Figure 1.

The project stages were:

- Model tonnage flows without DRS scheme.
- Model tonnage flows with DRS scheme.
- Assess impact on household recycling rate.
- Assess direct financial impacts: sale of materials and disposal costs.
- Assess service and other impacts.
- Stakeholder engagement.

The Valpak project team collaborated with the Local Government Association (LGA) and local authority officers who provided feedback and data. This engagement ensured the accuracy and relevance of the findings and facilitated the incorporation of practical insights from those directly involved in waste management.

Figure 1. Local authority management of household waste with a deposit return system



1.3 Methodology

The methodology included the creation of an Excel spreadsheet model to simulate the systems for each DRS material: PET plastic drinks bottles, aluminium drinks cans, and steel drinks cans. The model established the tonnages and flows of each material in England prior to the introduction of the DRS and the amounts diverted from household waste streams to DRS collections once implemented. It also assessed the direct financial impacts of the DRS by modelling the income from the sale of recycled materials and the costs per tonne for managing waste and how these change with the introduction of the DRS.

1.3.1 Sensitivity analysis

Sensitivity analyses were performed to assess the impact of varying return rates and other key variables. These analyses helped determine how different values of an independent variable affect the dependent variable under a given set of assumptions. The core assumption was an overall DRS return rate of 90 per cent, with sensitivity

analyses performed for rates of 70 per cent, 80 per cent, 85 per cent, and 95 per cent. Other sensitivity analyses kept the return rate constant at 90 per cent and assessed the impact of varying the tonnages of DRS materials, the proportions managed by each waste management route, and the income per tonne from sales of recyclates and the costs per tonne for managing waste.

1.4 Key messages

Reduction in household recycling rates: The introduction of DRS will reduce the overall household recycling rate by just under one per cent, as DRS materials are diverted from household waste streams.

Financial impact: The introduction of the DRS will lead to a significant reduction in net income for local authorities.

Enhanced recycling efficiency: The DRS would free up a small amount of capacity in collection vehicles that would make more space available for additional materials that may be collected under Simpler Recycling.

Litter reduction: The DRS is expected to reduce specific types of litter, although the overall impact on litter reduction may be mixed.

1.5 Results

Change in materials collected by local authorities: The report found that the current household consumption of DRS materials in England is 289,000 tonnes per year, with an additional 14,500 tonnes from takeaway consumption. Without a DRS, 255,000 tonnes of DRS materials are disposed of in local authority household waste streams per year, and 179,000 tonnes of this is recycled. With a DRS in place operating at a 90 per cent return rate, 229,500 tonnes of DRS materials are diverted to the DRS per year, reducing the amount disposed of in household waste streams to 25,500 tonnes.

- For a local authority with 100,000 households, on average 1,000 tonnes of DRS materials are currently managed per year and 700 tonnes recycled. With a DRS operating at a 90 per cent return rate, this drops to 100 tonnes managed and 70 tonnes recycled, a drop of over 600 tonnes.

Impact on household recycling rates: DRS materials currently make up 1.1 per cent of local authority household waste streams by weight and contribute 0.8 per cent to the recycling rate. With a DRS operating at a 90 per cent return rate, the recycling rate drops by 0.7 per cent, with DRS materials contributing just 0.1 per cent to the local authority household waste recycling rate.

Direct financial impacts: The estimated current total net income for local authorities in England from managing DRS materials is £68.2 million (income from sale of recyclate minus sorting costs and residual waste management costs). With the

extension of the emissions trading scheme (ETS) to waste incineration, this net income would decrease to £58.5 million. After the introduction of DRS, the estimated total net income for local authorities from managing DRS materials would be £6.8 million without ETS, a reduction of £61.4 million, and £5.9 million with ETS, a drop in income of £52.7 million.

- For a local authority with 100,000 households, the average net income from managing DRS materials is £269,000. With the extension of the emissions trading scheme (ETS) to waste incineration, this income would decrease to £231,000. After the introduction of DRS, the estimated total net income for local authorities from managing DRS materials would be £27,000 without ETS, a reduction of £242,000, and £23,000 with ETS, a drop in income of £208,000.

Service impacts: The implementation of DRS is expected to free up some capacity in collection vehicles that would be available for additional materials collected under Simpler Recycling. This could help reduce the requirement for more recycling collection rounds that might otherwise be required for Simpler Recycling.

Mixed results on litter reduction: While the DRS is expected to reduce specific types of litter, the overall impact on litter reduction may vary, as evidenced by the experience in Ireland, and significant cost savings may not be realisable.

2 Introduction

This report assesses the impact of the introduction of the deposit return scheme (DRS) for drinks containers on local authorities in England. Under this scheme, customers will pay a deposit for particular containers that is refunded when the container is returned intact to a redemption point. The assumption is that the DRS will be implemented as planned by Defra, specifically targeting single-use containers ranging from 150ml to three litres, made of PET plastic, steel and aluminium. This report provides a high-level assessment on the impact on local authorities, covering household recycling rates, financial impacts and operational and service impacts.

Local authority management of household waste is shown as a detailed flow diagram in Figure 2. The key to this and subsequent flow diagrams is show in Figure 3. Household waste streams (including litter) are shown in yellow, commercial waste streams in blue, recycling streams in green and residual or unsorted streams in grey. Dashed arrows indicate smaller flows.

Since 'household waste' includes litter in a local authority waste management context, the term 'waste from households' is used, in line with Defra reporting, to indicate waste generated by households and disposed of in kerbside services, recycling banks or at household waste recycling centres (HWRCs), rather than as litter or in commercial waste streams.

Materials recovery facilities (MRFs) separate recycling that has been collected commingled at the kerbside, and mini-MRFs separate cans and plastics that have been collected together in a kerbside sort collection.

Most residual waste streams go directly to landfill or incineration, usually in an energy from waste (EfW) plant, but some residual waste undergoes alternative treatment such as mechanical biological treatment (MBT), which reduces its water content, separates out some recyclables, and produces a compost-like output from the organic waste fraction and a refuse derived fuel (RDF) or solid recovered fuel (SRF) from the remainder.

Figure 2. Local authority management of household waste

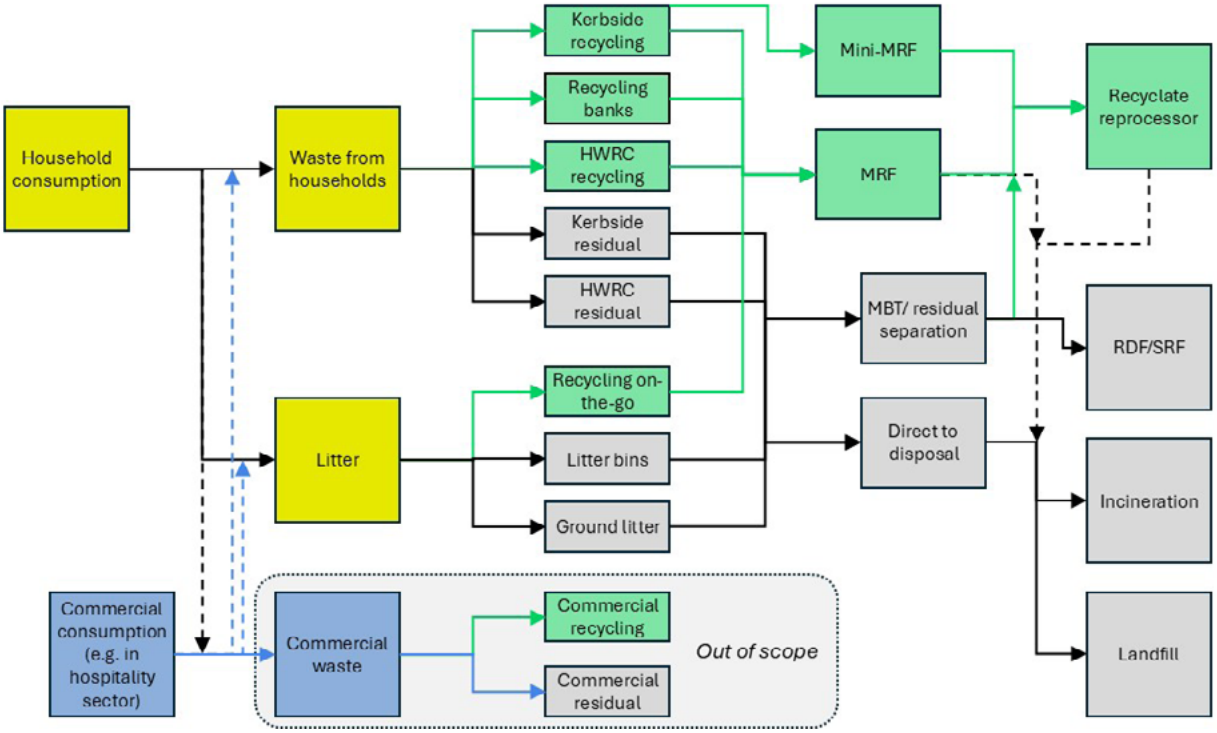


Figure 3. Key to flow diagrams

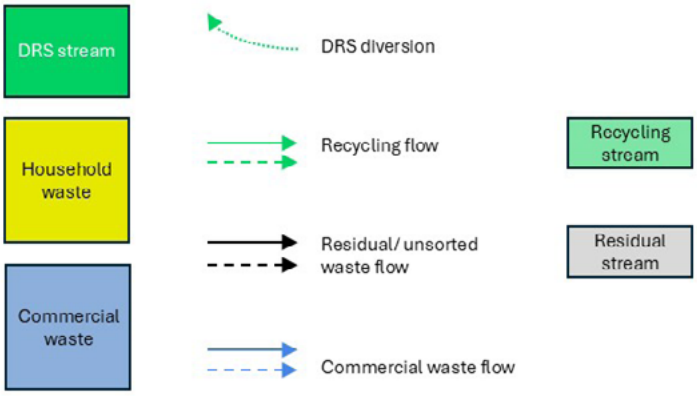
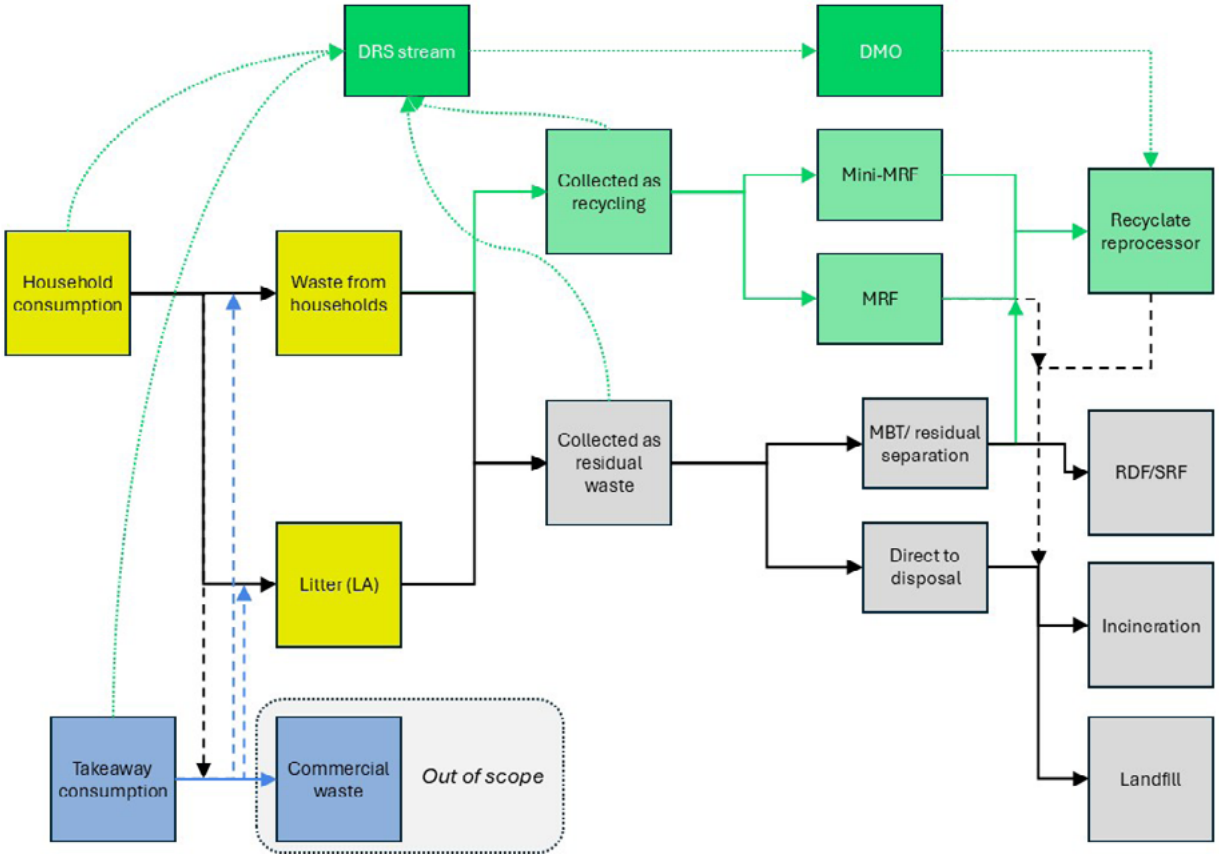


Figure 4 illustrates the (simplified) flows once a deposit return system is in place. Recyclable drinks containers will be diverted from both the recycling and residual waste streams, as indicated by the curved dotted lines. Drinks containers collected in the DRS streams will be managed by a deposit management organisation (DMO) rather than the council. This also focuses on the key stream of waste from a commercial source that will often end up in a household waste stream: waste from takeaways.

Figure 4. Local authority management of household waste with a deposit return system



3 Background

3.1 History of container return in the UK

Return schemes for beverage containers have been in existence in the UK for over 200 years: soft drink producers were offering money back on returned beverage containers from at least 1803 and up-front deposits were charged by some producers from the 1880s, depending on market conditions. Voluntary deposit schemes were operational in the UK until the late 1980s, when Corona still charged a 10 pence deposit on their soft drinks glass bottles. This scheme was viable because the bulk of their sales were via door-to-door delivery with collection. Reusable milk bottles delivered to and collected from doorsteps were also the norm until relatively recently but are now rare. The rise of supermarket sales of drinks and milk in disposable packaging, particularly plastic and metal, made door-to-door delivery and collection schemes largely economically unviable.

3.2 Summary of DRS schemes from around the world

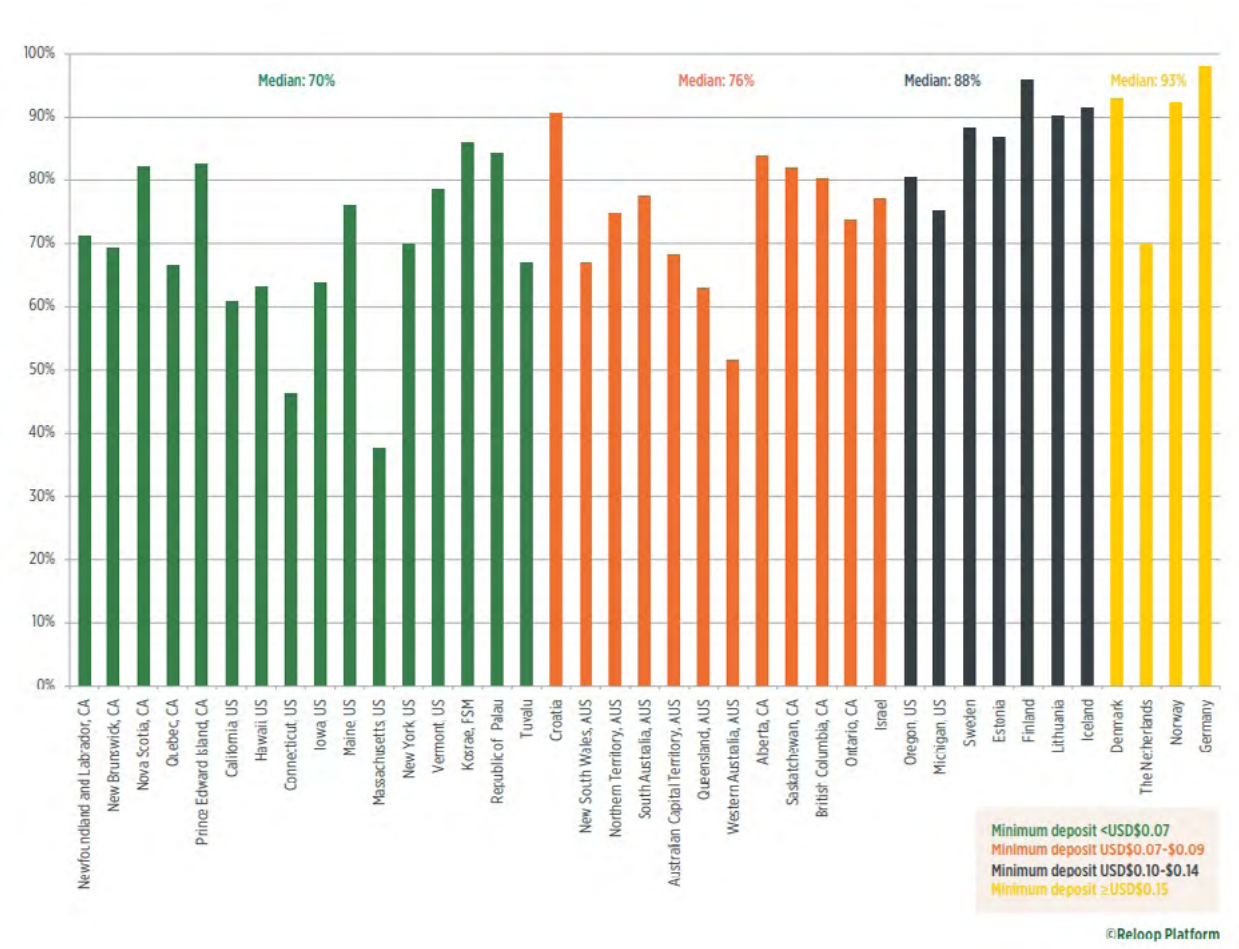
In the US, deposits were introduced as far back as the 1870s and were commonplace from the mid-1920s. The first mandatory DRS was implemented in 1970 in British Columbia, Canada. Since then, more than 35 countries around the world, including in the US, Canada, Australia and Europe, have now implemented a deposit return scheme for drinks containers. An overview of deposit return schemes is provided in Annex A. The first DRS in Europe launched in Sweden in 1984, with only a handful of countries now without a DRS. One of the most recent implemented was in Ireland, which was introduced in February 2024 and is discussed in detail in section 3.4.

Current return rates are between 38 per cent and 98 per cent, with an average reported return rate of 80 per cent and a median of 85 per cent (see Table 6 in Annex A for more details). Current deposits range between €0.01 - €0.40, with a mean of 15 cents and a median of 12 cents.

A Reloop report from 2022 found that higher deposit values are associated with higher return rates. Figure 5, which is from the Reloop report, shows the return rates for a range of countries, states and provinces and compares these with the minimum deposit values. At the time of the study, minimum deposit values typically ranged from

USD $0.07 to over USD $0.15, with the majority of existing schemes using a deposit value of under USD $0.09. When the minimum deposit value was less than USD $0.07, the median return rate was 70 per cent, and when it was over USD $0.15, the median return rate was 93 per cent.

Figure 5. Return rates in deposit return systems by minimum deposit value (Reloop, 2022)



3.3 Impact of deposit return schemes on litter

A DRS places a value on empty drinks containers, increasing their perceived and actual value across the overall lifespan of the beverage. Through this, deposit return schemes aim to not only increase recycling rates of beverage containers, but also to significantly reduce littering of common types of beverage containers. In the US, return rates of containers in 2023 ranged from 36 per cent in Massachusetts to 87 per cent in Oregon. On average, US states implementing a DRS have found reductions in beverage container litter ranging from 60 per cent to 84 per cent. In Europe, Estonia, achieved a reduction in beverage container litter of 88 per cent. As detailed in the next section, surveys in Ireland have shown a near 50 per cent reduction in drinks cans and plastic bottles in litter on the ground in the first six months of operation.

3.4 Implementation of a DRS in Ireland

The DRS in Ireland was launched in February 2024 with the goals of significantly increasing recycling rates and reducing litter across the country. These objectives align with the broader EU targets of achieving a 77 per cent recycling rate for plastic bottles by 2025 and 90 per cent by 2029.

Scheme operation

The DRS in Ireland applies to PET plastic bottles and aluminium and steel cans. The containers included in the scheme have a capacity between 150ml and three litres, with the deposit charged varying based on their size:

- Containers between 150ml and 500ml have a deposit of €0.15.
- Containers over 500ml up to three litres have a deposit of €0.25.

These deposits are refunded when the empty containers are returned for recycling, provided they have the Re-turn logo and the barcode is readable.

Comparison to the UK DRS proposals

The UK scheme will also apply to single-use drinks containers made from aluminium, steel, and PET plastic, with capacities between 150ml and three litres, the same as the Irish scheme. Like in Ireland, the UK scheme will not include glass bottles (although an exception may be made for Wales), which is a notable difference from some other international DRS implementations.

The deposit amount in the UK is expected to be 20 pence (approximately €0.24) and the system will be managed by a Deposit Management Organisation (DMO) appointed in April 2025. The UK scheme aims to achieve a 90 per cent return rate within three years of operation.

Scheme performance

Since its inception, the DRS has seen over one billion containers collected in Ireland, a milestone that some believe demonstrates the scheme's potential in driving recycling efforts. However, the cumulative collection rate, which stood at 45 per cent by August 2024, indicates that while progress has been made, there is still a considerable journey ahead to meet the 77 per cent target. In that month, the scheme did achieve a reported in-month collection rate 73 per cent, just 200 days after the launch. However, the absence of detailed data on the material recycling rate since then has led to some scepticism and perceptions of defensiveness in the reporting.

Prior to the implementation of the DRS, Ireland's recycling rates for beverage containers were significantly lower, at around 60 per cent, which highlights the potential for improvement brought about by the DRS. If the monthly collection rate of 73 per cent was maintained after August 2024, the system has the potential to place Ireland well on track to meet its EU target.

Litter reduction

It has been reported that the DRS has had a noticeable impact on specific types of litter, although these reductions may be lower than what was hoped. Surveys conducted by An Taisce have shown a near 50 per cent reduction in drinks cans and plastic bottles in ground litter. These figures demonstrate the scheme's partial success in addressing the litter problem associated with beverage containers whilst indicating potential for further improvement.

Despite the reductions in specific types of litter, An Taisce also report that the overall litter levels have remained static in many areas. This suggests that while DRS containers are less prevalent, other types of litter continue to pose significant challenges and the resource requirement to clean up may have been unaffected. The mixed results indicate that while the DRS is effective in reducing certain types of litter, it may not be a comprehensive solution to the broader litter problem.

Community and council feedback

Feedback from local councils and community groups has been generally positive, with many using the scheme for fundraising and community clean-up efforts. However, there have been challenges as well. For instance, Irish Railways reported increased costs due to the need for new bins designed to prevent people from reaching in to scavenge for DRS containers, which was causing additional litter and mess, as unwanted containers were not placed back in the bins.

Impact on businesses and consumers

The scheme's impact on businesses and consumers has also been a topic of discussion. According to Ernst & Young, the DRS was anticipated to bring both challenges and opportunities for businesses, including changes in consumer behaviour and potential cost implications. The Grocer's analysis highlighted the initial stages of the scheme and its reception among stakeholders.

Concerns and recommendations for the DRS in Ireland

Moreover, the Irish Waste Management Association has raised concerns about the potential loss of income for the waste industry due to reduced availability of recyclable materials in the streams they collect. This has led to discussions about the need for a digital DRS to optimise the system and minimise costs.

Conclusion on the DRS in Ireland

While the DRS in Ireland has made strides in collecting containers and reducing specific types of litter, the overall impact on litter reduction is mixed. The scheme's progress towards meeting recycling targets is promising, but the lack of comprehensive data on material recycling rates and the persistence of other types of litter suggest that further efforts are needed to achieve broader environmental goals.

4 Methodology

An Excel spreadsheet model was created to model the simplified system shown in Figure 4 for each DRS material: PET plastic drinks bottles, aluminium drinks cans and steel drinks cans. The model establishes the tonnages and flows of each material in England prior to the introduction of the DRS, and the amounts of each diverted from household waste streams to DRS collections once implemented.

Through this model, the potential impact on local authority household waste recycling rates in England were calculated. The direct financial impacts were assessed through applying income or gate fees as appropriate to the reductions in recycling and residual waste to obtain the loss of income from sale of recyclate and changes in costs from reduction in residual waste treatment.

The DRS will be implemented in the UK in October 2027. For the model, the latest available data was used, but without forecasting future tonnages or costs. (An exception is for the ETS costings, which are based on the forecast for 2028, the year of its extension to waste incineration.)

The model was based on 2023 tonnages both for amounts of packaging placed on the market and packaging managed by local authorities, the latest data available at the time of writing this report.

For income from sale of recyclate and the costs of processing and disposal, the latest available data was used as discussed in section 4.4 and Annex C.

Kerbside collection costs were not included in the model, with the focus on establishing the change in tonnage from the implementation of the DRS and the costs of managing the streams once collected. The scale of changes in tonnages enabled the impacts on service delivery to be established, as discussed in sections 4.5 and 5.5.

The project stages were:

- Stage 1: Model tonnage flows without DRS scheme.
- Stage 2: Model tonnage flows with DRS scheme.
- Stage 3: Assess impact on household recycling rate.
- Stage 4: Assess direct financial impacts: sale of materials and disposal costs.
- Stage 5: Assess service and other impacts.

It should be noted that throughout the report percentages in figures and tables may not add to 100 per cent due to rounding.

4.1 Modelling tonnage flows without a DRS scheme

Modelling of tonnage flows of DRS materials was based primarily on work done by Valpak for its PackFlow Refresh 2023 suite of reports for Defra. These covered packaging flows in the UK for each of the main packaging materials, including plastic, aluminium and steel, from being placed on the market through to disposal in a recycling or residual waste stream, subsequent management of those streams and final reprocessing or disposal. The PackFlow reports are used by Defra to underpin the development of the Extended Producer Responsibility (EPR) Regulations (including in impact assessments). Splits for each nation within the UK were calculated in PackFlow, and assessment was made of the amounts of DRS materials in the flows.

The PackFlow Refresh 2023 reports are based on tonnages for 2022; for this report, the data was adjusted to 2023 by applying the percentage change in packaging tonnages for plastic, aluminium and steel reported for 2022 and 2023 on the National Packaging Waste Database.

For the PackFlow reports, an online survey was carried out by Pollfish to determine the likelihood of key packaging items being disposed of in 'waste from households' streams, or as litter (in bins or as ground litter), or elsewhere (ie in commercial waste streams), which allow quantification of the proportion of DRS materials disposed in each of these streams.

Reject rates applied for MRF processing were based on data obtained for a previous Valpak report, Packaging Recycling Supply Chain Assessment.

Other factors were obtained from analysis of WasteDataFlow data for England for 2023, particularly the collection questions and Q100 and the complied performance indicator reports.

Model inputs related to tonnages and proportions are listed in Annex B, Table 7, with sources provided.

It was assumed that PET bottles and aluminium and steel cans that are littered on the ground are not lost to the environment but will at some point be picked up by local authorities and enter the local authority waste stream. For this report, losses to commercial waste streams were not modelled further as they are no longer the responsibility of local authorities.

4.2 Modelling tonnage flows with a DRS scheme

Average return rates for European countries with a DRS have been found to be 90 per cent, with some countries exceeding this according to a recent government press release. In the Deposit Scheme for Drinks Containers (England and Northern Ireland) Regulations 2025, the UK government has stipulated a minimum overall collection target for these nations of 90 per cent, to be achieved within three years of the start of the scheme, with stepped targets of 70 per cent in year one, 80 per cent in year two and 90 per cent in year three. There is also stipulation of a minimum collection rate of 85 per cent for each material type included in the scheme from year three onwards.

Flows for each DRS material were calculated using the Excel model, with the core assumption assumed that the overall DRS return rate, will be 90 per cent, with sensitivity analyses performed for rates of 70 per cent, 80 per cent, 85 per cent and a higher rate of 95 per cent.

It was assumed for simplicity that the rates for each material type will be the same as each other for each scenario, in other words that people will be equally likely to dispose of each material type in the DRS.

These DRS and non-DRS tonnages are used to calculate the household recycling rate for each scenario and the direct costs of managing the waste and recycling streams as described in section 4.4 and other service impacts in 4.5.

4.3 Assessing impact on household recycling rate

The household recycling rate was calculated for the non-DRS and DRS scenarios to assess the impact of a DRS scheme, including the variations found in the sensitivity analyses.

4.4 Assessing direct financial impacts: sale of materials and disposal costs

Direct financial impacts were obtained for the sale of recyclable materials and disposal costs by applying costs per tonne to the modelled tonnage data, without and with a DRS scheme in place.

Model inputs related to income from sale of recyclate and costs of processing and disposal are discussed in full in Annex C, with data listed in Table 8 and sources provided.

Income per tonne for sale of recyclables and costs per tonne of sending to incineration (EfW) and landfill were obtained from letsrecycle.com, and Material Recovery Facility (MRF) processing costs and transport costs per tonne were based on data in the WRAP Gate Fees Report 2023-24. These income and costs data were checked with local authority stakeholders.

The full income from sale of recyclate has been included in the modelling, on the basis that even contractors that do not share any income with local authorities will build the expected income into their contract costs. In these cases, the change in income may not have an impact until the contract is next let, although some contracts have a clause that allows fees to be changed when the DRS is implemented.

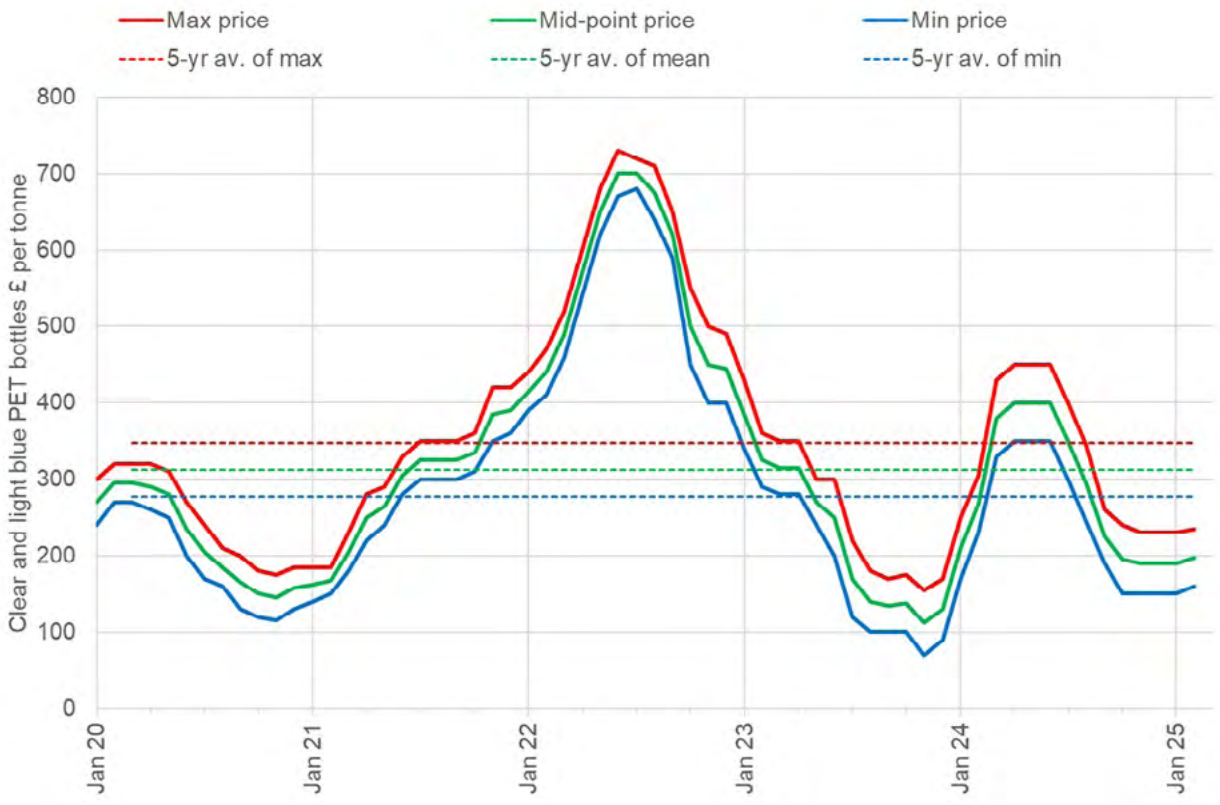
Landfill tax was taken from HM Revenue & Customs landfill tax pages published 30 October 2024, noting the large change in April to adjust for the high inflation over the past three years.

Emissions Trading Scheme (ETS) fee forecasts were based on analyses published by the Department for Energy Security and Net Zero in December 2024.

It was assumed for simplicity that the income per tonne would be unchanged for the DRS materials themselves between the non-DRS and DRS scenarios: while the 'basket of materials' price would change based on the tonnages being handled, for example as part of a MRF gate fee, this would be directly related to the removal of DRS materials, so the price per tonne for each material type would be unchanged. Significant reductions in quantities of materials processed could lead to higher per-tonne processing charges for the remaining materials. However, the DRS should not impact significantly on overall tonnages being processed by MRFs, and Simpler Recycling should lead to higher quantities being processed, which would mitigate reductions from DRS.

Recyclate prices are, however, highly volatile and difficult to predict with any accuracy, as illustrated by Figure 6. It shows the income per tonne from the sale of 'Clear and light blue PET' over the past five years, compiled from data provided by letsrecycle.com, which provides maximum and minimum prices per tonne for each month. The figure also shows the midpoints of these monthly price ranges and the averages of these over the past five years from March 2020 to February 2025. Over this period, prices have varied between £70 and £730 per tonne, with an average over the five years of £313. The average of the maximum monthly prices over these five years is £348 and the average of the minimum monthly prices is £278.

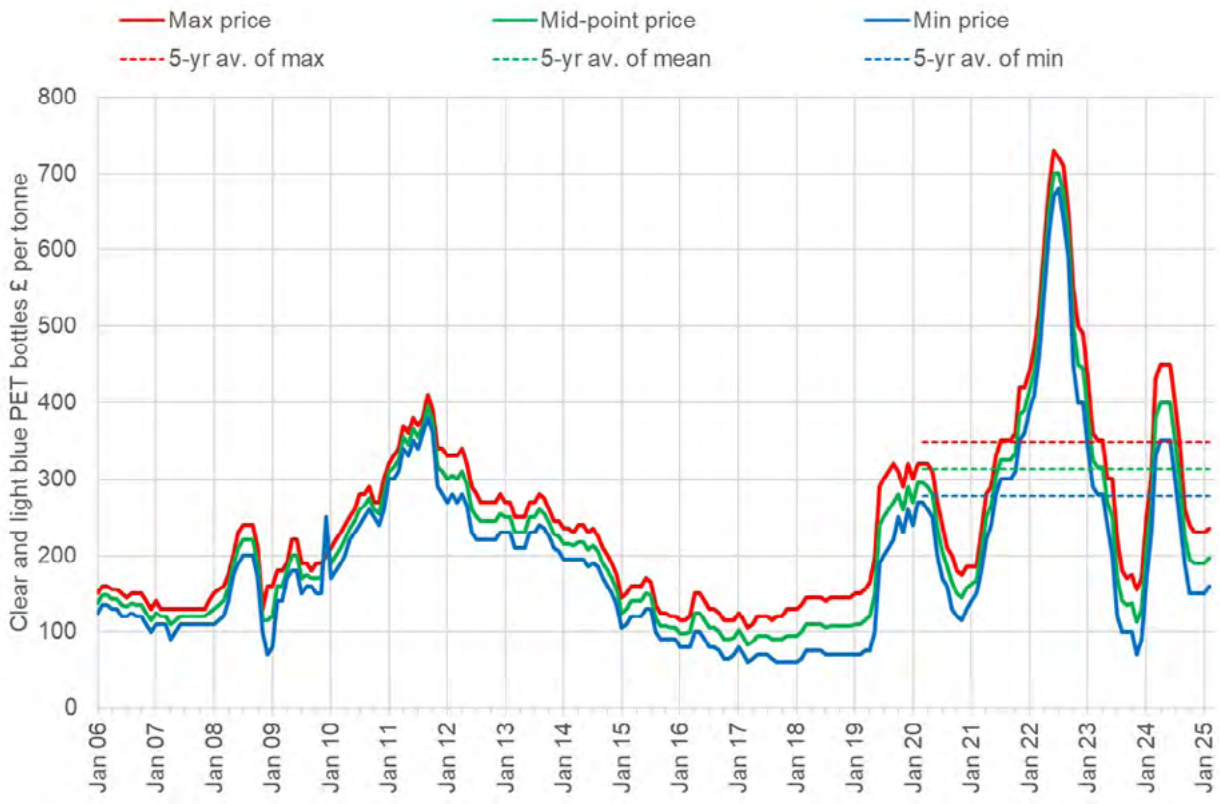
Figure 6. Price volatility of PET bottle prices, 2020 to 2025



While this five year period includes the Covid pandemic and its impacts, averaging over the entire five years smooths out that impact, covering both the trough during the peak pandemic period and subsequent recovery and peak in prices, followed by a smaller oscillation about the averages.

For context, the price volatility since 2006 is shown in Figure 7. This period includes the 2008 global financial crisis, which resulted in a peak then trough and subsequent recovery.

Figure 7. Price volatility of PET bottle prices, 2006 to 2025



Due to the volatilities in the income and costs for recycling and waste, and the inability to forecast these accurately, the most recent five-year averages of the monthly midpoints and maximum and minimum prices were used for the modelled core values, upper values and lower values respectively. These are merely indicative, and should be treated with caution, as future trends of recyclate prices are impossible to predict accurately. In addition, the removal of DRS materials may suppress the price offered for other materials, particularly for non-DRS PET, since high quality food-contact PET would be available from the DRS.

The difference in costs and income due to the implementation of DRS was estimated by the differences between the non-DRS scenario and the DRS scenario. This included the differences in income from recyclables, costs of MBT processing, costs of incineration, ETS costs, costs of landfill, and total waste treatment costs.

4.5 Assessing service and other impacts

Analysis was then made of the impacts on services and infrastructure and indirect cost increases or savings from these.

These included whether the changes in DRS materials would allow local authorities to reduce round numbers.

The impact on litter was also considered, building on the findings from the first year of the DRS in Ireland discussed in section 3.4.

5 Results

5.1 Change in materials collected by local authorities

Table 1 provides a summary of consumption of DRS materials and subsequent management in local authority waste streams, without and with a DRS, as a total for all local authorities in England. More detailed model outputs are provided in Annex D. Table 2 provides the results per 100,000 households.

5.1.1 Current management of DRS materials without a DRS

Table 1 shows that there is current household consumption of 289,000 tonnes of DRS materials in England, through purchases from supermarkets and other stores, and an additional consumption of 14,500 tonnes from consumption of takeaways drinks, giving a total consumption of 303,500 tonnes of DRS materials. This comprises 184,000 tonnes of PET drinks bottles, 117,000 tonnes of aluminium cans and just 3,300 tonnes of steel drinks cans. There has been a long-running trend of drinks cans moving from steel to aluminium, such that only a very small proportion of drinks cans are now steel.

From modelling with the methodology described in section 4 and the inputs shown in Table 7 in Annex B, it is estimated that 48,500 tonnes is disposed of in commercial waste streams (such as in offices, gyms, or on trains and other public transport) and 30,000 in local authority litter streams – in bins or as ground litter. This leaves 225,000 tonnes of DRS materials currently in other local authority waste and recycling streams, such as kerbside collections, recycling banks and household waste recycling centres.

It is estimated that 189,000 tonnes of DRS materials is captured in commingled and segregated recycling streams and 172,000 tonnes is subsequently recycled after allowing for sorting losses. Processing by alternative residual waste treatments such as mechanical biological treatment (MBT) diverts 7,000 tonnes of DRS materials from residual waste, giving a total of 179,000 tonnes of DRS materials recycled. Of the DRS materials remaining in residual waste, 68,000 tonnes is incinerated and 7,000 tonnes landfilled.

5.1.2 Management of DRS materials with a DRS in place

For the core modelling in this report, it is assumed that 90 per cent of DRS materials are diverted to the DRS – that is, 90 per cent of drinks containers are returned and the deposit reclaimed. This is the current target for the year 2030, with intermediate targets of 70 per cent in 2028 and 80 per cent in 2029. Thus this 90 per cent is not anticipated to be achieved in the first year of the DRS but is a medium-term goal. The impact of different return rates is assessed in the sensitivity analyses section, 5.4.

For this report, it is assumed that consumption patterns themselves do no change and material substitution does not occur following the implementation of the DRS - what changes is what consumers do with drinks containers when empty. In practice, consumers may avoid products with a deposit, choosing other containers that do not incur a deposit, such as glass bottles, drinks cartons or pouches. Likewise, brands and retailers may switch to other materials that are not in-scope for the DRS to avoid reduced sales of drinks that incur a deposit. For drinks currently in PET containers, the switch may be to other plastic polymers such as polypropylene or high-density polyethylene, which is more commonly used for plastic milk bottles. With the assumption of no material substitution or consumption pattern change, there will be no impact of DRS on total consumption of DRS materials.

With 90 per cent diversion to a DRS, the remaining 10 per cent of materials are assumed to be split in the same proportions as before, leading to an estimated 5,000 tonnes being disposed in commercial streams, 3,000 tonnes in litter and 22,500 tonnes in other local authority waste and recycling streams. It is estimated that 19,000 tonnes of DRS materials is captured in commingled and segregated recycling streams and 17,000 tonnes is subsequently recycled after allowing for sorting losses. Processing by alternative residual waste treatments diverts 700 tonnes of DRS materials from residual waste, giving a total of 18,000 tonnes of DRS materials recycled. Of the DRS materials remaining in residual waste, 6,800 tonnes is incinerated and 700 tonnes landfilled.

5.1.3 Flow diagrams

These total flows of DRS materials are illustrated as Sankey diagrams in Figures 7 and 8, and flows for individual materials in Figures 9 to 14 (Figures 9 and 10 for PET drinks bottles, Figures 11 and 12 for aluminium drinks cans, and Figures 13 and 14 for steel drinks cans). In Sankey diagrams, the width of each connecting line is proportional to the flow quantity. In each pair of figures, the first figure shows the flow without a DRS and the second the flow with a DRS.

Table 1. DRS material tonnages without and with a DRS, England total (tonnes)

	Without DRS					With DRS					
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Tonnes per 100,000 household	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Change in total	Change per 100,000 household
Household consumption	181,988	105,412	1,623	**289,022**	1,140	181,988	105,412	1,623	**289,022**	0	0
Takeaway consumption	1,570	11,208	1,724	**14,502**	57	1,570	11,208	1,724	**14,502**	0	0
Total consumption	**183,557**	**116,619**	**3,347**	**303,524**	**1,197**	**183,557**	**116,619**	**3,347**	**303,524**	**0**	**0**
Disposed in household waste and recycling streams exc. litter	139,027	83,959	2,410	**225,396**	889	13,903	8,396	241	**22,540**	-202,856	-800
Disposed in LA litter stream	16,917	12,218	470	**29,606**	117	1,692	1,222	47	**2,961**	-26,645	-105
Recycling from commingled and segregated streams	107,937	62,888	1,586	**172,412**	680	10,794	6,289	159	**17,241**	-155,171	-612
Processed by alternative residual waste treatments	11,401	9,418	385	**21,205**	84	1,140	942	39	**2,120**	-19,084	-75
Diverted from residual waste	800	5,814	134	**6,748**	27	80	581	13	**675**	-6,073	-24
Recycled	108,738	68,702	1,720	**179,160**	707	10,874	6,870	172	**17,916**	-161,244	-636
Incinerated	42,784	24,601	1,050	**68,436**	270	4,278	2,460	105	**6,844**	-61,592	-243
Landfilled	4,423	2,874	109	**7,406**	29	442	287	11	**741**	-6,665	-26

Table 2. DRS material tonnages without and with a DRS, per 100,000 households (tonnes)

	Without DRS				With DRS				
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Change in total
Household consumption	718	416	6	**1,140**	718	416	6	**1,140**	0
Takeaway consumption	6	44	7	**57**	6	44	7	**57**	0
Total consumption	**724**	**460**	**13**	**1,197**	**724**	**460**	**13**	**1,197**	**0**
Disposed in household waste and recycling streams exc. litter	548	331	10	**889**	55	33	1	**89**	-800
Disposed in LA litter stream	67	48	2	**117**	7	5	0	**12**	-105
Recycling from commingled and segregated streams	426	248	6	**680**	43	25	1	**68**	-612
Processed by alternative residual waste treatments	45	37	2	**84**	4	4	0	**8**	-75
Diverted from residual waste	3	23	1	**27**	0	2	0	**3**	-24
Recycled	429	271	7	**707**	43	27	1	**71**	-636
Incinerated	169	97	4	**270**	17	10	0	**27**	-243
Landfilled	17	11	0	**29**	2	1	0	**3**	-26

Figure 8. Flow of DRS materials without DRS

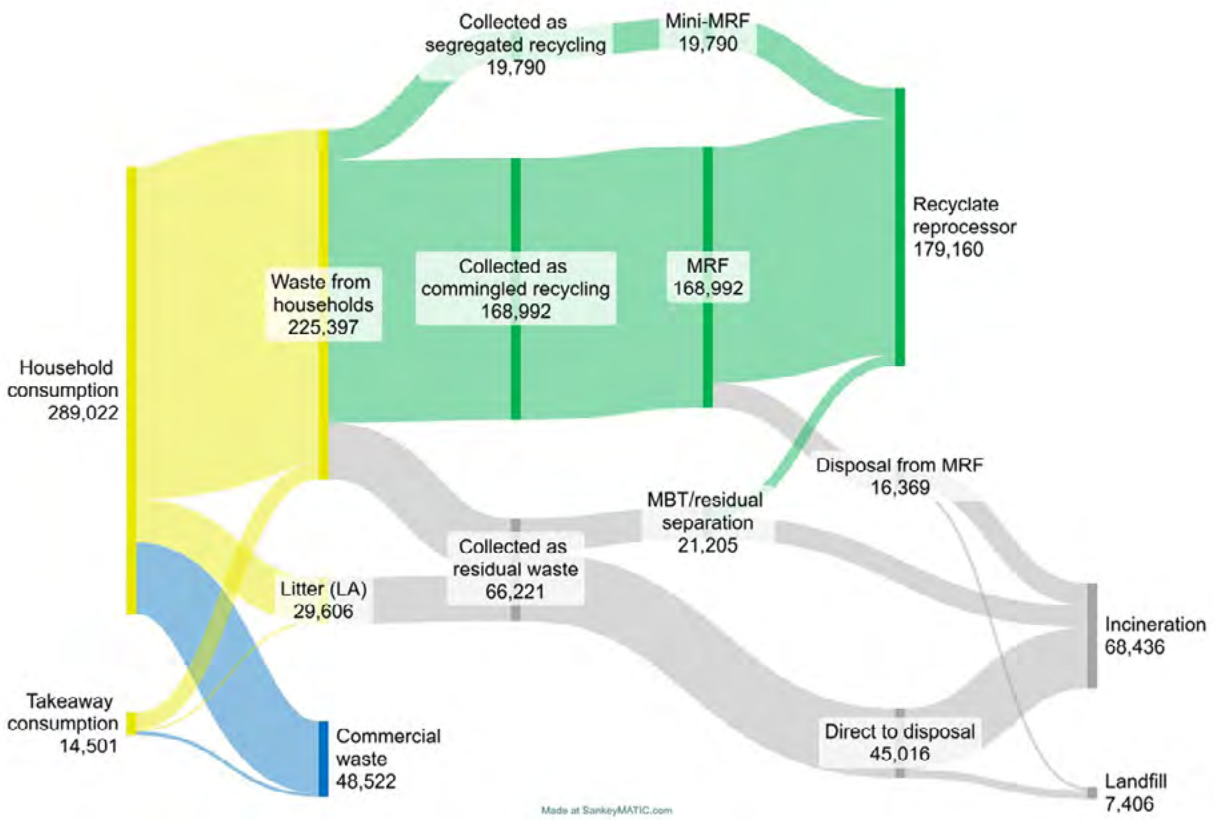


Figure 9. Flow of DRS materials with DRS

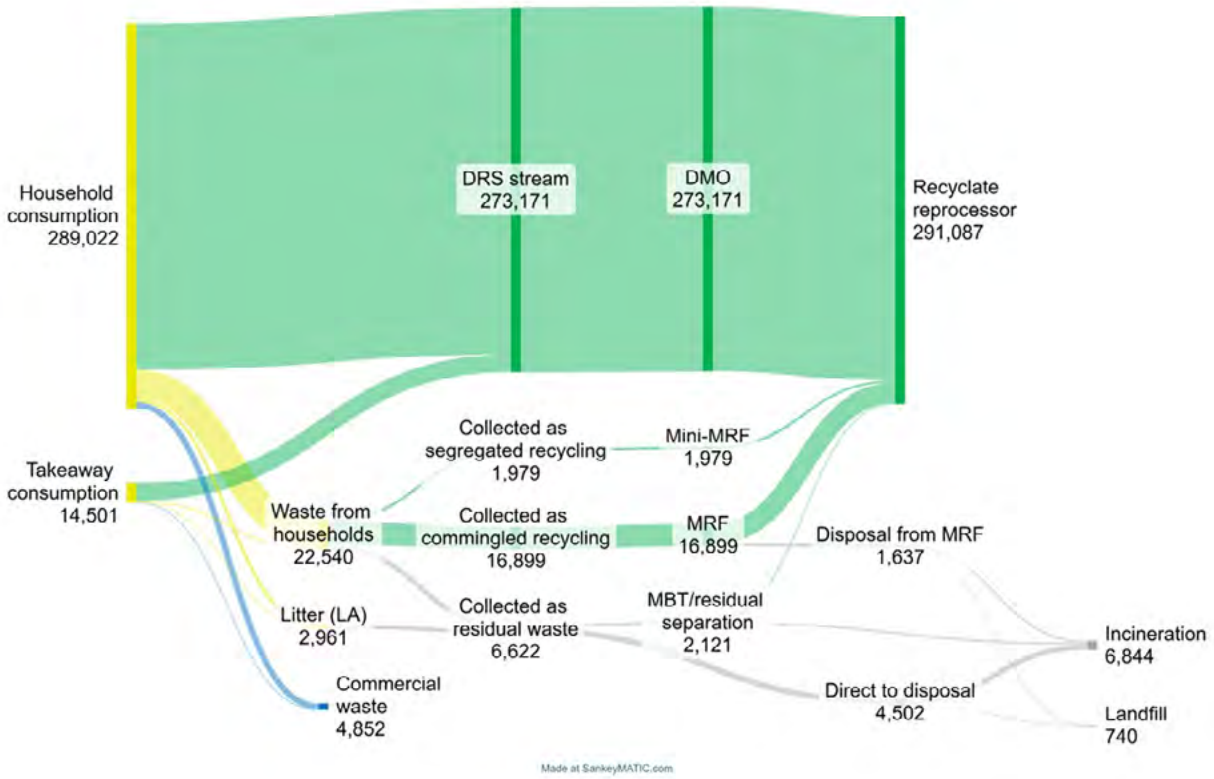


Figure 10. Flow of PET drinks bottles without DRS

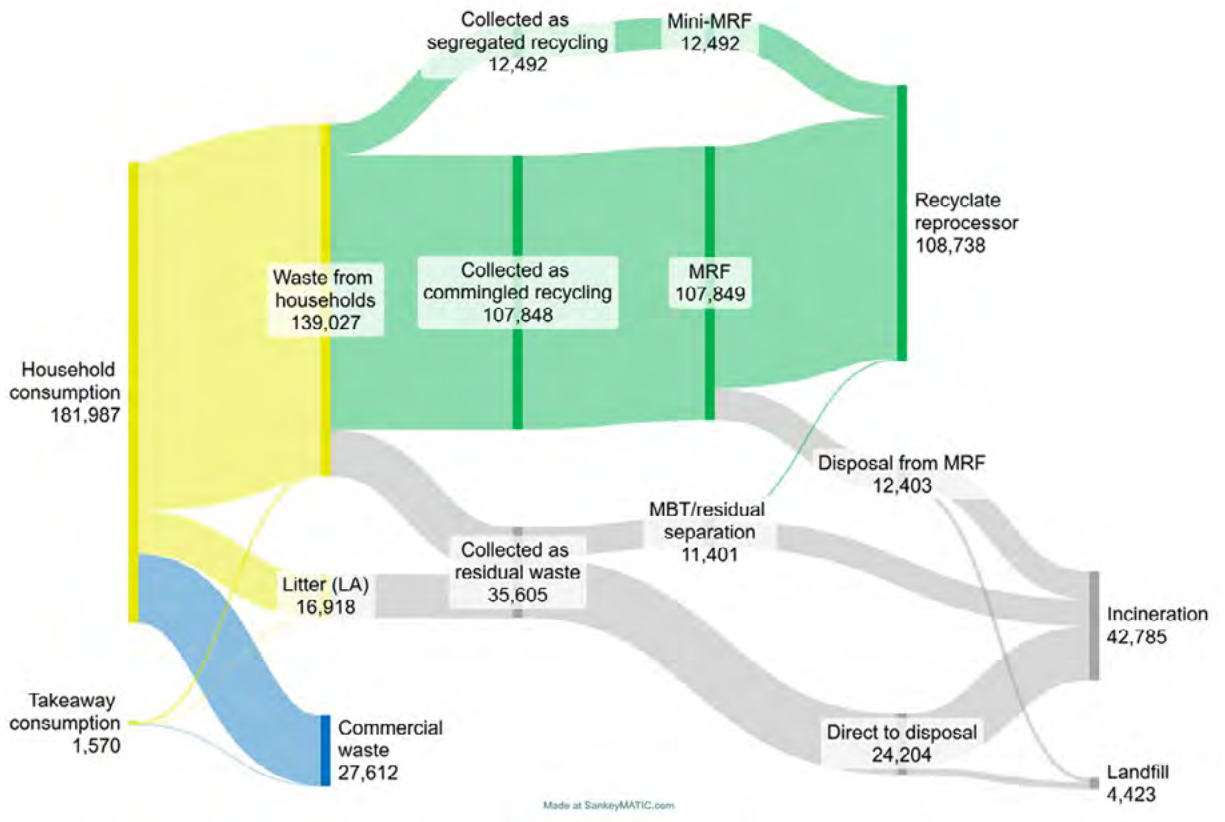


Figure 11. Flow of PET drinks bottles with DRS

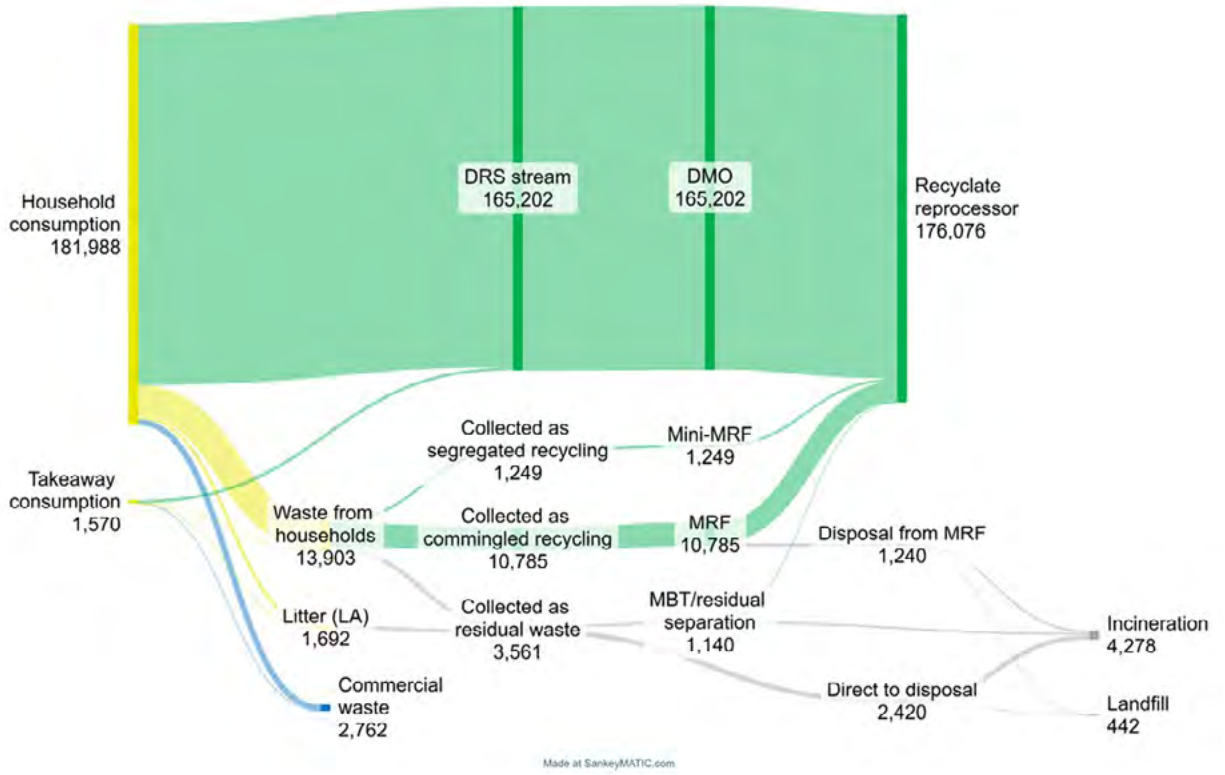


Figure 12. Flow of aluminium drinks cans without DRS

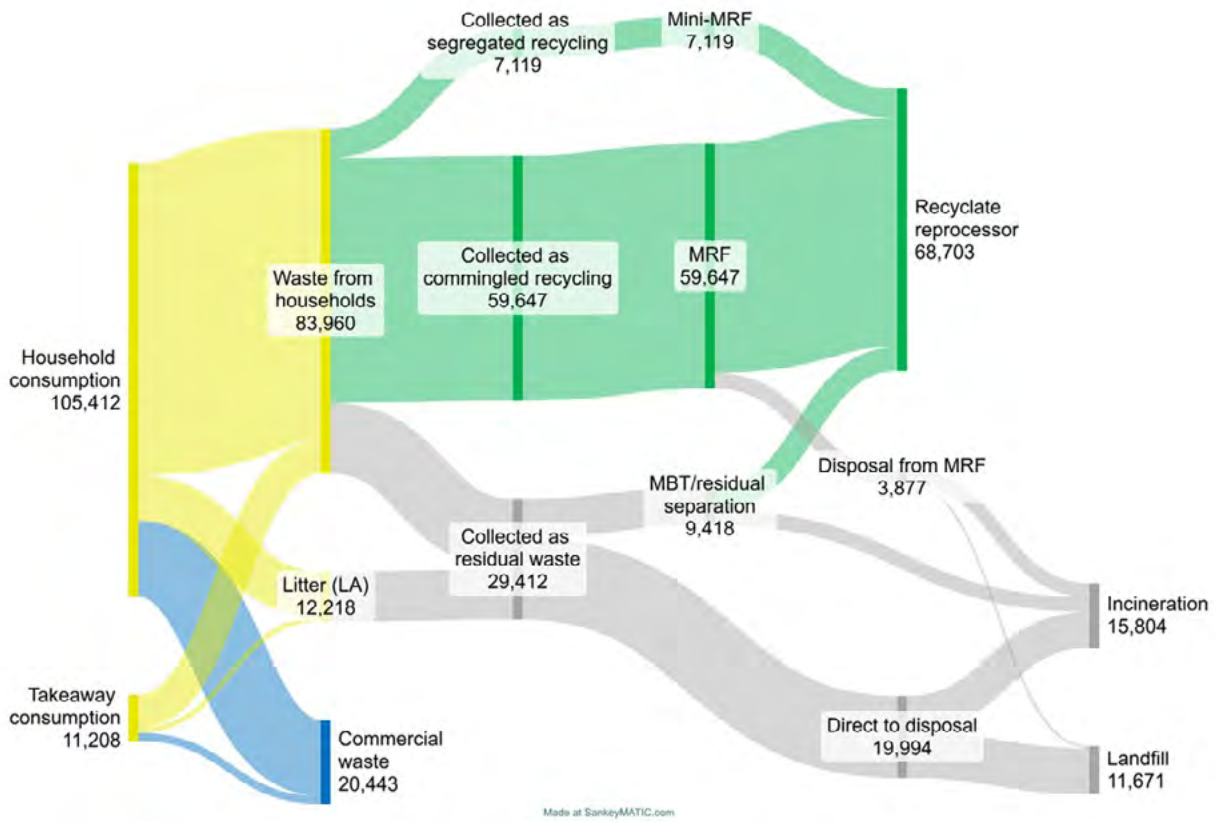


Figure 13. Flow of aluminium drinks cans with DRS

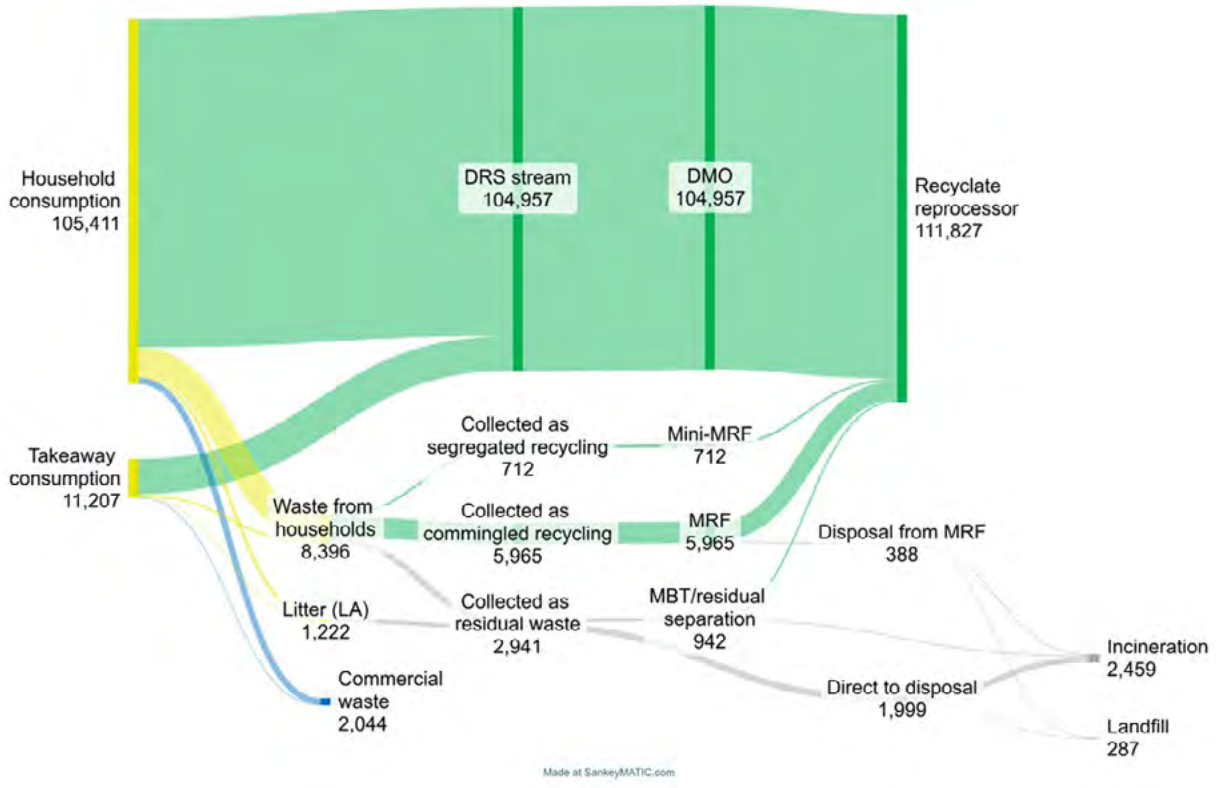


Figure 14. Flow of steel drinks cans without DRS

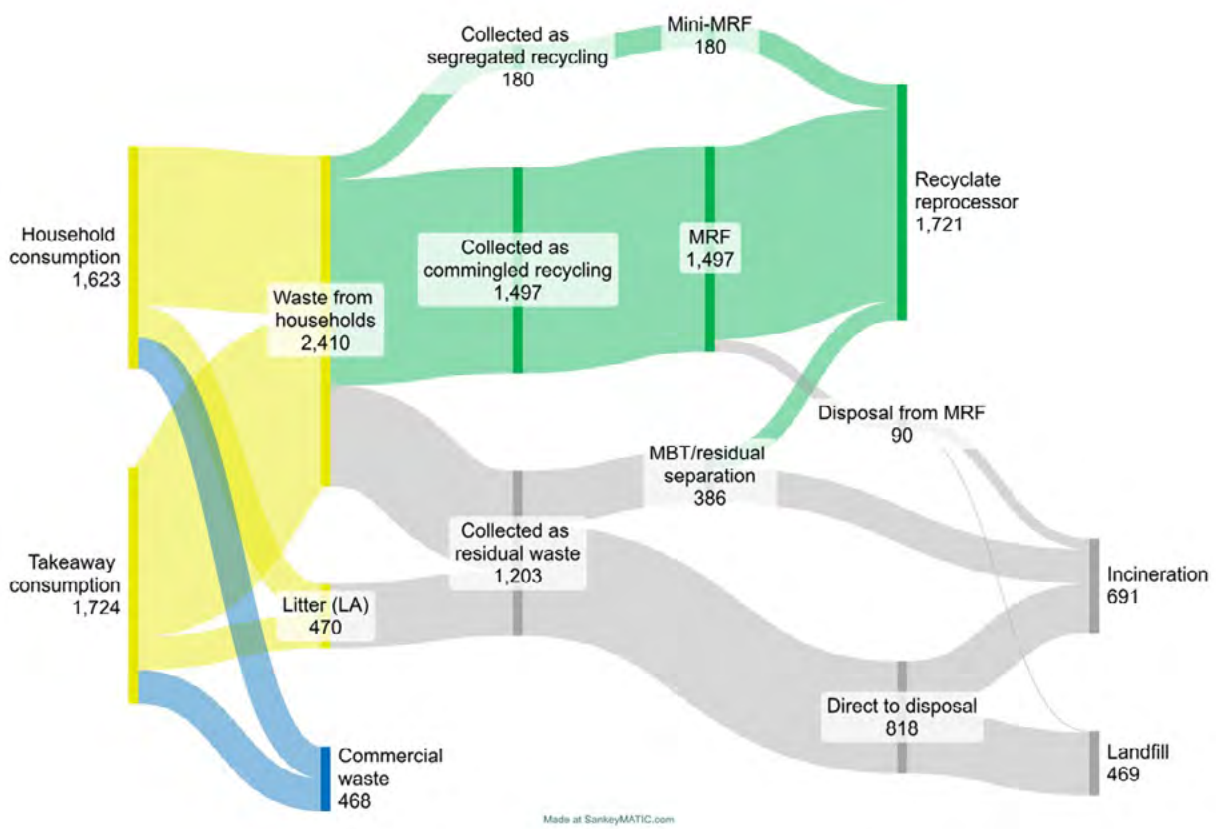
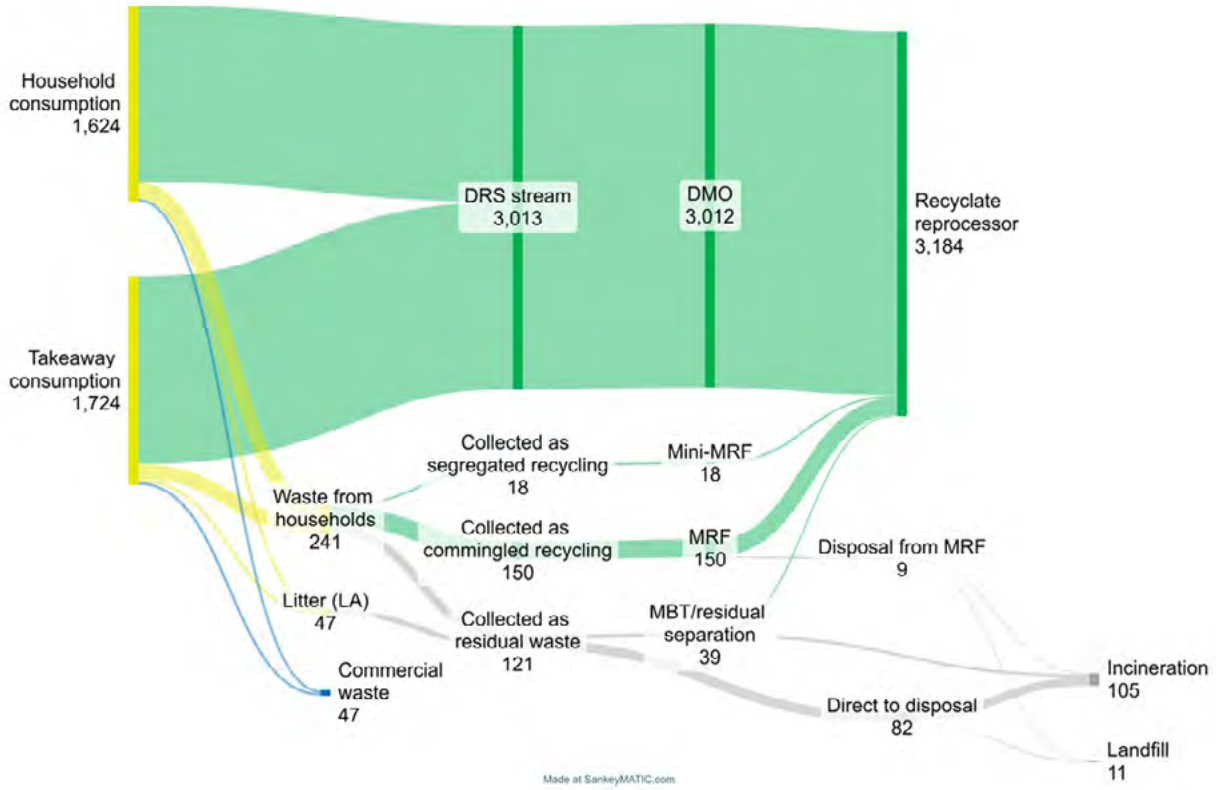


Figure 15. Flow of steel drinks cans with DRS



5.2 Impact on household recycling rates

Table 3 shows the impact of DRS materials on recycling rates, without and with a DRS.

The modelled flows show that without a DRS, the average percentage of DRS materials in the streams managed by local authorities is just 1.1 per cent of total household waste and recycling by weight. PET bottles contribute 0.7 per cent, aluminium drinks cans 0.4 per cent and steel drinks cans contribute about 0.01 per cent.

With a DRS operating with a 90 per cent return rate, these percentages drop to a tenth of this amount, so DRS materials are 0.1 per cent of the streams managed by local authorities, a drop of 1.0 per cent in the total household waste and recycling stream.

Recycling of DRS materials makes up 0.8 per cent of total household waste, that is, they contribute 0.8 per cent towards the overall household recycling rate.

With a DRS in place, this would drop to 0.08 per cent, that is the overall household recycling rate would drop by 0.7 per cent.

As a percentage of total household dry recycling, DRS materials make up 3.5 per cent, with PET bottles contributing 2.1 per cent, aluminium drinks cans 1.3 per cent and steel drinks cans 0.03 per cent.

With a DRS in place, this would drop to 0.35 per cent, so 3.1 per cent of the dry recycling stream would be lost. (The numbers do not match exactly due to rounding.) If that were all lost from the kerbside stream, it would be a loss of four per cent by weight of the stream. Analysis of WasteDataFlow shows that on average about 92 per cent of DRS materials currently collected for recycling by local authorities are collected in kerbside recycling, rather than other routes such as recycling banks or HWRCs.

The overall capture rate for DRS materials in household waste streams is estimated as 70 per cent. For individual materials, the capture rates are 70 per cent for PET drinks bottles, 71 per cent for aluminium cans and 60 per cent for steel cans. Note that this is based on what is in the household stream, not on what is purchased by householders, since some is diverted to commercial waste streams.

The capture rates within the household waste streams are modelled as being unchanged by the introduction of a DRS, as the proportions of DRS materials being managed via each route within the household stream have not been changed.

Table 3. Impact of DRS materials on recycling rates, without and with a DRS

	Without DRS				With DRS				
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Change in total
DRS materials in household stream as % of total household waste	0.69%	0.43%	0.013%	**1.13%**	0.07%	0.04%	0.0013%	**0.11%**	-1.02%
DRS materials recycled in household stream as % of total household waste	0.48%	0.31%	0.008%	**0.80%**	0.05%	0.03%	0.0008%	**0.08%**	-0.72%
DRS materials recycled as % of total household waste recycled	2.1%	1.3%	0.03%	**3.48%**	0.21%	0.13%	0.003%	**0.35%**	-3.13%
DRS materials recycled in household stream as % of DRS amounts in household waste stream	70%	71%	60%	**70%**	70%	71%	60%	**70%**	0.0%

5.3 Direct financial impacts

Table 4 shows the income from the sale of recyclate and the treatment costs, and an overall net cost for managing DRS materials, as a total for all local authorities in England. Table 5 provides the results per 100,000 households. Collection costs are not considered at this stage.

It shows that there is an estimated current total net income for local authorities in England from handling DRS materials (without a DRS) of £68.2 million without an ETS scheme for waste incineration being in place. (Net income is the income from sale of recyclate minus the sorting costs and the costs of management of residual waste.) This net income is mostly driven by the estimated net income from aluminium drinks cans, of £53.9 million. Handing PET drinks bottles currently provides an estimated net income of £14.4 million and handling steel drinks cans currently results in an estimated net cost of £89,000. This is due to the low income from steel cans recycling, which is not sufficient to compensate for the cost of managing steel cans in residual waste and sorting steel cans for recycling.

The introduction of ETS carbon trading for waste incineration of fossil-sourced materials would add an estimated cost of £9.7 million for the PET drinks bottles currently handled by local authorities in England, bringing the estimated net income from PET drinks bottles down to £4.7 million and the total estimated net income from DRS materials (without a DRS) down to £58.5 million, equivalent to £231,000 per 100,000 households.

After the introduction of DRS, if a return rate of 90 per cent is achieved, there would be an estimated total net income for local authorities in England from handling DRS materials of £6.8 million without an ETS scheme for waste incineration being in place. The estimated net income from aluminium drinks cans would be £5.4 million and from PET drinks bottles £1.4 million, whereas steel cans would have a marginal net cost of £9,000. This is an estimated reduction of total net income of £61.4 million across all local authorities in England.

The introduction of ETS carbon trading for waste incineration of fossil-sourced materials would add an estimated cost of £971,000 for the PET drinks bottles handled by local authorities in England, bringing the estimated net income from PET drinks bottles down to £472,000 and the total estimated net income from DRS materials down to £5.9 million, an estimated reduction of £52.7 million across all local authorities in England, equivalent to £208,000 per 100,000 households.

Table 4. Income from sale of recyclate and treatment costs with and without DRS, England total (£)

	Without DRS					With DRS					
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Tonnes per 100,000 household	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Change in total	Change per 100,000 household
Income from sale of recyclables	£33,779,903	£65,539,778	£267,237	**£99,586,918**	£392,791	£3,377,990	£6,553,978	£26,724	**£9,958,692**	-£89,628,226	-£353,512
Mini-MRF processing cost	£249,830	£142,371	£3,591	**£395,793**	£1,561	£24,983	£14,237	£359	**£39,579**	-£356,213	-£1,405
MRF processing cost, plus transport to MRF	£12,448,154	£6,884,581	£172,746	**£19,505,481**	£76,934	£1,244,815	£688,458	£17,275	**£1,950,548**	-£17,554,933	-£69,240
Income from sale of recyclables (net of processing and transport costs)	£21,081,919	£58,512,826	£90,899	**£79,685,644**	£314,296	£2,108,192	£5,851,283	£9,090	**£7,968,564**	-£71,717,080	-£282,867
Cost to send to MBT etc, inc. transport	£1,618,965	£1,337,359	£54,719	**£3,011,043**	£11,876	£161,897	£133,736	£5,472	**£301,104**	-£2,709,939	-£10,689
Cost to send to incineration, inc. transport	£4,280,427	£2,792,561	£106,225	**£7,179,212**	£28,316	£428,043	£279,256	£10,622	**£717,921**	-£6,461,291	-£25,485
Cost to send to landfill, inc. transport	£752,523	£489,024	£18,575	**£1,260,122**	£4,970	£75,252	£48,902	£1,858	**£126,012**	-£1,134,110	-£4,473
Total net waste treatment cost without ETS	**-£14,430,004**	**-£53,893,882**	**£88,620**	**-£68,235,267**	**-£269,134**	**-£1,443,000**	**-£5,389,388**	**£8,862**	**-£6,823,527**	**£61,411,740**	**£242,220**
Cost of ETS carbon trading	£9,708,382	£0	£0	**£9,708,382**	£38,292	£970,838	£0	£0	**£970,838**	-£8,737,544	-£34,463
Total net waste treatment cost with ETS	**-£4,721,623**	**-£53,893,882**	**£88,620**	**-£58,526,885**	**-£230,842**	**-£472,162**	**-£5,389,388**	**£8,862**	**-£5,852,688**	**£52,674,196**	**£207,758**
% of current costs or income						10%	10%	10%	**10%**		
Change						£4,249,460	£48,504,494	-£79,758	**£52,674,196**		
Total waste treatment cost per household	-£0.19	-£2.13	£0.00	**-£2.31**		-£0.02	-£0.21	£0.00	**-£0.23**	£2.08	
Total waste treatment cost per person	-£0.08	-£0.95	£0.00	**-£1.04**		-£0.01	-£0.10	£0.00	**-£0.10**	£0.93	

Table 5. Income from sale of recyclate and treatment costs, per 100,000 households (£)

	Without DRS				With DRS				
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	**Total**	Change in total
Income from sale of recyclables	£133,235	£258,502	£1,054	**£392,791**	£13,323	£25,850	£105	**£39,279**	-£353,512
Mini-MRF processing cost	£985	£562	£14	**£1,561**	£99	£56	£1	**£156**	-£1,405
MRF processing cost, plus transport to MRF	£49,098	£27,154	£681	**£76,934**	£4,910	£2,715	£68	**£7,693**	-£69,240
Income from sale of recyclables (net of processing and transport costs)	£83,151	£230,786	£359	**£314,296**	£8,315	£23,079	£36	**£31,430**	-£282,867
Cost to send to MBT etc, inc. transport	£6,386	£5,275	£216	**£11,876**	£639	£527	£22	**£1,188**	-£10,689
Cost to send to incineration, inc. transport	£16,883	£11,014	£419	**£28,316**	£1,688	£1,101	£42	**£2,832**	-£25,485
Cost to send to landfill, inc. transport	£2,968	£1,929	£73	**£4,970**	£297	£193	£7	**£497**	-£4,473
Total net waste treatment cost without ETS	**-£56,915**	**-£212,568**	**£350**	**-£269,134**	**-£5,691**	**-£21,257**	**£35**	**-£26,913**	**£242,220**
Cost of ETS carbon trading	£38,292	£0	£0	**£38,292**	£3,829	£0	£0	**£3,829**	-£34,463
Total net waste treatment cost with ETS	**-£18,623**	**-£212,568**	**£350**	**-£230,842**	**-£1,862**	**-£21,257**	**£35**	**-£23,084**	**£207,758**
% of current costs or income					10%	10%	10%	**10%**	
Change					£16,761	£191,312	-£315	**£207,758**	
Total waste treatment cost per household	-£0.19	-£2.13	£0.00	**-£2.31**	-£0.02	-£0.21	£0.00	**-£0.23**	£2.08
Total waste treatment cost per person	-£0.08	-£0.95	£0.00	**-£1.04**	-£0.01	-£0.10	£0.00	**-£0.10**	£0.93

5.4 Sensitivity analyses

The full results of the sensitivity analyses are provided in Annex E.

The core modelling indicates that the average change in recycling rate from implementing the DRS would be -0.72 per cent and the total net income would reduce by £61.4 million with the DRS but without ETS and £52.7 million with the DRS and ETS.

The various sensitivity analyses result in changes to the reduction to total net income of between £34.1 and £70.4 million without the ETS and between £29.3 million and £63.8 million with the ETS. The higher values are for income from sale of recyclables all being 10 per cent higher than the core model values or if the capture rate of DRS materials remaining in the household waste stream is increased by 10 per cent above the core model amounts. The lower values are for the DRS operating with a return rate of 50 per cent.

A DRS return rate of 50 per cent would result in a reduction of recycling rate of 0.4 per cent rather than the core model reduction of 0.7 per cent, whereas a DRS return rate of 95 per cent would result in a reduction of recycling rate of 0.8 per cent rather than the core model reduction of 0.7 per cent.

Reductions in recycling rate from the DRS being introduced of 0.8 per cent would also result from household consumption being 10 per cent higher, or by the recycling capture rate of DRS materials in the household stream being 10 per cent higher.

Table 14 in Annex E shows the impacts of a DRS on local authorities operating different collection types, based on a local authority of 100,000 households.

- The core model indicates an average reduction in net income from introducing DRS of £242,000 without ETS and £208,000 with ETS.
- Authorities with fully commingled collections and a £90/tonne MRF gate fee have a variation from the core model of 4 per cent lower reduction in net income without ETS and 5 per cent lower with ETS.
- Authorities with twin stream collections with paper/card separate and a £65/tonne MRF gate fee have a variation from the core model of 3 per cent greater reduction in net income both without and with ETS.
- Authorities with twin stream collections with glass separate and a £125/tonne MRF gate fee have a variation from the core model of 13 per cent lower reduction in net income without ETS and 16 per cent lower with ETS.
- Authorities collecting fully segregated using kerbside sort and mini-MRF processing costs of between £15 and £30 per tonne have a higher reduction in net income than the core model, of between 25 per cent and 29 per cent without ETS and between 33 per cent and 37 per cent with ETS.

5.5 Operational and service impacts including infrastructure requirements

5.5.1 Kerbside collections

Table 2 in section 5.1 shows that, for an authority with 100,000 households without a DRS in place, an average of:

- 680 tonnes per year is collected in commingled and segregated recycling streams
- 117 tonnes is disposed of as litter and
- 209 tonnes is disposed of in residual household waste streams (889 minus 680 tonnes).

After processing of the recycling and residual waste streams, these result in:

- 707 tonnes being recycled
- 270 tonnes being incinerated and
- 29 tonnes being landfilled.

After implementation of a DRS with a 90 per cent return rate, on average these are estimated to reduce to:

- 68 tonnes per year collected in commingled and segregated recycling streams, a reduction of 612 tonnes
- 12 tonnes disposed of as litter, a reduction of 105 tonnes and
- 21 tonnes disposed of in residual household waste streams (89 minus 68 tonnes), a reduction of 188 tonnes.

After processing of the recycling and residual waste streams, these result in:

- 71 tonnes being recycled, a reduction of 636 tonnes
- 27 tonnes being incinerated, a reduction of 243 tonnes and
- 3 tonnes being landfilled, a reduction of 26 tonnes.

For a large commingled kerbside collection round of 1,600 households operating fortnightly collections, this is equivalent to 418 kilograms being collected in each daily round without a DRS and 42 kilograms with a DRS operating at a 90 per cent return rate, a reduction of 377 kilograms per daily round. With two tips per day being the norm in an urban authority with large collection rounds, and for a typical payload of 12 tonnes, reduction of less than 200 kilograms per tip is unlikely to enable an immediate reduction in numbers of rounds for most authorities operating commingled collections, although there may be an opportunity when rounds are rebalanced. There is unlikely to be a reduction in number of bins set out by for collection by householders, particularly with fortnightly collections, since other materials will be in the commingled bin. The introduction of DRS may however provide sufficient capacity to enable additional materials to be collected in commingled bins and rounds under Simpler

Recycling, as discussed in section 5.6.1, or may help prolong the period until rounds need to be rebalanced or new rounds added if additional households are built.

For a large kerbside sort collection round of 850 households operating fortnightly collections, this is equivalent to 222 kilograms being collected in each daily round without a DRS and 22 kilograms with a DRS operating at a 90 per cent return rate, a reduction of 200 kilograms per daily round. With two tips per day again being the norm in an urban authority with large collection rounds, a reduction of less than 100 kilograms per tip is also unlikely to enable a reduction in numbers of rounds for most authorities operating kerbside sort collections. For kerbside sort collections, most rounds will need to tip when compartments other than the plastics and cans are full – the experience of recycling operations is that the card or glass compartments will fill first. As with commingled collections, the introduction of DRS may however provide sufficient capacity to enable additional materials to be collected in kerbside vehicles and boxes under Simpler Recycling, as discussed in section 5.6.1, or may help prolong the period until rounds need to be rebalanced or new rounds added if additional households are built.

For residual waste streams, if collected fortnightly in a round of 1,600 households, the model estimates that currently 129 kilograms of DRS materials would currently be collected per round per day, dropping to 13 kilograms with a DRS with a return rate of 90 per cent, a reduction of 116 kilograms. This is unlikely to enable any reduction in residual collection rounds, but the marginal additional capacity may help prolong the period until rounds need to be rebalanced or new rounds added if additional households are built.

5.5.2 Mini-MRF sorting facilities

For kerbside-sort authorities, the implementation of a DRS would reduce the operational time required for mini-MRF sorting facilities, which may enable depot staff to be deployed to other activities. This may be particularly important if increased materials are recycled under Simpler Recycling, especially for handling plastic film.

5.5.3 Recycling banks

Most local authorities have reduced their recycling banks significantly in recent years due to comprehensive coverage being provided at the kerbside. However, authorities that still operate cans and plastics recycling banks, such as those provided for flats, should be able to reduce the frequency of emptying banks or may be able to reduce the number of recycling banks. In practice it would be worthwhile for a local authority to wait until the DRS were established and operating at a high enough return rate to assess whether recycling banks could be reduced in number or a lower emptying frequency be established.

5.5.4 Litter

The implementation of the DRS in Ireland is reported to have produced a near 50 per cent reduction in drinks cans and plastic bottles in ground litter, as noted in section

3.4. These reductions are lower than what was hoped, not matching the anticipated diversion to the DRS of 70 per cent or more for the first year of operation. Additionally, despite the reductions in DRS-type litter, overall litter levels have remained static in many areas. Thus, while DRS containers are less prevalent, the resource requirement to clean up litter may have been unaffected.

Rather than the implementation of DRS providing an opportunity to reduce litter bin costs, it may actually require new bins designed to prevent people from reaching in to scavenge for DRS containers, at additional cost, as has been reported by Irish Railways. This scavenging has caused additional litter and mess, with unwanted containers being left on the ground alongside bins.

5.6 Links and dependencies with other policies

The UK government is implementing a set of policies as part of its circular economy strategy, with the complementary aims of increasing recycling, reducing waste and enhancing environmental sustainability:

- the introduction of a deposit return scheme for drinks containers
- simpler recycling
- Extended Producer Responsibility (EPR) for packaging
- the extension of the Emissions Trading System (ETS) to waste incineration.

5.6.1 Simpler Recycling

Simpler Recycling is a requirement for local authorities in England to provide more standardised recycling collections, with a mandated core set of materials that must be collected at the kerbside from every household from April 2026. The list of materials set out in legislation are glass bottles and containers, paper and card, metal packaging, plastic bottles, and plastic pots, tubs and trays, and this specifically includes aluminium foil, aluminium food trays, steel and aluminium aerosols, aluminium tubes, metal jar lids, and food and drink cartons All local authorities in England already collect plastic bottles and metal cans at the kerbside, although some do not currently collect plastic pots, tubs and trays (a reported 16 per cent in 2021/22 according to Defra's impact assessment). Authorities will also need to collect plastic film from April 2027; only 19 per cent collected it in 2021/22. There is a recommendation for authorities that use kerbside sort to collect food and drinks cartons (such as Tetra Paks) in the same compartment as cans and plastic, which on a typical kerbside sort vehicle such as a Romaquip vehicle is in an upper tier compartment with hydraulic compaction and capacity up to 850kg.

It is estimated in Defra's impact assessment of Simpler Recycling that, if collected for recycling, an average household recycles 1.2 kilograms per household per year (kg/hh/yr) of food and drinks cartons, 0.4 kg/hh/yr of foil and 6.0 kg/hh/yr of film. If a local authority does currently not collect these, but does to comply with Simpler Recycling,

it would add 7.6 kg/hh/yr to collections. This can be compared with the estimated 6.1 kg/hh/yr (612 tonnes per 100,000 people) that would be lost if 90 per cent of DRS materials were diverted to the DRS.

For a large urban kerbside sort round of 850 households operating fortnightly collections, these are equivalent to 248 kilograms per collection round of potentially new materials under Simpler Recycling, compared with 200 kilograms of drinks containers that would be diverted to a DRS with a return rate of 90 per cent. Thus, the implementation of DRS could free up capacity for additional materials collected under Simpler Recycling. Currently, however, most kerbside rounds will need to tip when compartments other than the plastics and cans are full – the experience of recycling operations is that the card or glass compartments will fill first. Moving cartons from the card compartment to the metal and plastics compartment would be unlikely to free up much room in the card compartment. There would be additional space in kerbside boxes, however, which could be utilised for plastic film, foil and food and drink cartons.

For a large, commingled collection round of 1,600 households operating fortnightly collections, the potentially new materials under Simpler Recycling would on average add an estimated 468 kilograms per collection round, compared with 377 kilograms of drinks containers that would be diverted to a DRS with a return rate of 90 per cent. Thus, for commingled collections, where the full load weight is a critical factor, the implementation of DRS may be more significant in freeing up capacity in collection vehicles for additional materials collected under Simpler Recycling. There would also be additional space in kerbside wheeled bins, which could be utilised for plastic film, foil and food and drink cartons.

Simpler Recycling aims to encourage more people to recycle more materials more often, as there will be less confusion about what can and cannot be recycled, so there is likely to be a requirement for additional capacity above the amounts that have been quantified here for cartons, foil and film. Thus, reductions in amounts collected due to diversion to a DRS could help reduce a requirement for more recycling collection rounds under Simpler Recycling (which would also be balanced by a reduction in amounts of residual waste collected).

5.6.2 Extended Producer Responsibility (EPR)

Extended Producer Responsibility (EPR) places the responsibility for the management of waste on producers, making them financially accountable for the end-of-life processing of their packaging. Under this system, brands and retailers using containers not included in the DRS are required to contribute to the collection, recycling or disposal of their packaging.

For brands and retailers selling drinks in containers in-scope of the DRS, the DRS will provide the system for the collection and recycling of returned items, removing the cost of their management from the EPR scheme. One of the aims of the DRS to facilitate an enhanced closed-loop system for PET drinks bottles and drinks cans, increasing sustainability.

EPR fee modulation will adjust the fees based on the environmental impact of packaging materials, with higher costs for materials that have a greater environmental impact and lower fees for those that are more easily recyclable. This will incentivise producers to use more sustainable packaging, which should increase the amounts recycled at the kerbside and reduce amounts in residual waste, and also reduce contamination of recycling streams with items that cannot be recycled.

5.6.3 Extension of ETS to Waste Incineration

The Emissions Trading System (ETS) currently covers carbon emissions from power generation, industry, and aviation, and it is proposed to extend this to waste incineration from 2028. This would place a carbon cost on the incineration of fossil-derived waste, particularly plastics. The extension of ETS to waste incineration thus creates an additional financial incentive for reducing waste sent to incineration and encouraging recycling.

If more PET drinks containers are returned via DRS than are currently recycled, there will be less incineration of recyclable materials, reducing carbon emissions, which should lower the costs related to ETS. These costs are accounted for in the modelling presented in this report and are described in section 5.3, Direct financial impacts.

Total net costs are provided both without and with ETS costs. These are shown separately because the actual mechanism to be used to allocate ETS carbon costs to waste incinerators are not yet fully known, nor the mechanism by which these will likely be passed on to local authorities. If these costs are based on a generic fossil carbon factor for municipal waste, it will be difficult to achieve savings to local authorities from removing PET bottles from incinerator streams due to diversion to a DRS. Thus, these costs have been kept separate to allow the potential impact of ETS to be understood and the costings can be adjusted in the future when there is more clarity on the charging mechanisms.

5.7 Data gaps, uncertainties and risk

Sources of potential uncertainties and data gaps are discussed below. These data gaps and uncertainties lead to uncertainties in the modelled results. Impacts of uncertainties are explored further in the sensitivity analyses section. With the modelled inputs explored in that section, there could be a range of reductions to total net income of between £34.1 and £70.4 million without the ETS and between £29.3 million and £63.8 million with the ETS. Changes to how ETS costs are calculated or to recyclate income beyond those modelled could lead to even larger variations in net income.

Diversion rates to a DRS: Whilst a target of 90 per cent has been set for year 3 of the DRS, with 70 per cent in year one and 80 per cent in year two, these may not be achieved or may take longer to be achieved than expected. The diversion rate to the DRS is the most important factor for the impact on local authorities. For the

modelling, it is assumed that all materials will be diverted at the same rates. The impact of different overall return rates and return rates by material were explored in the sensitivity analyses. Additionally, it is not known whether there will be different rates of diversion to a DRS from the recycling, (domestic) residual and litter streams. For simplicity, the modelling for this report assumes the same diversion rate from each stream.

ETS costs: Exact arrangements for the allocation of the costs from the extension of ETS to waste incineration are not yet fully known, nor the mechanism by which these will likely be passed on to local authorities. This omission could affect the accuracy of financial impact assessments. ETS costs are reported separately to allow the costings to be adjusted in the future when there is more clarity on the charging mechanisms.

Recyclate prices: The volatility of recyclate prices adds uncertainty to financial projections. Historical data shows significant fluctuations and future trends are difficult to predict accurately, impacting the financial modelling of the DRS. In addition, the removal of DRS materials may supress the price offered for other materials, particularly for non-DRS PET, since high quality food-contact PET would be available from the DRS.

The full income from sale of recyclate has been included in the modelling, on the basis that even contractors that do not share any income with local authorities will build the expected income into their contract costs. In these cases, the change in income may not have an impact until the contract is next let, although some contracts have a clause that allows fees to be changed when the DRS is implemented.

Materials Recovery Facility (MRF) cost variations: The model does not account for potential changes in MRF processing costs post-DRS due to changes in the types and quantities of materials being sorted. Significant reductions in amounts could lead to higher per-tonne processing charges for the remaining materials. However, the DRS should not impact significantly on overall tonnages being processed by MRFs, and Simpler Recycling should lead to higher quantities being processed, which would mitigate reductions from DRS.

Mini-MRF processing costs: Operators of mini-MRFs for separating plastic, ferrous metals and non-ferrous metals collected under kerbside sort were unable to provide processing costings since they are part of overall depot costs and not accounted for separately. For this report, these costs were instead estimated based on other handling costs reported in WRAP's gate fee reports and the impact of the cost was tested in the sensitivity analyses.

Alternative waste treatment processing costs: For simplicity, the model assumes that all residual waste treatment not reported as landfill or incineration on WasteDataFlow is treated for a similar average cost and uses a reported price for mechanical biological treatment (MBT) as the basis for this. MBT costs themselves are

however widely variable as they are based on long-term contracts and may include a direct contribution to repaying construction costs as well as a processing cost per tonne, or are under a PFI arrangement without transparent per-tonne costings.

Routes for disposal of packaging: Assumptions were made on the proportion of DRS materials disposed of at home, in litter streams (bins or ground litter), or in a commercial waste stream (such as at work or in a leisure setting) based on an online survey of members of the public.

Reject rates of DRS materials from MRFs: Rates are based on research from 2014, working with MRF operators, which may now be out of date due to improvements in MRF sorting technologies. Lower reject rates would lead to higher recycling and lower amounts being sent for disposal, which would result in higher modelled earnings for local authorities and higher modelled losses when a DRS is implemented.

Impact on litter: While initial surveys in Ireland indicate a reduction in specific types of litter, comprehensive data on the overall impact of the DRS on litter levels is limited. This gap hinders the ability to fully evaluate the scheme's effectiveness in addressing litter issues and the extent to which costs of litter collection will be reduced. Litter costs have not been included in the model.

Material substitution: To avoid reduced sales of drinks that incur a deposit, drinks manufacturers may switch to packaging materials that are not in-scope for the DRS, such as glass bottles, drinks cartons or pouches, or plastic polymers such as polypropylene or high-density polyethylene. If this were to occur, local authorities would not lose as much materials to the DRS, but the alternative materials could be heavier (for example glass) or lighter (such as pouches) and would have different incomes from sale of recyclate and different processing costs per tonne.

Consumer purchasing behaviour: Consumers may avoid products with a deposit, instead choosing other containers that do not incur a deposit, such as glass bottles, drinks cartons or pouches, or drinks in plastic bottles other than PET, or potentially not making a purchase. The model assumes consumer purchases are unchanged.

6 Conclusions

Reduction in household recycling rates: The introduction of the DRS will lead to a decrease in the overall household recycling rate by approximately 0.7 per cent, as DRS materials are diverted from household waste streams.

Significant financial impact: Local authorities will experience a substantial reduction in net income from handling DRS materials, with an estimated decrease of £61.4 million without ETS and £52.7 million with ETS.

Potential for improved service efficiency: The DRS has the potential to free up a small amount of capacity in collection vehicles, which could provide sufficient space for additional materials collected under Simpler Recycling.

Mixed results on litter reduction: While the DRS is expected to reduce specific types of litter, the overall impact on litter reduction may vary, as evidenced by the experience in Ireland.

Annex A: Overview of deposit return schemes

Table 6 provides a summary of deposit return schemes from around the world, indicating when the scheme was implemented, whether PET, aluminium and/or glass containers are included, the return rate, if available, and the deposit value, in Euros. Information sources are provided after the table.

Table 6. Overview of deposit return schemes

Australia	1977 in South Australia; more since 2012	Yes	Yes	Yes	76%	0.06
Austria	1990, last amended 2025	Yes	Yes	Yes	75%	0.25
Barbados	1986, last amended 2019	Yes	Yes	Yes		
Belarus	TBA	Coming soon	Coming soon	Coming soon		
Belgium	1993	No	No	Yes		0.1-0.2
Croatia	2005, last amended 2020	Yes	Yes	Yes	91%	0.07
Denmark	1981, last amended 2020	Yes	Yes	Yes	93%	0.13-0.40
Ecuador	2012	Yes	No	No		
Estonia	2005	Yes	Yes	Yes	87%	0.1
Fiji	TBA	Coming soon	Coming soon	Coming soon		
France	2025 pilot	Pilot 2025	No	Pilot 2025		TBC
Finland	1996 (cans) / 2008 (PET) / 2012 (glass)	Yes	Yes	Yes	96%	0.1-0.4

Country	Implementation	PET	Aluminium	Glass	Return rate	Deposit value (€)
Germany	2003, last amended 2024 (milk)	Yes	Yes	Yes	98%	0.25 (0.08, 0.15 for reuse)
Hungary	2024	Yes	Yes	Yes		0.13
Iceland	1989	Yes	Yes	Yes	91%	0.12
Ireland	2024	Yes	Yes	No		0.15, 0.25
Israel	2001, last amended 2010	Yes	Yes	Yes	77%	0.07
Jamaica	2021	Yes	No	No		0.006
Latvia	2022	Yes	Yes	Yes	83%	0.1
Lithuania	2016	Yes	Yes	Yes	92%	0.1
Luxemburg	2023	Yes	Yes	Yes	58%	
Kiribati	2005	Yes	Yes	No		
Malta	2022	Yes	Yes	Yes	80%	0.1
Micronesia (Kosrae)	1991, last amended in 2007	Yes	Yes	Yes		
India (Maharashtra)	2018, last amended 2019	Yes	No	No		
Netherlands	2004, last amended 2021	Yes	Yes	Yes	70%	0.15-0.25
Norway	1997, last amended 1999	Yes	Yes	No	92%	0.13-0.32
Palau	2011	Yes	Yes	Yes		
Poland	2025	Coming soon	Coming soon	Yes		TBC
Portugal	2026	Coming Soon	Coming Soon	Coming Soon	45%	TBC
Romania	2023	Yes	Yes	Yes		0.1
Seychelles	2007	Yes	Yes	Yes		
Singapore	2025	Yes	Yes	No		

Country	Implementation	PET	Aluminium	Glass	Return rate	Deposit value (€)
Slovakia	2022	Yes	Yes	Yes	92%	0.15
South Korea	1985, last amended 2003	No	No	Yes		0.007-0.013
Spain	2027 to be implemented	Coming Soon	No	No		0.1-0.2
Sweden	1982, last amended 2022	Yes	Yes	Yes	88%	0.11-0.22
Switzerland	2001	Yes	Yes	Yes		0.32
Turkey	2022	Yes	Yes	Yes		
United Kingdom	2027	Coming soon	Coming soon	No		0.24
United States	Varies by state	Yes	Yes	Yes	38%-81% (median 68%)	0.05-0.14

Main information sources

- Container Recycling Institute: Bottle Bill website
- RELOOP: Factsheet Performance 2022
- PwC Reuse and Recycling Systems for Selected Beverage Packaging from a Sustainability Perspective, 2011

Additional country information

- Australia: Container deposit legislation in Australia
- Estonia, Latvia, and Lithuania: Deposit Return Systems For Beverage Containers In The Baltic States, 2019
- Ireland: Re-Turn: Ireland's Deposit Return Scheme
- Jamaica Information Service: Deposit Refund Scheme For Plastic Bottles Now In Place, June 2021
- Luxembourg: Ce que va changer la loi déchets dans notre quotidien ('What the waste law will change in our daily lives'), April 2022
- Poland: Polish government plans deposit system for plastic and glass bottles, April 2021
- Portugal:Portugal Confirms National Deposit Return Scheme Launch for 2026, November 2023
- Romania: TOMRA welcomes today's launch of Romania's deposit return scheme, November 2023

Annex B: Model inputs: tonnages and proportions

Tonnages and proportions input into the model are shown in Table 7, with sources listed below.

Table 7. Model inputs: core values for tonnages and proportions

	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total DRS materials	Data source key
Household consumption (tonnes)	181,988	105,412	1,623	289,022	A
Takeaway consumption (tonnes)	1,570	11,208	1,724	14,502	A
DRS materials in litter (tonnes)	16,917	12,218	470	29,606	B
Recycling from commingled and segregated streams (tonnes)	107,937	62,888	1,586	172,412	C
MRF processing proportion of DRS materials collected for recycling (%)	88.4%	88.7%	88.7%	88.5%	D
DRS materials MRF reject rate (%)	11.5%	6.5%	6.0%	9.7%	E
Incineration proportion of MRF rejects (%)	87.8%	87.8%	87.8%	87.8%	C
Residual waste incineration (%)	59.8%	59.8%	59.8%	59.8%	C
Residual waste landfill (%)	8.2%	8.2%	8.2%	8.2%	C
Residual waste undergoing alternative treatment to landfill or incineration (%)	32.0%	32.0%	32.0%	32.0%	C
Diverted from residual waste (tonnes)	800	5,814	134	6,748	C
DRS return rate (%)	90%	90%	90%	90%	F

Data sources:

- A: From Valpak's PackFlow Refresh 2023 reports.
- B: From analysis of WasteDataFlow 2023 data for English local authorities, combined with waste composition data for litter from Composition analysis of litter waste in Wales, 2020 (the most recent comprehensive litter analysis available for the UK).
- C: From analysis of WasteDataFlow 2023 data for English local authorities.
- D: From analysis of WRAP LA Portal 2022-23 data for English local authorities to obtain total tonnages collected at the kerbside in segregated and commingled collections. (Metals and plastics collected together at the kerbside in otherwise segregated collections are sometimes reported on WasteDataFlow as commingled, so that source cannot be used.)
- E: From Valpak's Packaging Recycling Supply Chain Assessment (August 2017).
- F: Government targets set in The Deposit Scheme for Drinks Containers (England and Northern Ireland) Regulations 2025 (January 2025).

Annex C: Model inputs: income and costs per tonne

The following pages provide graphs showing income per tonne from sale of recyclate or treatment costs per tonne, which are summarised in Table 8. These show:

- Figure 16: Income for all plastic types, £/tonne
- Figure 17: Income for clear and light blue PET bottles, £/tonne
- Figure 18: Income for aluminium cans, £/tonne
- Figure 19: Income for steel cans, £/tonne
- Figure 20: Landfill gate fee, £/tonne
- Figure 21: Landfill gate fee plus landfill tax, £/tonne
- Figure 22: Incineration (Energy from Waste) gate fee, £/tonne
- Figure 23: Comparison of disposal costs, £/tonne
- Figure 24: ETS traded carbon values

The graphs show maximum and minimum monthly income or costs per tonne obtained from letsrecycle.com and the monthly midpoints. For each material or disposal route, there is a graph covering the past five years from March 2020 to February 2025 and a graph showing the trends (not adjusted for inflation) since 2014 for treatment costs and since 2006 for recyclate income. The latter date was chosen to illustrate the impact of the global financial crisis of 2008 for comparison with the impact of the Covid pandemic in 2020-22. For disposal, data was not available prior to 2014 on letsrecycle.com.

Superimposed on each graph are the five-year averages of the monthly maxima, monthly minima and monthly mid-points, to give an idea of how prices have varied over the past 5 years and to smooth out month-on-month changes and the impact of the Covid pandemic in 2020-22.

For modelling of recyclate income, the five-year average of midpoint values is used as the core value and the five-year averages of the monthly maxima and monthly minima are used as the upper and lower modelled points respectively in the sensitivity analyses as shown in in Table 8. However, recyclate income prices are clearly very volatile and, in the future, could go well above or well below these modelled values.

There is an argument that a local authority PET bottle stream post-DRS will have a lower value than the current pricing for PET bottles because it will contain a higher

percentage of non-food-contact PET, whereas the DRS stream will likely have a higher value as it will be a very low contamination stream comprising solely food-contact PET bottles. Thus, after the removal of DRS PET from the local authority stream, the price obtained for local authority collected 'Clear and light blue PET' may shift towards the pricing for Coloured PET or Mixed plastic – which may themselves also reduce, since they will have a lower proportion of food-contact PET.

After the introduction of DRS, the aluminium stream is likely to have a lower value than currently as it will contain a lower proportion of food-contact aluminium and a higher proportion of items such as aerosol cans and cosmetic tubes.

Steel drinks cans are already a very low proportion of steel cans collected by local authorities, so DRS is unlikely to have a significant impact on the pricing of local authority collected steel cans.

However, these impacts of DRS on prices per tonne are unknown and the 5-year averages have been used to provide an assessment of potential impacts.

For the modelling of disposal costs, values were obtained from the WRAP Gate Fees report 2023-24 where available and transport costs were also obtained from the WRAP Gate Fees report 2023-24. For the sensitivity analyses of disposal costs, the averages of the monthly maxima and minima in 2024 from letsrecycle were used as shown in Table 8.

For ETS traded carbon values, the DESNZ Net Zero Strategy Aligned value for 2028 was chosen as the core value; this is the year when ETS will be expanded to cover waste incineration. The upper and lower modelled values were the High Sensitivity (Low Fossil Fuel Prices and High Economic Growth) and Low Sensitivity (High Fossil Fuel Prices and Low Economic Growth) values in that year.

Table 8 provides income and costs input into the model as core values and in the sensitivity analyses. The midpoint is generally used as the core value, unless a value is available from the WRAP gate fee report, as indicated in the last column. Sources are listed below the table.

Table 8. Model inputs: costs and income modelled core values and ranges

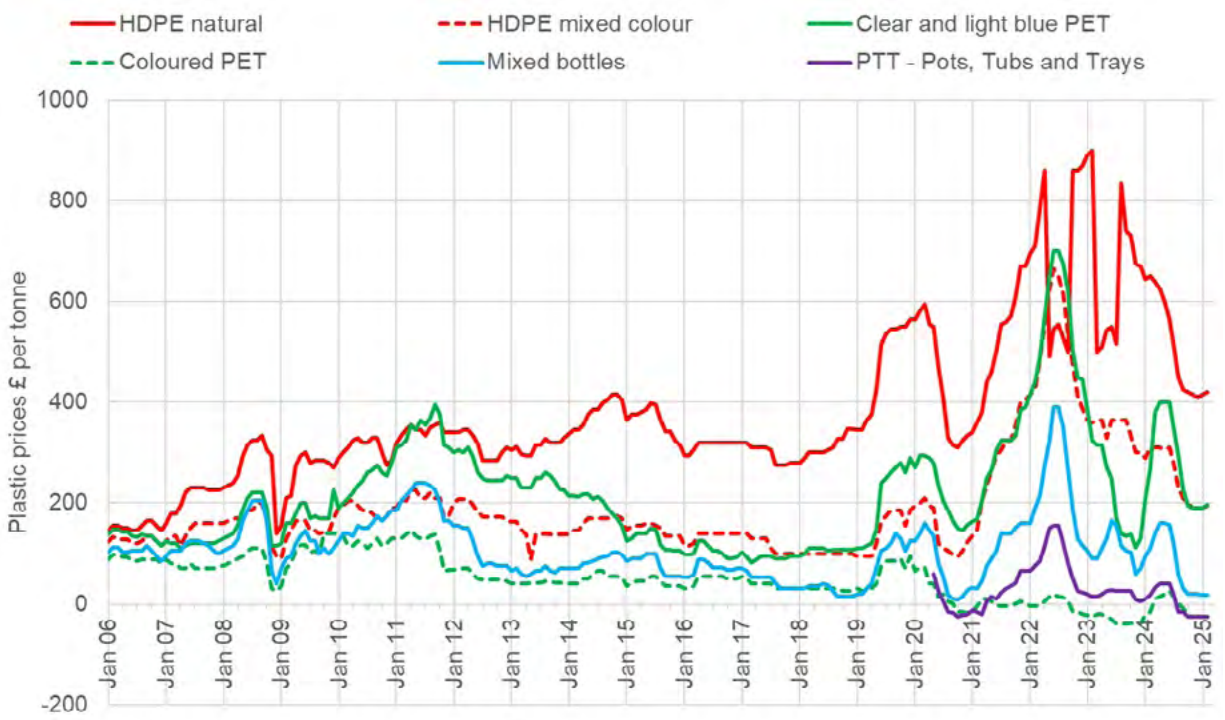
Data source(s)	Income or cost	High	Mid-point	Low	Additional modelled value
A1	Income from sale of PET bottles (£/tonne)	£348	£312.96	£278	£197.50 (Feb 2025)
A1	Income from sale of aluminium cans (£/tonne)	£1,013	£953.98	£895	£1,080 (Feb 2025)
A1	Income from sale of steel cans (£/tonne)	£166.50	£155.38	£144	£115 (Feb 2025)
B	Mini-MRF processing (£/tonne)	£25	£20	£15	
C1	MRF processing (£/tonne)	£98.00	£89.42	£80.00	
D	MBT processing (£/tonne)	£150	£125	£100	
A2, C2	Incineration gate fee (£/tonne)	£113.50	£102.58	£92.00	£116 (WRAP, core)
E	ETS traded carbon value (£/tonne CO2 eq.)	£110	£88	£62	£40 (2024 average)
A3, C2	Landfill gate fee (£/tonne)	£30.00	£25.00	£20.00	£24 (WRAP, core)

Data sources

- A1: Average of recyclate income prices on letsrecycle from March 2020 to February 2025, for 'Clear and light blue PET bottles', aluminium cans and steel cans.
- A2: Average of incineration (EfW) costs per tonne from letsrecycle for 2024.
- A3: Average of landfill costs per tonne from letsrecycle for 2024 plus landfill tax rate from April 2025 of £126.15.
- B: Assumption; range of values used in sensitivity analyses between £15 and £30 per tonne.
- C1: MRF gate fee from WRAP's Gate Fees report 2023-24, weighted by type of kerbside recycling collection obtained by analysis of WasteDataFlow question 10 returns for English local authorities in 2023.
- D: Personal communication, NAWDO member: suggested range of £100 to £150.
- E: From Department for Energy Security & Net Zero, Traded carbon values used for modelling purposes, 2024 (December 2024).

Transport costs used in the model are taken from WRAP'

Figure 16. Income for all plastic types, £/tonne



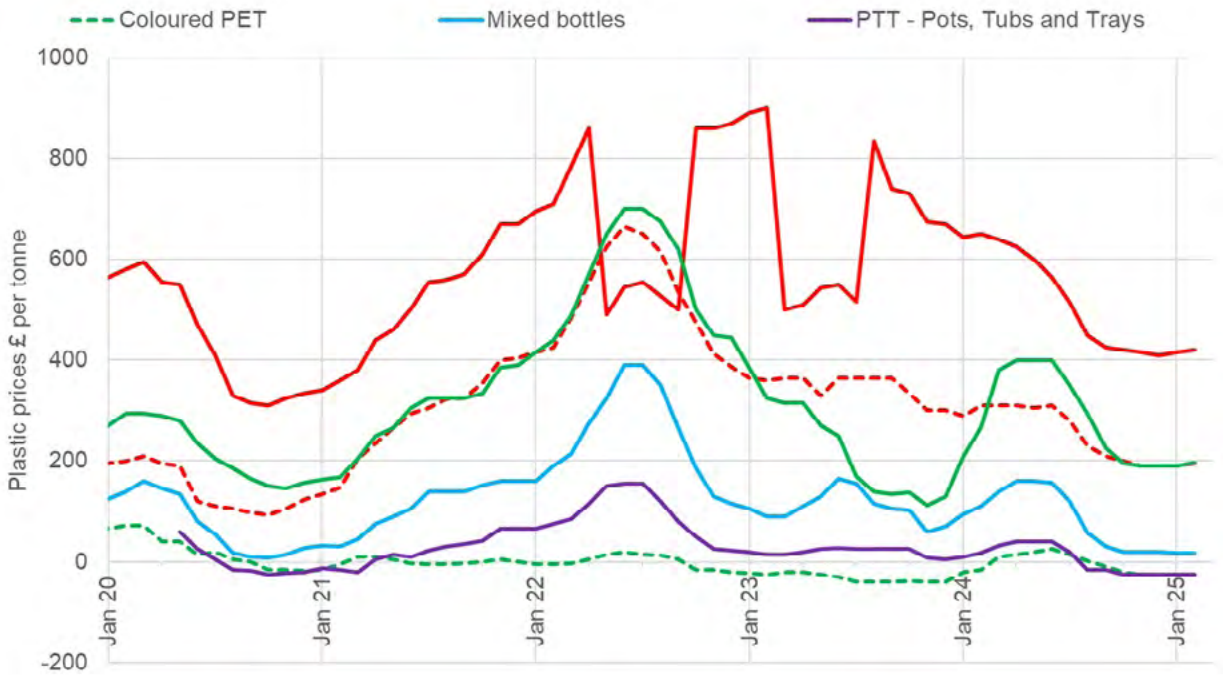
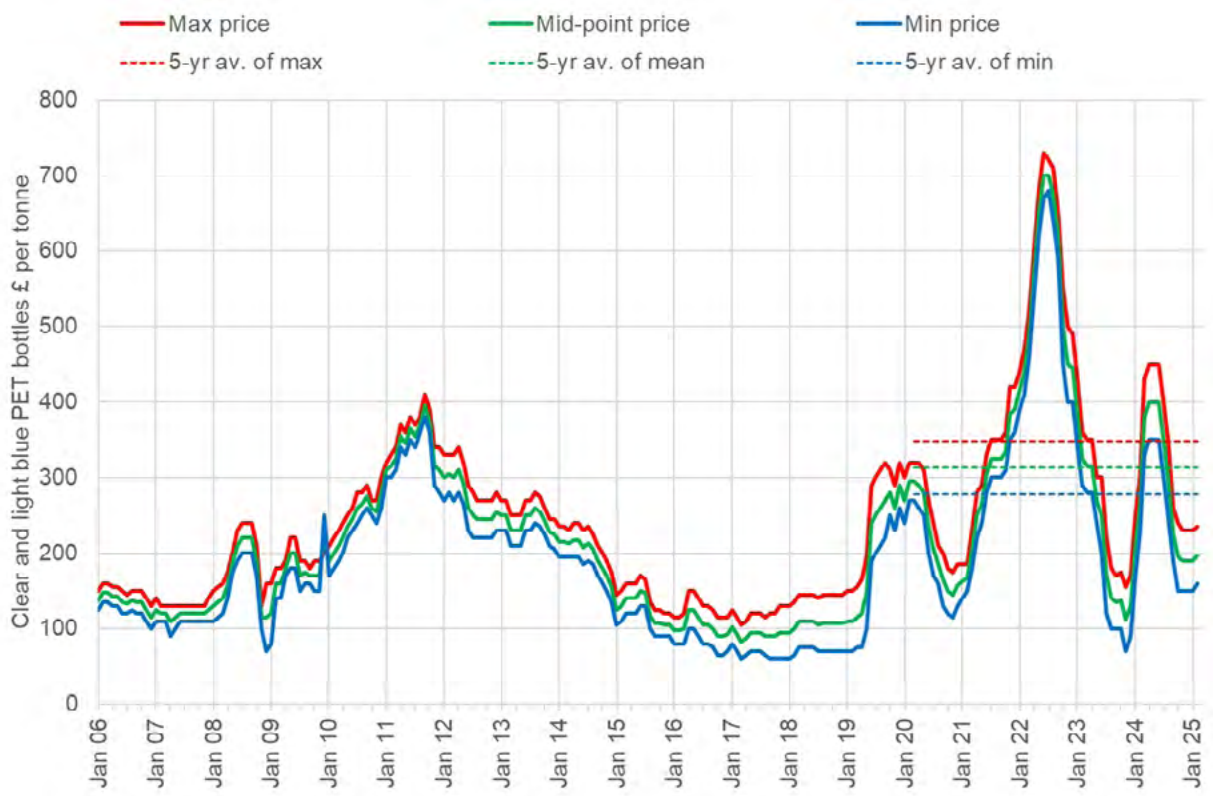


Figure 17. Income for clear and light blue PET bottles, £/tonne



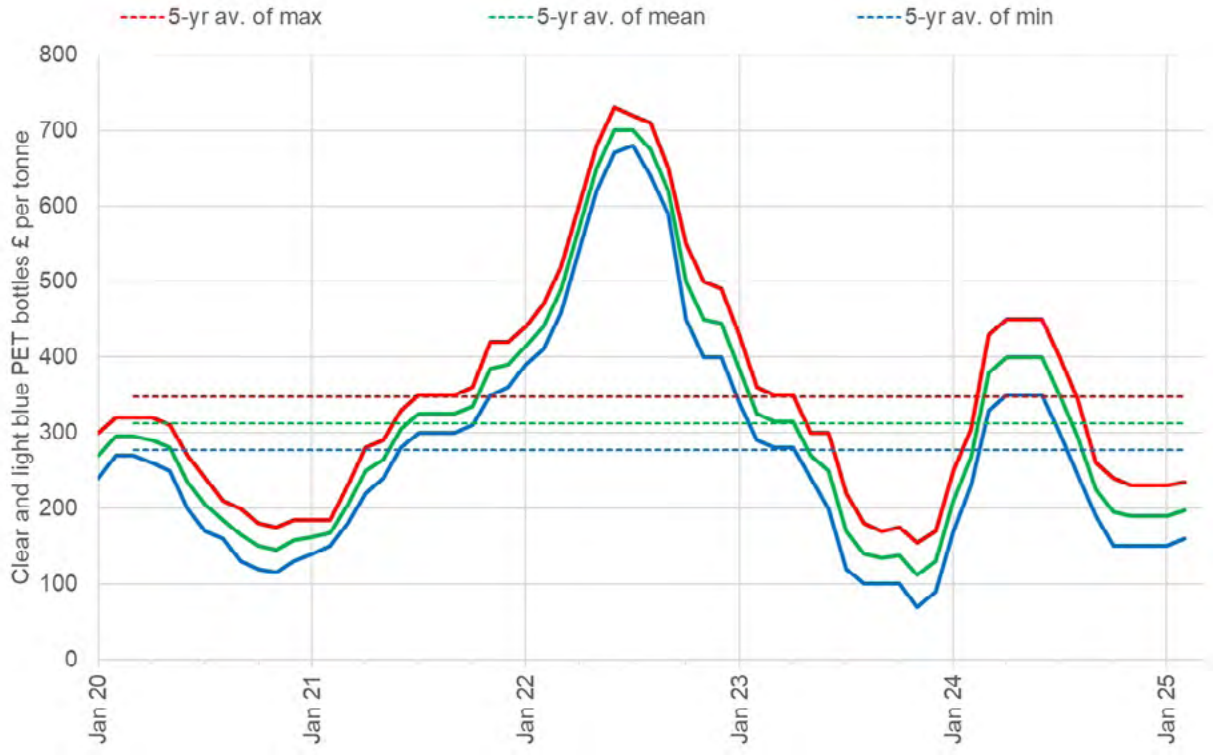
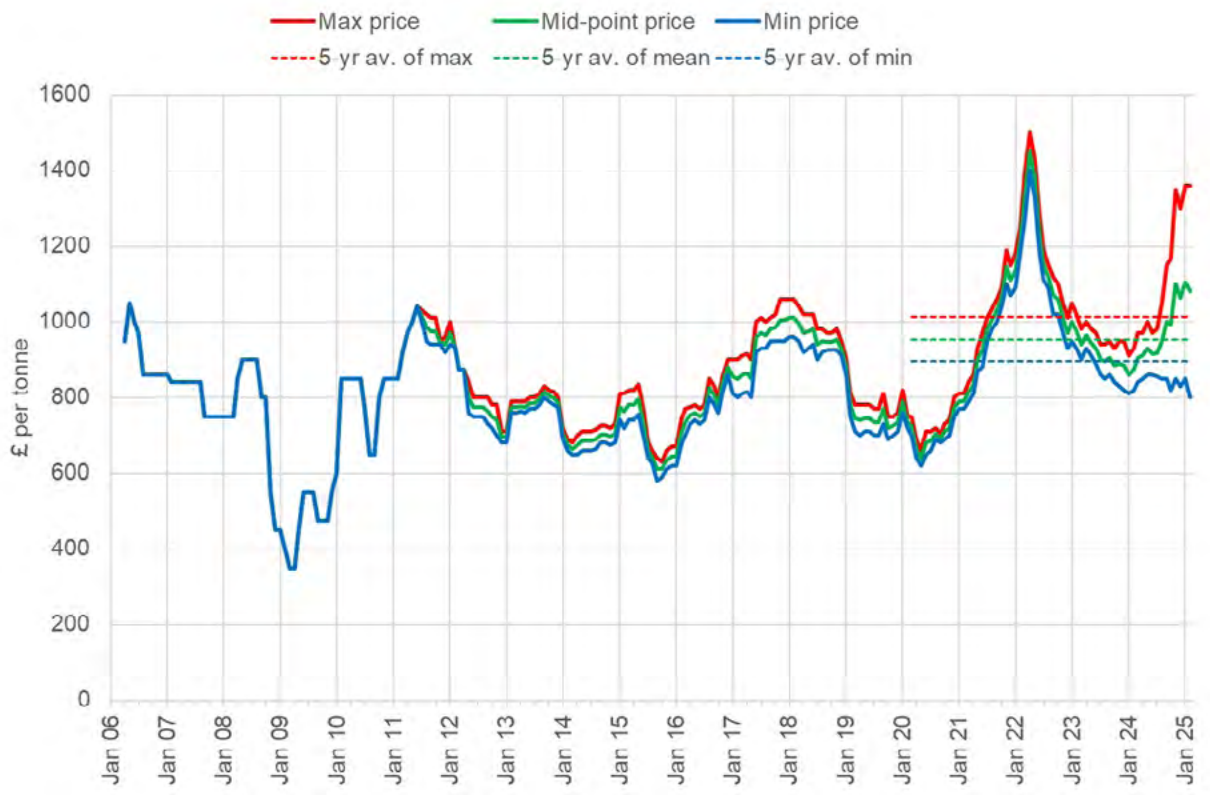


Figure 18. Income for aluminium cans, £/tonne



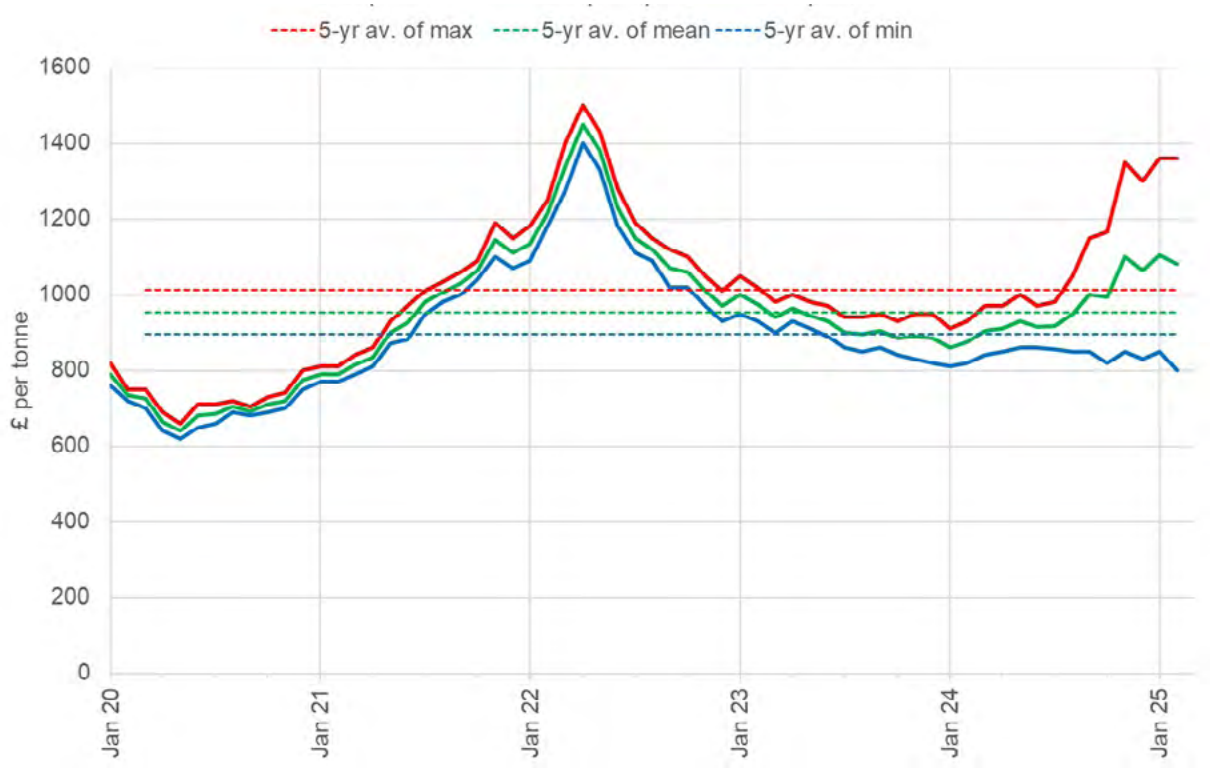
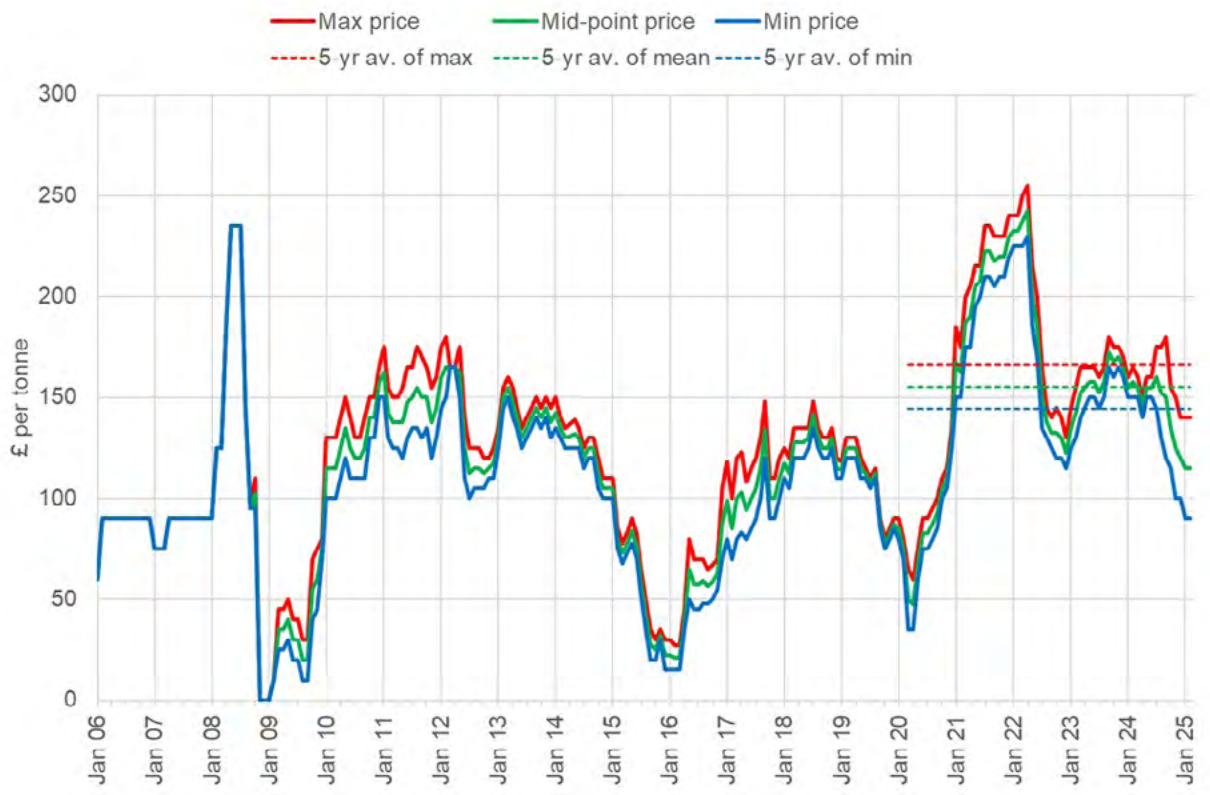


Figure 19. Income for steel cans, £/tonne



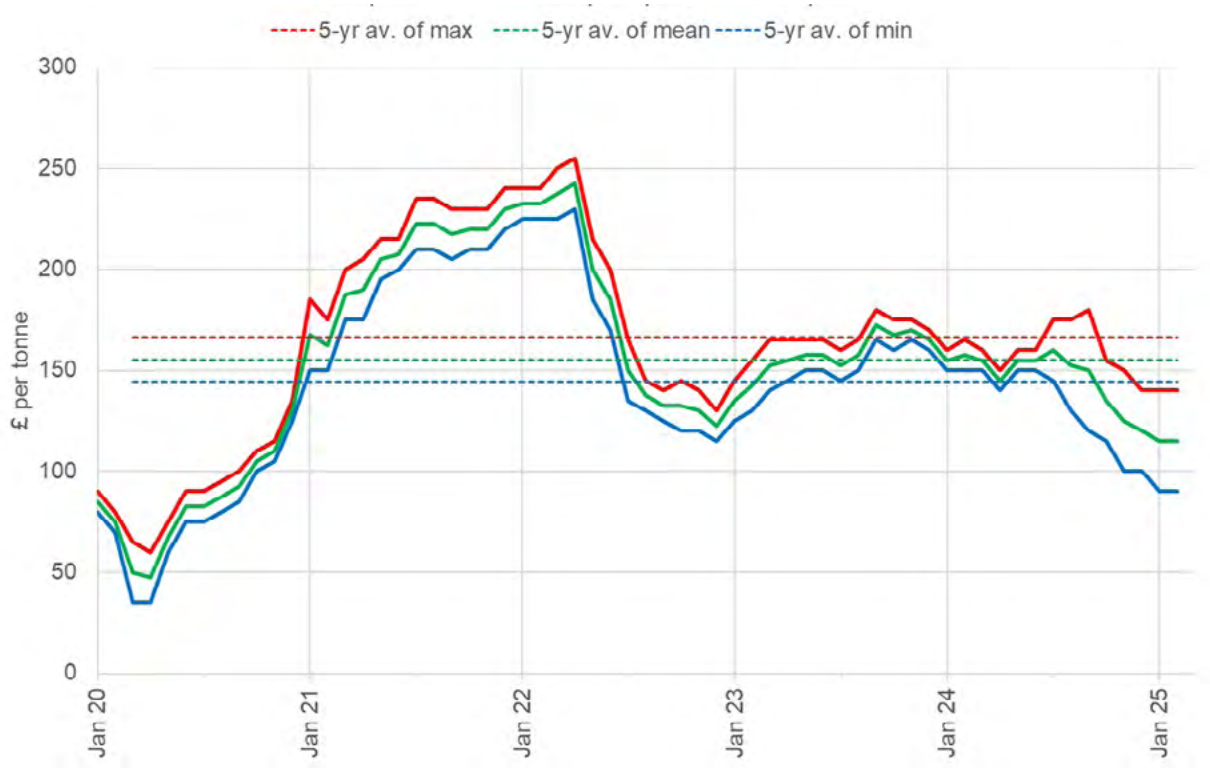
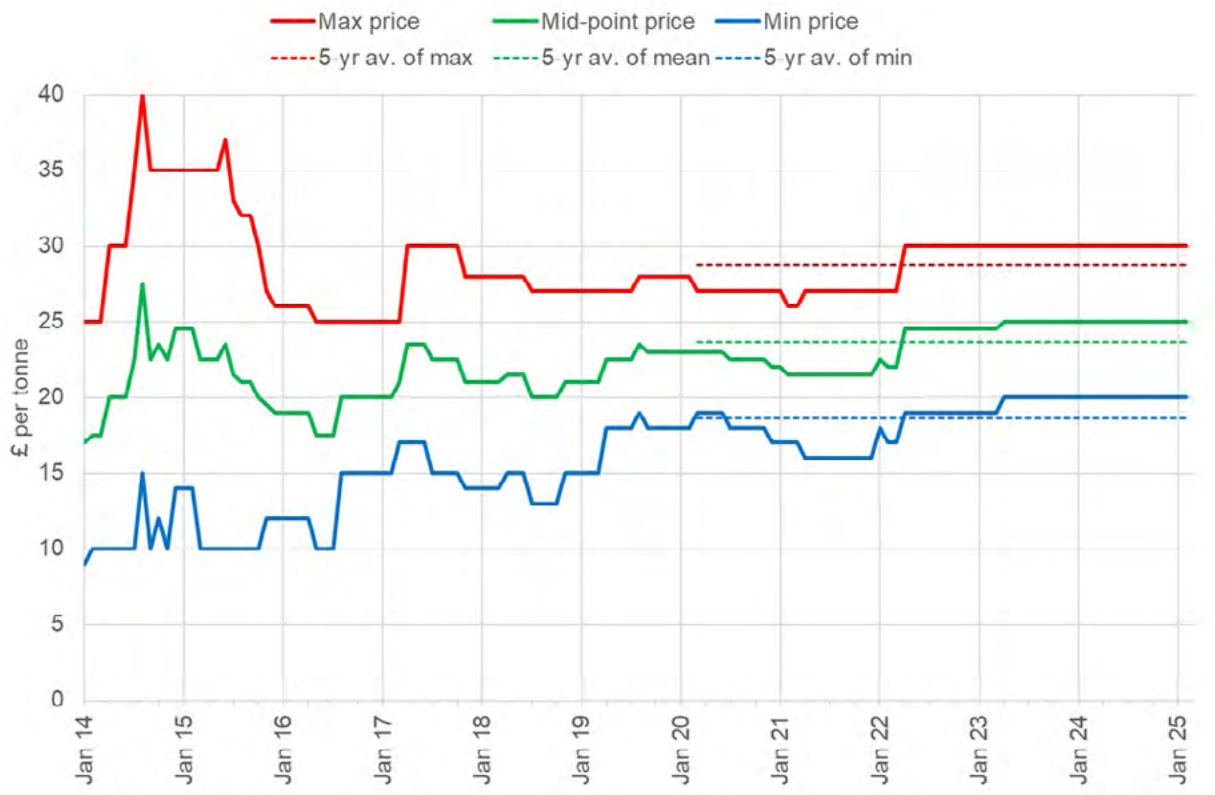


Figure 20. Landfill gate fee, £/tonne



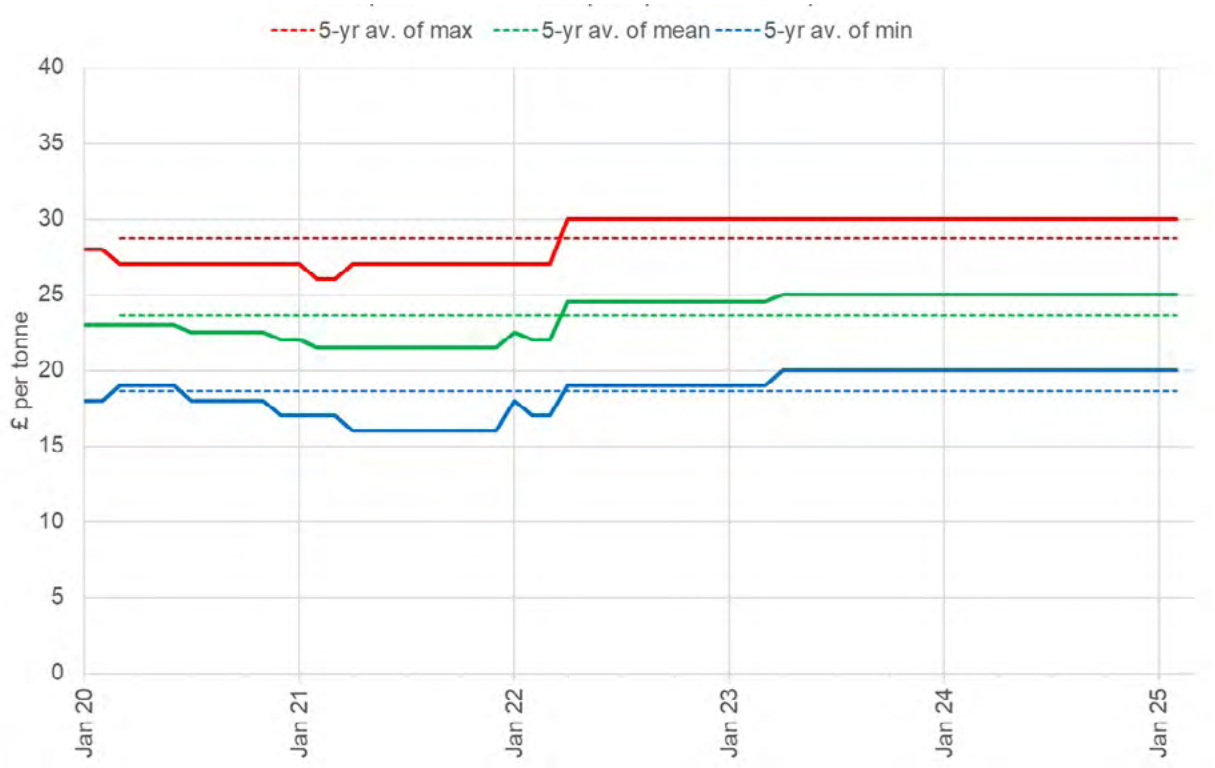
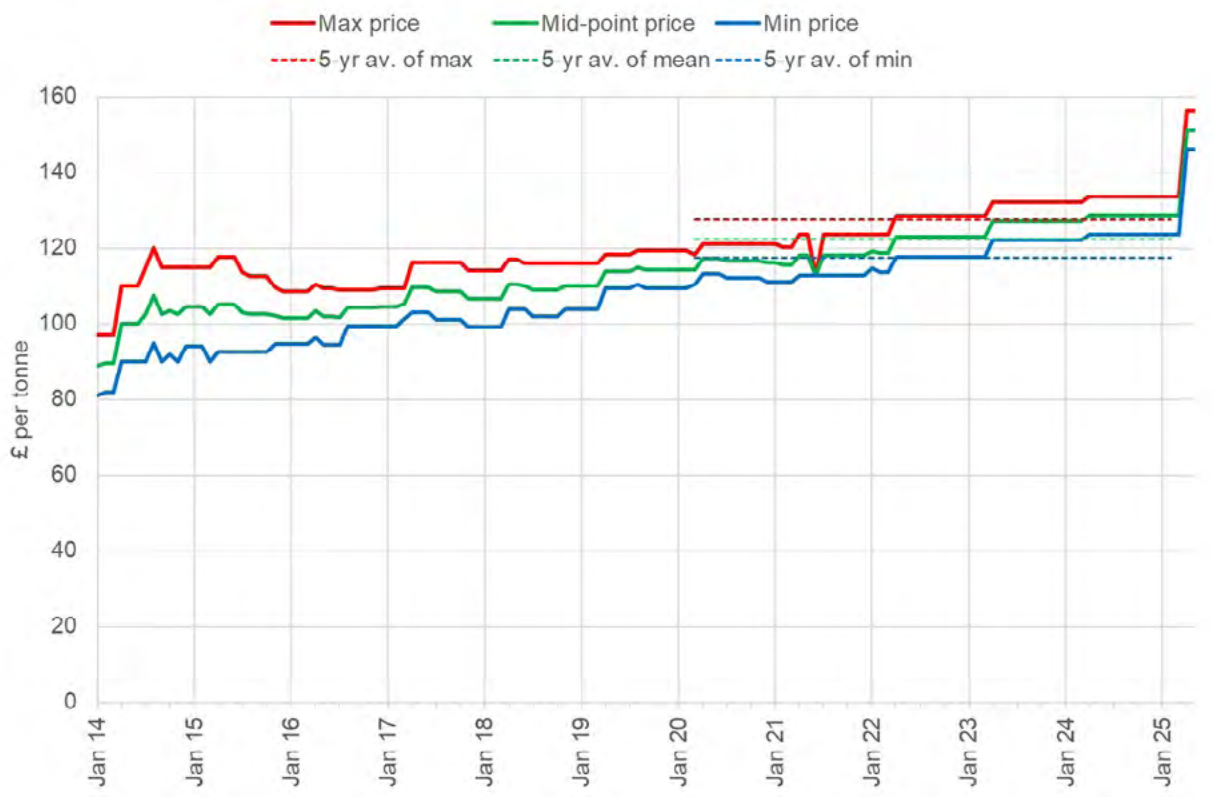


Figure 21. Landfill gate fee plus landfill tax, £/tonne



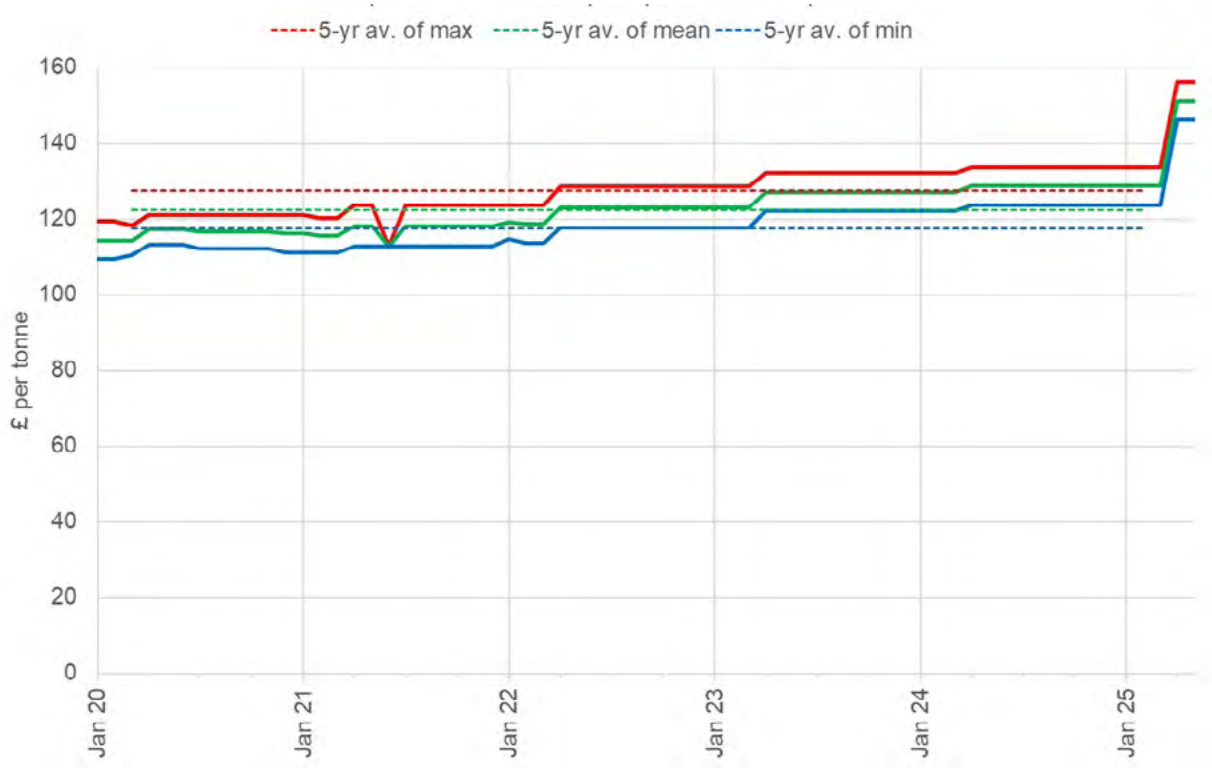
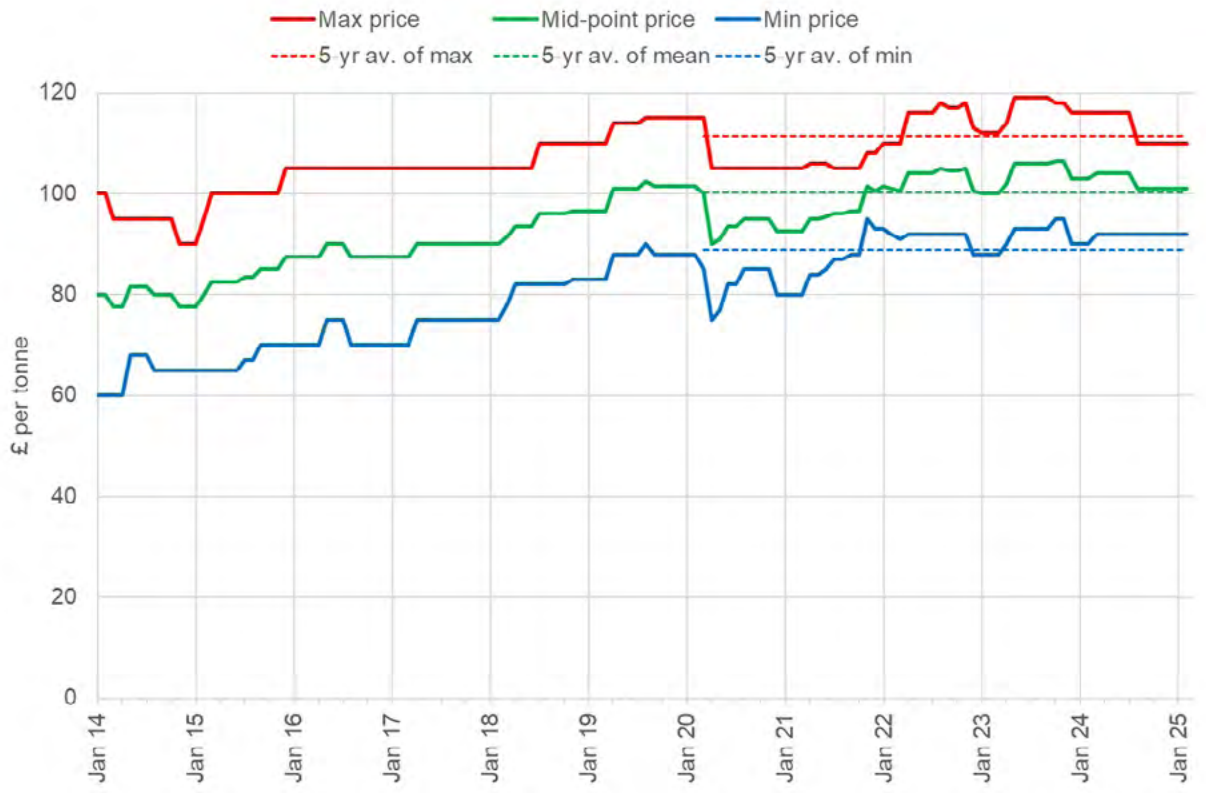


Figure 22. Incineration (Energy from Waste) gate fee, £/tonne



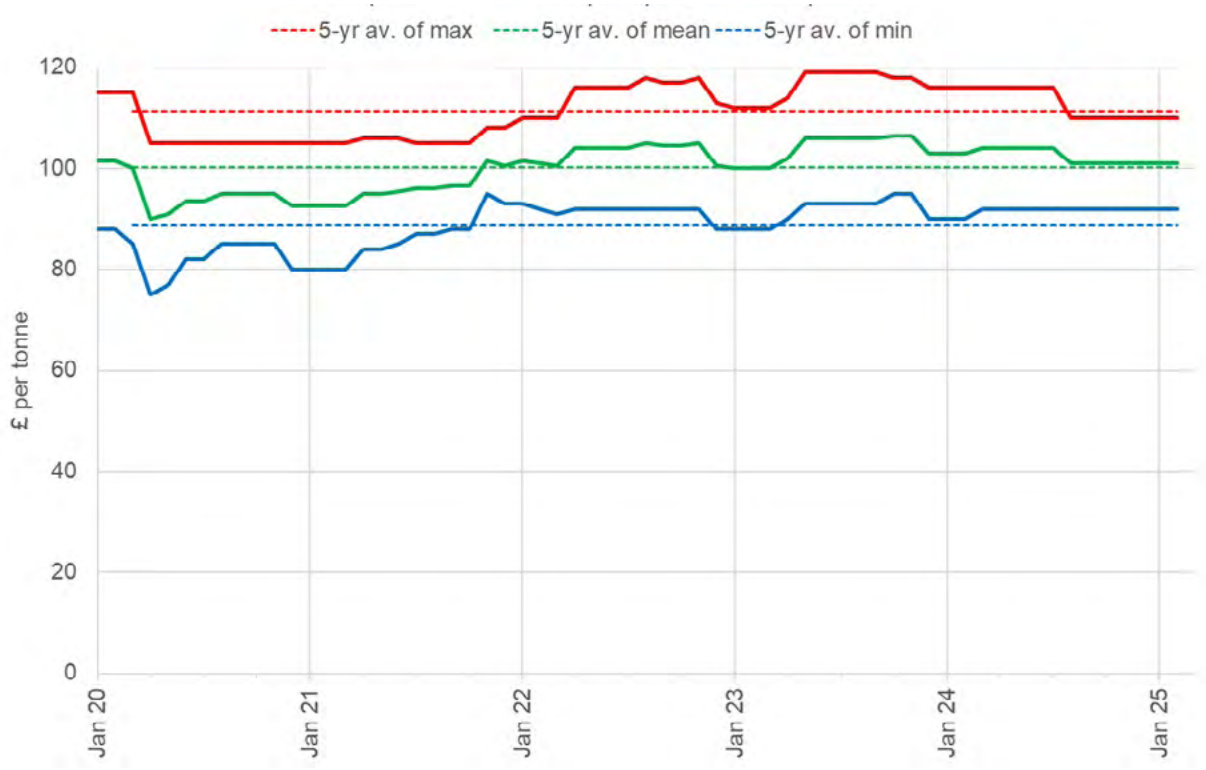
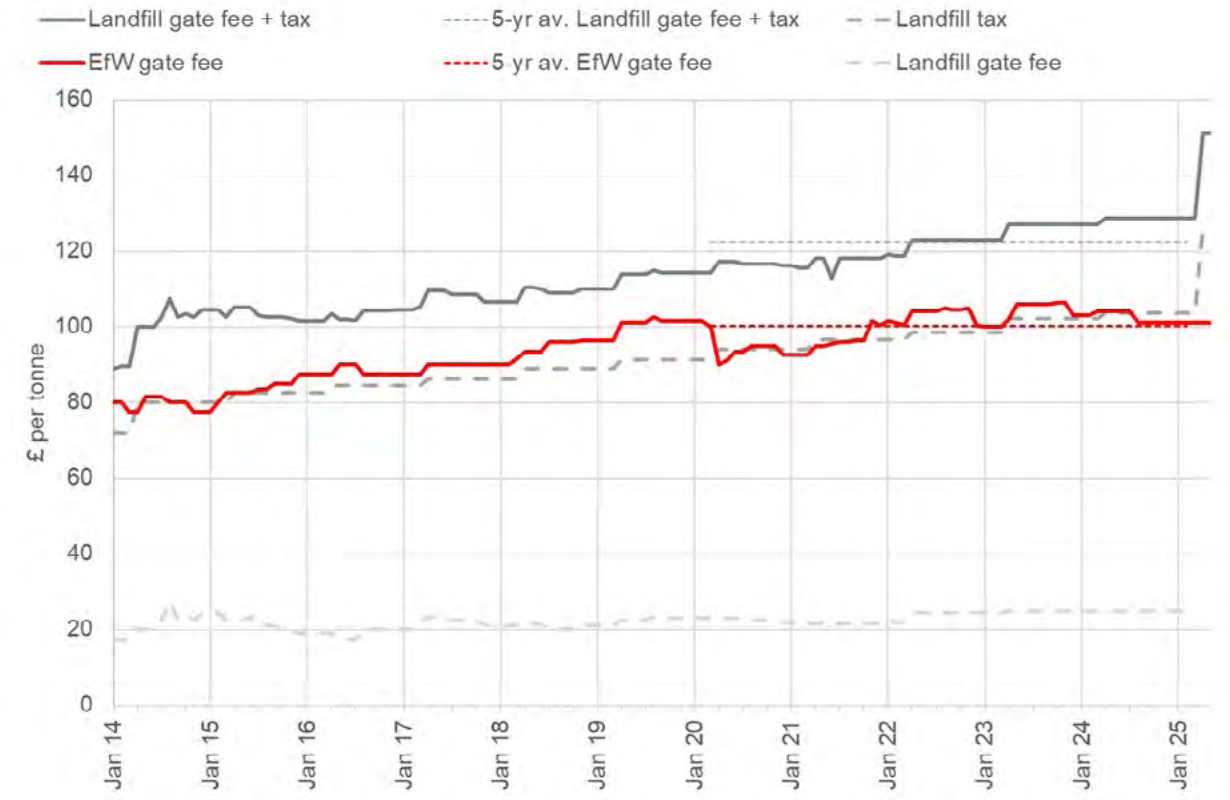


Figure 23. Comparison of disposal costs, £/tonne



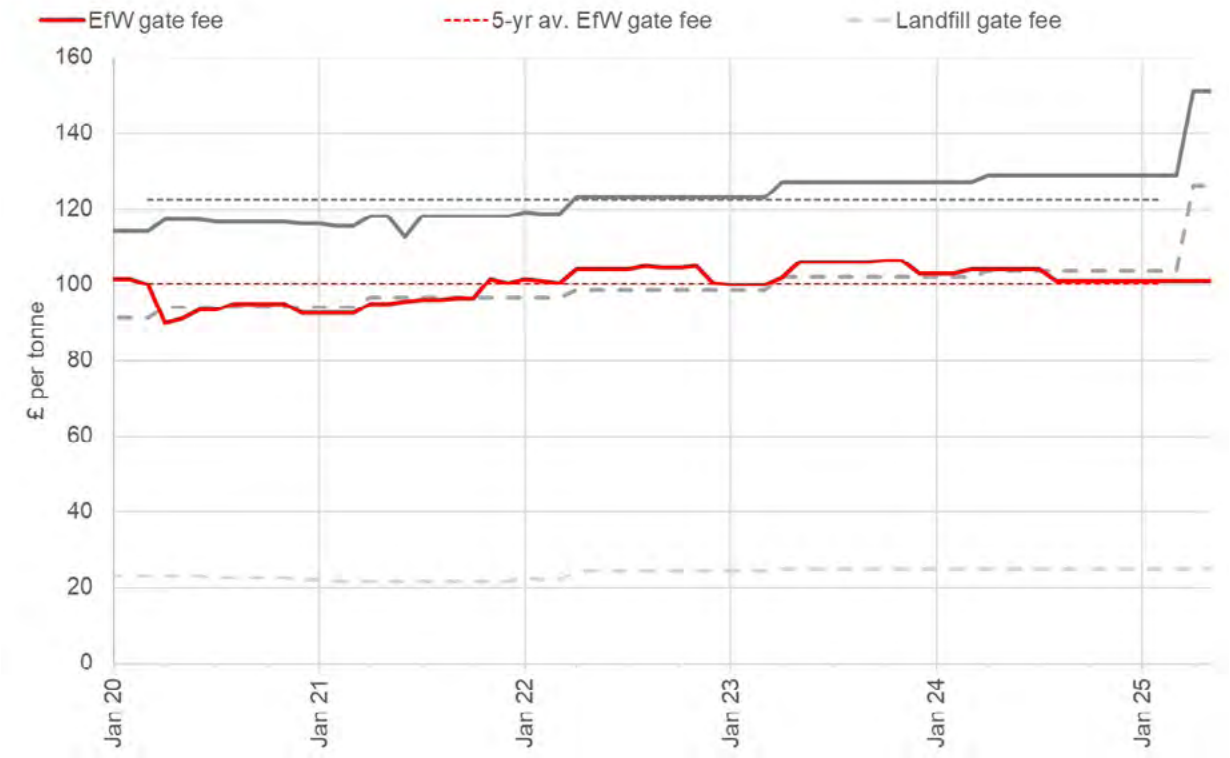
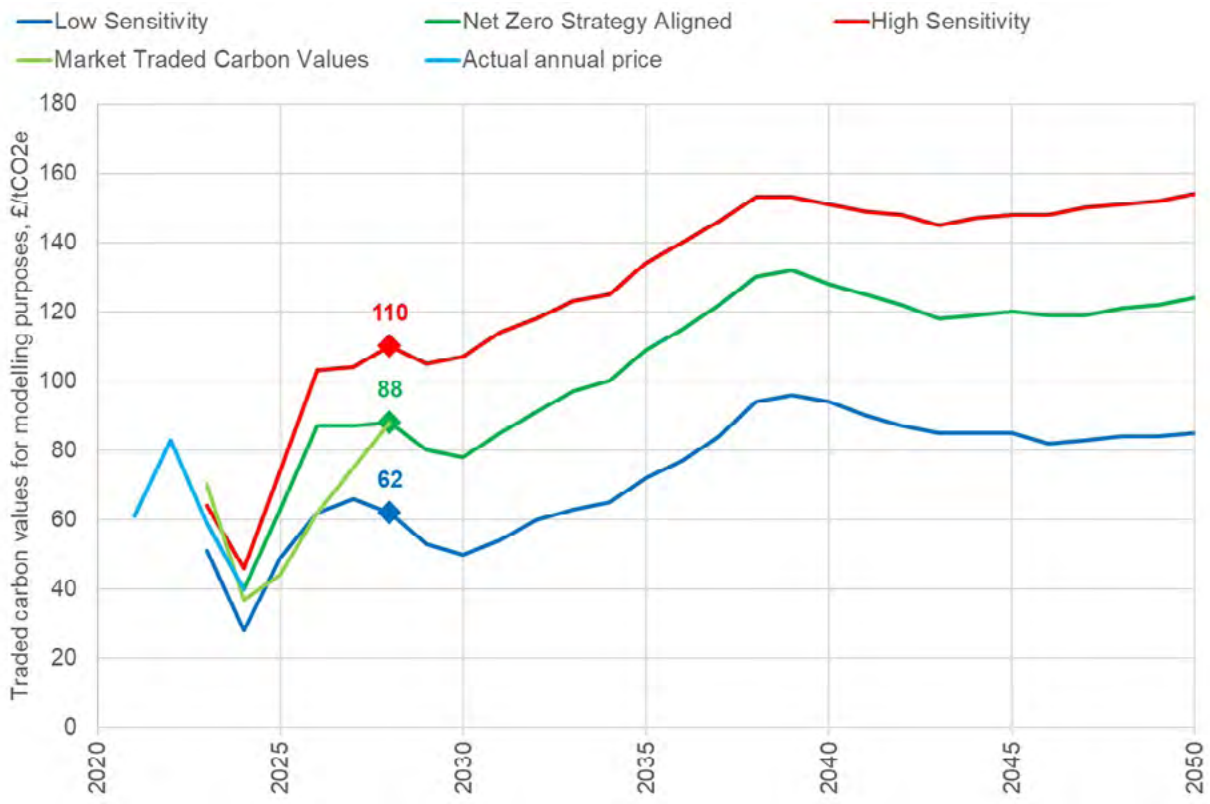


Figure 24. ETS traded carbon values



Annex D: Model outputs

The following pages provide detailed outputs from the model in tonnes and percentages.

Tonnages of DRS materials consumed and waste streams used for disposal, without and with a DRS are shown in Table 9.

Table 10 and Table 11 show the management of DRS materials in recycling and residual streams, without and with a DRS.

The outputs are summarised in Tables 1, 2 and 3 in the main body of the report.

Table 9. DRS materials consumed and managed, without and with a DRS (tonnes)

	Without DRS					With DRS					
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Tonnes per 100,000 household	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Change in total	Change per 100,000 household
Household consumption	181,988	105,412	1,623	289,022	1,140	181,988	105,412	1,623	289,022	0	0
Takeaway consumption	1,570	11,208	1,724	14,502	57	1,570	11,208	1,724	14,502	0	0
Total consumption	183,557	116,619	3,347	303,524	1,197	183,557	116,619	3,347	303,524	0	0
Disposed in commercial stream (inc. non-LA litter)	27,612	20,442	467	48,522	191	2,761	2,044	47	4,852	-43,670	-172
Disposed in household waste and recycling streams exc. litter	139,027	83,959	2,410	225,396	889	13,903	8,396	241	22,540	-202,856	-800
Disposed in LA litter stream	16,917	12,218	470	29,606	117	1,692	1,222	47	2,961	-26,645	-105
Disposed in household waste and recycling streams inc. litter	155,945	96,177	2,880	255,002	1,006	15,594	9,618	288	25,500	-229,501	-905

Table 10. Management of DRS materials, without and with a DRS, totals (tonnes) and averages (%)

	Without DRS					With DRS					
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Tonnes per 100,000 household	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Change in total	Change per 100,000 household
Recycling from commingled and segregated streams	107,937	62,888	1,586	172,412	680	10,794	6,289	159	17,241	-155,171	-612
Return rate in household waste streams exc. litter	78%	75%	66%	76%		78%	75%	66%	76%	0%	
Disposed in household residual streams exc. litter	18,687	17,194	733	36,615	144	1,869	1,719	73	3,661	-32,953	-130
Disposed in LA litter stream	16,917	12,218	470	29,606	117	1,692	1,222	47	2,961	-26,645	-105
MRF processing proportion of DRS materials collected for recycling	88%	89%	89%	89%		88%	89%	89%	89%	0%	
Input to MRF	107,848	59,647	1,497	168,992	0	10,785	5,965	150	16,899	-152,093	0
DRS materials MRF reject rate	12%	7%	6%	10%		12%	7%	6%	10%	0%	
Rejected from MRF	12,403	3,877	90	16,369	65	1,240	388	9	1,637	-14,732	-58
Output from MRF	95,446	55,770	1,407	152,622	602	9,545	5,577	141	15,262	-137,360	-542
Processed via mini-MRF (at WTS)	12,492	7,119	180	19,790	78	1,249	712	18	1,979	-17,811	-70

Table 11. Management of DRS materials in residual streams, without and with a DRS, totals (tonnes) and averages (%)

	Without DRS					With DRS					
	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Tonnes per 100,000 household	PET drinks bottles	Aluminium drinks cans	Steel drinks cans	Total	Change in total	Change per 100,000 household
Incineration proportion of MRF rejects	87.8%	87.8%	87.8%	87.8%		87.8%	87.8%	87.8%	87.8%	0.0%	
Incineration proportion of residual waste	59.8%	59.8%	59.8%	59.8%		59.8%	59.8%	59.8%	59.8%	0.0%	
Landfill proportion of residual waste	8.2%	8.2%	8.2%	8.2%		8.2%	8.2%	8.2%	8.2%	0.0%	
Alternative treatment proportion of residual waste	32.0%	32.0%	32.0%	32.0%		32.0%	32.0%	32.0%	32.0%	0.0%	
Processed by alternative residual waste treatments	11,401	9,418	385	21,205	84	1,140	942	39	2,120	-19,084	-75
Diverted from residual waste	800	5,814	134	6,748	27	80	581	13	675	-6,073	-24
Diversion rate from residual waste by alternative treatment	7.0%	61.7%	34.7%	31.8%		7.0%	61.7%	34.7%	31.8%	0.0%	
Recycled	108,738	68,702	1,720	179,160	707	10,874	6,870	172	17,916	-161,244	-636
Incinerated	42,784	24,601	1,050	68,436	270	4,278	2,460	105	6,844	-61,592	-243
Landfilled	4,423	2,874	109	7,406	29	442	287	11	741	-6,665	-26

Annex E: Sensitivity analyses

Tables 10 to 12 provide the results of the sensitivity analyses to show the impact on the average recycling rate and total net costs.

These tables show the DRS materials recycled in the household stream as a percentage of total household waste, the net cost of DRS materials without DRS and with a DRS, the change in costs from introduction of a DRS and the percentage change from the core model net costs. Negative net costs represent an overall income to English local authorities.

Total net costs are provided without the ETS expanded to waste incineration of fossil-sourced materials, and with ETS costs for waste incineration. These are shown separately because the actual mechanism to be used to allocate ETS carbon costs to waste incinerators are not yet fully known, nor the mechanism by which these will likely be passed on to local authorities. If these costs are based on a generic fossil carbon factor for municipal waste, it will be difficult to achieve savings to local authorities from removing PET bottles from incinerator streams due to diversion to a DRS. Thus keeping these costs separate allows the potential impact of ETS to be understood and the costings can be adjusted in the future when there is more clarity on the charging mechanisms.

The core modelling indicates that implementing the DRS with a return rate of 90per cent would on average reduce the recycling rate by 0.7 per cent and the total net income would reduce by £61.4 million with the DRS but without ETS and £52.7 million with the DRS and ETS.

Table 12 shows the impact of varying the DRS return rate:

- Varying the DRS return rate from 50 per cent to 95 per cent results in the recycling rate reducing by between 0.40 per cent (with a return rate of 50 per cent) and 0.76 per cent (with a return rate of 90 per cent). The reduction in total net income would be between £34.1 and £64.8 million without ETS and between £29.3 and £55.6 million with ETS, that is between 44 per cent lower reduction than the core model with the implementation of the DRS and 6 per cent higher.
- Varying the DRS return rate for each material in turn to 85 per cent while keeping the average DRS return rate at 90 per cent results in a reduction in net costs without ETS of between £59.2 and £64.9 million without ETS and between £50.1 and £56.7 million with ETS (from 5 per cent lower to 8 per cent higher than the core model).

Table 13 shows the impacts of detailed sensitivity analyses varying tonnages, proportions and rates up or down by 10 per cent, varying income or costs per tonne up or down by 10 per cent, and varying income or costs per tonne by chosen high and low values as detailed in Table 8 in Annex C.

- Varying tonnages and proportions up or down by 10 per cent resulted in changes in the recycling rate from implementing the DRS varying from -0.65 per cent to -0.79 per cent and a reduction in net costs without ETS of between £52.6 and £70.2 million without ETS and between £41.6 and £63.8 million with ETS (+/-21 per cent from the core model).
- Varying income or costs per tonne up or down by 10 per cent resulted in a reduction in net costs without ETS of between £52.4 and £70.4 million without ETS and between £43.7 and £61.6 million with ETS (+/-17 per cent from the core model).
- Varying income or costs per tonne by the chosen high and low values detailed in Table 8 in Annex C resulted in a reduction in net costs without ETS of between £50.2 and £69.2 million without ETS and between £41.5 and £60.5 million with ETS (from 21 per cent lower to 15 per cent higher than the core model).

Table 14 shows the impacts of a DRS on local authorities operating different collection types, based on a local authority of 100,000 households.

- The core model indicates a reduction in net income from introducing DRS of £242,000 without ETS and £208,000 with ETS.
- Authorities with fully commingled collections and a £90/tonne MRF gate fee have a variation from the core model of 4 per cent lower reduction in net income without ETS and 5 per cent lower with ETS.
- Authorities with twin stream collections with paper/card separate and a £65/tonne MRF gate fee have a variation from the core model of 3 per cent greater reduction in net income both without and with ETS.
- Authorities with twin stream collections with glass separate and a £125/tonne MRF gate fee have a variation from the core model of 13 per cent lower reduction in net income both without and 16 per cent lower with ETS.
- Authorities collecting fully segregated using kerbside sort and mini-MRF processing costs of between £15 and £30 per tonne have a higher reduction in net income than the core model, of between 25 per cent and 29 per cent without ETS and between 33 per cent and 37 per cent with ETS.

Table 12. Impacts of varying DRS return rates on average recycling rate (%) and total net costs (£m)

	DRS materials recycled in household stream as % of total household waste			Net cost of DRS materials: without DRS, £m		Net cost of DRS materials: with DRS, £m		Change in costs from introduction of DRS, £m		% change from core model net costs	
	Without DRS	With DRS	Change	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS
Core values (DRS return rate 90%)	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£6.8	-£5.9	£61.4	£52.7	0.0%	0.0%
Varying DRS return rate from 50% to 95%											
DRS return rate 50%	0.80%	0.40%	-0.40%	-£68.2	-£58.5	-£34.1	-£29.3	£34.1	£29.3	-44.4%	-44.4%
DRS return rate 60%	0.80%	0.32%	-0.48%	-£68.2	-£58.5	-£27.3	-£23.4	£40.9	£35.1	-33.3%	-33.3%
DRS return rate 70%	0.80%	0.24%	-0.56%	-£68.2	-£58.5	-£20.5	-£17.6	£47.8	£41.0	-22.2%	-22.2%
DRS return rate 80%	0.80%	0.16%	-0.64%	-£68.2	-£58.5	-£13.6	-£11.7	£54.6	£46.8	-11.1%	-11.1%
DRS return rate 85%	0.80%	0.12%	-0.68%	-£68.2	-£58.5	-£10.2	-£8.8	£58.0	£49.7	-5.6%	-5.6%
DRS return rate 90%	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£6.8	-£5.9	£61.4	£52.7	0.0%	0.0%
DRS return rate 95%	0.80%	0.04%	-0.76%	-£68.2	-£58.5	-£3.4	-£2.9	£64.8	£55.6	5.6%	5.6%
Varying DRS return rate for individual material to 85% while keeping the average DRS return rate at 90%											
PET drinks bottles DRS return rate 85%[1]	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£3.3	-£1.9	£64.9	£56.7	5.7%	7.6%
Aluminium drinks cans DRS return rate 85%[2]	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£9.1	-£8.4	£59.2	£50.1	-3.7%	-4.8%
Steel drinks cans DRS return rate 85%[3]	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£6.8	-£5.8	£61.5	£52.7	0.1%	0.1%

1 DRS return rate for PET drinks bottles 85%; metal drinks cans DRS return rates 97.9% for 90% overall.
2 DRS return rate for aluminium drinks cans 85%; PET and steel drinks containers DRS return rates 93.0% for 90% overall.
3 DRS return rate steel drinks cans 85%; PET and aluminium drinks containers DRS return rates 90.1% for 90% overall.

Table 13. Results of sensitivity analyses indicating impacts on average recycling rate (%) and total net costs (£m)

	DRS materials recycled in household stream as % of total household waste			Net cost of DRS materials: without DRS, £m		Net cost of DRS materials: with DRS, £m		Change in costs from introduction of DRS, £m		% change from core model values	
	Without DRS	With DRS	Change	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS
Core values	0.80%	0.08%	-0.72%	-£68.2	-£58.5	-£6.8	-£5.9	£61.4	£52.7	0.0%	0.0%
Varying tonnages, proportions and rates up or down by 10%											
Maxima	0.87%	0.09%	-0.65%	-£58.4	-£46.2	-£5.8	-£4.6	£70.2	£63.8	14.4%	21.1%
Minima	0.72%	0.07%	-0.79%	-£78.0	-£70.8	-£7.8	-£7.1	£52.6	£41.6	-14.4%	-21.1%
Varying income or costs per tonne up or down by 10%											
Maxima	0.80%	0.08%	-0.72%	-£58.3	-£48.6	-£5.8	-£4.9	£70.4	£61.6	14.6%	17.0%
Minima	0.80%	0.08%	-0.72%	-£78.2	-£68.5	-£7.8	-£6.8	£52.4	£43.7	-14.6%	-17.0%
Varying income or costs per tonne by chosen high and low values											
Maxima	0.80%	0.08%	-0.72%	-£55.8	-£46.1	-£5.6	-£4.6	£69.2	£60.5	12.7%	14.8%
Minima	0.80%	0.08%	-0.72%	-£76.9	-£67.2	-£7.7	-£6.7	£50.2	£41.5	-18.3%	-21.3%

Table 14. Net costs of DRS materials per 100,000 households for local authorities with different collection types

	Net cost of DRS materials: without DRS, £		Net cost of DRS materials: with DRS, £		Change in costs from introduction of DRS, £		% change from core model values	
	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS	Total without ETS	Total with ETS
Core values	-£269,000	-£231,000	-£27,000	-£23,000	£242,000	£208,000	0.0%	0.0%
Commingled collections								
Fully commingled, £90/tonne MRF gate fee	-£260,000	-£222,000	-£26,000	-£22,000	£234,000	£200,000	-3.7%	-4.8%
Two-stream, paper/card separate, £65/ tonne MRF gate fee	-£279,000	-£241,000	-£28,000	-£24,000	£251,000	£217,000	3.4%	3.5%
Two-stream, glass separate, £125/tonne MRF gate fee	-£234,000	-£196,000	-£23,000	-£20,000	£211,000	£176,000	-13.6%	-16.4%
Segregated collections								
Fully segregated, £30/tonne mini-MRF handling cost	-£327,000	-£286,000	-£33,000	-£29,000	£294,000	£257,000	24.9%	32.6%
Fully segregated, £25/tonne mini-MRF handling cost	-£331,000	-£289,000	-£33,000	-£29,000	£297,000	£260,000	26.2%	34.0%
Fully segregated, £20/tonne mini-MRF handling cost	-£334,000	-£292,000	-£33,000	-£29,000	£301,000	£263,000	27.5%	35.5%
Fully segregated, £15/tonne mini-MRF handling cost	-£337,000	-£296,000	-£34,000	-£30,000	£304,000	£266,000	28.7%	37.0%

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