

Analysis of Compliance with the Targets for the Separate Collection Rate of Plastic Beverage SUPD Bottles up to 3 Litres in Spain.

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Report For

Zero Waste Europe



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About Eunomia Research and Consulting

Eunomia are internationally recognised as experts on the circular economy, packaging, and recycling policy. We work extensively at the European level and with governments around the world on evidence-led policy design, appraisal, and evaluation.

We have extensive experience in the design and implementation requirements of the EU's Single-Use Plastic Directive and the revised Packaging and Packaging Waste Directive.

We have a particular interest in plastics policy, and have worked with the Commission, national governments, municipalities, business, and NGOs on plastic collection and recycling systems, in particular for PET beverage bottles.

About Zero Waste Europe

Zero Waste Europe (ZWE) is the European network of communities, local leaders, experts, and change agents working towards a better use of resources and the elimination of waste in our society. We advocate for sustainable systems; for the redesign of our relationship with resources; and for a global shift towards environmental justice, accelerating a just transition towards zero waste for the benefit of people and the planet. www.zerowasteurope.eu

About Alianza Residuo Cero

Zero Waste Alliance is made up of Friends of the Earth, CECU, Ecologistas en Acción, Greenpeace, Per la Mar Viva, Retorna, Rezero and Surfrider, and is the Spanish representative of Zero Waste Europe. We believe in a zero waste future in which all products and services have been redesigned to reduce the rate of waste generation through prevention, reuse, repair, composting and sustainable and responsible management of resources.

Executive Summary

In 2019 the European Union (EU) adopted the Single-Use Plastics Directive (SUPD) that, amongst many other measures, established mandatory targets for the separate collection of single-use plastic beverage bottles of up to three litres (referred to in this report as “SUPD Bottles”).¹ It also established associated reporting requirements and in 2021, detailed calculation rules through an implementing act (EU) 2021/1752.² These provisions of the SUPD were implemented in Spanish law through Article 59 of Law 7/2022 on separate collection of plastic bottles.³

Accurate statistics, calculated in accordance with the legislation, are therefore essential to comply with both Spanish domestic and EU legal obligations. However, stakeholders have expressed significant doubts about current calculation methodologies and source data used to inform Spain’s official statistics in this area. This report therefore provides an independent assessment of existing data sources and the preliminary calculations by Ecoembes (the PRO for lightweight packaging) on the separate collection rate for single-use plastic beverage bottles.

The findings from this analysis are concerning. Firstly, they reveal significant limitations in the current Spanish packaging and packaging waste data and monitoring processes, especially regarding transparency. As a result, it is difficult to have confidence in the reported statistics.

Secondly, the calculation methods used to determine the reported separate collection rate are not consistent with good practice in the EU, with several important factors not accounted for in the methods used. These factors make a substantial difference to the evaluation of whether Spain is deemed to be on course to meet its domestic and EU obligations on separate collection.

Thirdly and most importantly, they show that the preliminary figures presented to date over-estimate Spanish performance to a significant degree. This risks creating a false impression that separate collection is on track in Spain, when in fact it appears that urgent policy interventions are likely be required for Spain to meet its legal obligations.

The analysis conducted in this report presents Enomia’s ‘best estimate’ calculation based on EU calculation and reporting requirements, drawing on good practice used in other major European economies.

This analysis also stress-tests the sensitivity of this best estimate to a range of alternative data sources and calculations, to rigorously examine uncertainty in the data and test whether a significantly different outcome is plausible. The best estimate available for separate collection in Spain in this study is 36% for 2021, far below the 70% target for 2023 in Spanish law, and the 77% target for 2025 in Spanish and EU law.

Taken together, these findings strongly suggest that Spain has an urgent need to undertake measures, such as a Deposit Return System, to considerably improve separate collection performance if it is to meet its legal obligations, as well a need to address significant issues with its approach to statistical analysis and reporting on separate collection of SUPD Bottles.

¹ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

² European Commission, 2021, Commission Implementing Decision (EU) 2021/1752 of 1 October 2021, [Implementing decision - 2021/1752 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eli/dec/2021/1752/en)

³ Jefatura del Estado, 2022, Law 7/2022, of April 8, on waste and contaminated soils for a circular economy., <https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809>

Approach

This study set out to provide an independent analysis of the separate collection rate reporting in Spain for single-use PET beverage bottles of up to three litres. This particular segment of single-use plastic waste is important because it is the majority of the stream that is the focus of specific Spanish and EU legislation and mandatory targets.

The analysis is tailored to the Spanish market by only assessing PET beverage bottles up to three litres ("PET SUPD Bottles"). PET makes up 94% of all SUPD Bottles placed on the market in Spain, making it a valid indicator of the total SUPD rate.¹ Although it would be best practice to account for the remaining 6% (HDPE SUPD Bottles), there is insufficient data publicly available to do so. Additionally, Ecoembes' reported 71.1% separate collection rate is only for PET SUPD Bottles and does not include HDPE SUPD Bottles. Therefore, assessing only PET SUPD Bottles in this assessment allows for a direct comparison to the Ecoembes reported figures, whilst still representing the majority of the SUPD bottle market, and can be done robustly using available data sources.

To frame this analysis, Eunomia conducted a review of the key legal provisions in EU and Spanish legislation relating to separate collection of single-use plastic beverage bottles. A thorough assessment of data sources was then undertaken, with a range of stakeholders engaged with in order to support cross-checking of our data sources, calculations and assumptions.

Legal requirements for separate collection and reporting in the EU

The SUPD requires that Member States demonstrate that by 2025 they have achieved a separate collection rate of 77% for SUPD Bottles.

Spanish legislation not only requires that monitoring and reporting take place against SUPD targets, but additionally specifies that if a collection rate for SUPD Bottles of 70% is not achieved by 2023 then a new waste collection system in the form of a deposit return scheme (DRS) would be introduced. A DRS would see a small refundable deposit charged to consumers when drinks in plastic bottles are purchased, and returned to consumers when the empty bottle is correctly returned for subsequent recycling. DRS is widely acknowledged as the most reliable means of achieving high separate collection rates of beverage containers and Spain's law was therefore designed to ensure that sufficient action would be taken ahead of the EU target for 2025.

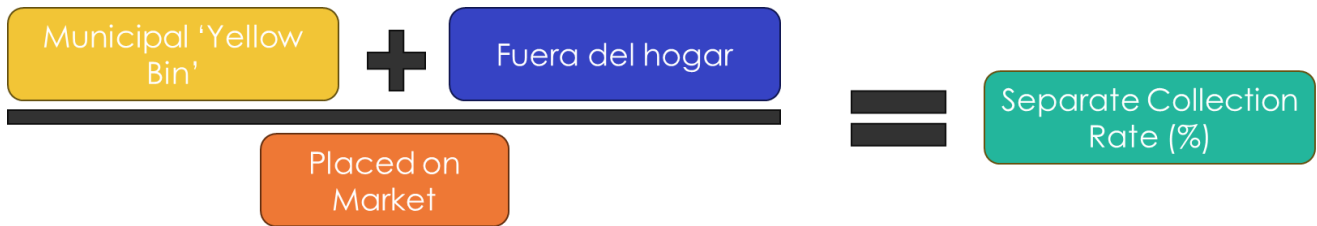
Both Spanish and EU law set clear requirements for the separate collection of plastic bottles up to 3 litres in size, covering both what constitutes 'separate collection' and the precise packaging items that should be included (single use beverage bottles up to 3 litres in size, including their caps and lids). The trigger point in Spain for the implementation of DRS for plastic beverage bottles is therefore theoretically clear, relating to the non-accomplishment of the SUPD bottle collection target in 2023. The Ministry must assess and make public the status of compliance with the targets set for 2023 by 31 October 2024. The calculation of those percentages shall be carried out in accordance with the methodology set out in Implementing Decision (EU) 2021/1752.

What is clear is that **three key headline figures are needed to calculate the separate collection rate in Spain** (see Figure 1-1).

- The numerator (amount separately collected) is based on the weight of target materials that are collected separately. In Spain there are two routes of interest: the **municipal 'yellow bin' stream** from households and businesses, and the **private stream called 'fuera del hogar'**, or 'outside of home' which comprises collections from select venues.

- The denominator is the weight of target materials that are **placed on the market** (POM). This includes all SUPD Bottles sold to consumers in Spain, regardless of how – or if – they are collected post-consumption.

Figure 1-1: Components of the separate collection calculation



However, the question of how these requirements should be applied in practice to produce transparent, reliable estimates has not yet been made clear enough by the Spanish authorities.

To date, the Ministry has not implemented the methodology of the Implementing Decision (EU) 2021/1752 to enable the Autonomous Communities to report the required data, which is essential to ensure a reliable, homogeneous and reliable reporting of the objectives of Article 9 of the SUP Directive.

This report sets out a clear, transparent, and replicable approach, that complies with all available requirements, and that can be updated as new primary data becomes available to calculate the separate collection of SUPD Bottles for the financial years 2022 and 2023. In this report the calculation is provided for 2021, using the most recent available data.

Calculating the separate collection rate for PET SUPD Bottles

To date Ecoembes has reported a separate collection rate of 71.1% for 2021 for PET SUPD Bottles. **The current study identifies that this estimate is far too high, and instead arrives at a best estimate of 36%, far below the Spanish targets for 2023 and 2025.**

Calculating the amount of material placed on the market

All stakeholders agree that some PET SUPD Bottles are placed on the market in Spain without being officially reported – so-called 'free-riding'. An estimate of these tonnages should be included in calculations of the collection rate. This study proposes 15% as a credible figure for the amount of undeclared material, according to the "Study on fraud in the field of extended producer responsibility (EPR) of household packaging in the Spanish market" commissioned by the MITERD to the consulting firm ENT (published in December 2022), which would raise the estimate of position in the market (i.e. the denominator in the calculation) up to **178 kilotonnes (kt)**, compared to the 154kt estimated by Ecoembes.⁴ Making just the one change to include this in the separate collection calculation would reduce the separate collection rate reported by Ecoembes to 62%. This is already below the 70% target for 2023 established in Law 7/2022.

⁴ MITECO, Estudio sobre el fraude en materia de responsabilidad ampliada del productor (RAP) de los envases domésticos en el mercado español, 2022, [2300623informefrauderapmaquetado_tcm30-569728.pdf](https://www.miteco.gob.es/contenidos/2300623informefrauderapmaquetado_tcm30-569728.pdf) ([miteco.gob.es](https://www.miteco.gob.es))

Calculating the amount of material collected in municipal yellow bins

The number of PET SUPD Bottles collected from municipal 'yellow bins' are not currently measured directly, and a calculation therefore needs to be built step-by-step:

- The calculation starts by removing moisture and dirt within the plastic packaging output stream of sorting plants. This step is first based on the scope of data available.
- From this, the amount sorted into PET bales is then estimated.
- Other contamination (e.g., non-PET items) and non-bottle PET materials (e.g. PET trays) in bales need to be accounted for and removed.
- Finally, not all PET bottles are eligible for the SUPD separate collection target, so two further components must be accounted for and removed – non-beverage bottles, and beverage bottles above 3 litres.

Credible Spanish data sources exist for most of these variables. Eunomia has drawn on these data in developing its best estimate of the current separate collection rate for PET SUPD Bottles, drawing on extensive experience from across the EU to make adjustments necessary to fill all data gaps. The best estimate in this report of the amount of material eligible for inclusion in the separate collection target for SUPD Bottles is **47,000 tonnes, 16,000 tonnes less than those declared by Ecoembes**.

Calculating the amount of material collected *fuera del hogar*

Reporting of *fuera del hogar* material is not transparent, and previous published figures significantly overestimate its potential contribution to separate collection. Key problems with the data presented by Ecoembes for this fraction include:

- **The lack of data transparency**, with no published audit or detailed underlying data.
- **Unfeasibly high reported tonnages of material** relative to the better understood and analysed municipal yellow bin stream; in addition, a small number of Autonomous Communities appear to account for a very large proportion of the reported tonnage, suggesting a lack of consistency in approaches to reporting. Similarly, historic data shows unexpected jumps in performance, with no real ability to explain or interrogate changes.
- Finally, given the adjustments discussed above that are required for the municipal yellow bin stream, adjustments to headline reporting to account for similar **contamination and non-target material** should also be made.

Due to the lack of detail, the data published by Ecoembes is impossible to cross-examine or verify.

Despite the difficulties in studying this flow of material, in which Ecoembes declares 47,000 tonnes, all the avenues we have explored to try to obtain estimates, place us in a range of between 9,000 and 18,000 tonnes, that is, between 38,000 and 29,000 tonnes lower than the amount Ecoembes declares, which does not have any technical proportion with the metrics of the yellow container.

We consider the best estimate of separate collection of PET SUPD Bottles in this stream to be 18,000 tonnes. It should be noted that there is significant uncertainty in this flow and that we have opted for the most conservative figure. If we had opted for 10,000 tonnes less, the impact on the rate of separate collection of PET SUPD Bottles would be in the order of 5.6 percentage points lower, i.e. even further away from the objectives of Spain 2023 and the European Union 2025.

Separate collection rate of PET SUPD Bottles

Using the data and methodology outlined above to calculate the denominator and numerator for the separate collection rate calculation, **this study's best estimate for the separate collection rate in Spain is 36% for 2021** – well below the 2023 target of 70%.

This methodology is repeatable once 2022 and 2023 data are available. The approach is also repeatable for HDPE SUPD Bottles, again when data is available. This research has not identified clear reasons to expect a significant improvement in collection for 2022 and 2023.

Figure 1-2 Best Calculation of Separate Collection Rate for PET SUPD Bottles



This result has been obtained with a very rigorous and conservative methodology. In this way, sources or hypotheses with less traceability and representativeness have been discarded.

We wanted to take advantage of the extensive research work carried out to explore other alternative scenarios. Thus, by changing some assumptions for the calculation of the contribution to the numerator of the "municipal yellow bin", estimates of 31%, 33%, 34% and 37% were obtained. In an extreme scenario, combining all the sources and hypotheses that would yield the highest index, 40% has been obtained.

This study assumes free-riding at 15%, using a Spanish source. It is widely accepted that free-riding takes place, perhaps even to a greater extent than shown. However, even if free-riding is ignored, the other elements of the preferred calculation here would mean the separate collection rate being achieved was still only 42%, far below the 70% target.

Scope for data improvement

There is a need to improve primary data for all SUPD Bottles – but better data will not change conclusions.

Placed on market data should account for free-riding as described above and some EU countries have well developed research methods for better estimating this. Understanding of the municipal yellow bin stream would be significantly improved by more detailed, frequent, and standardised compositional data analysis on inputs and outputs at sorting plants. Currently neither MITERD nor Autonomous Communities have an agreed comprehensive approach for this. This must also fully align with the legal requirements specifying 'separate collection'. A better understanding of composition in relation to SUPD Bottles would also help sense-check placed on market data and the extent free-riding. Finally, the *fuera del hogar* data must be opened up so that it can be cross-examined and assessed in a comparable way to municipal yellow bin collections.

These limitations apply to 2021 data and will not have been resolved in time for the 2022 and 2023 data that is expected soon. However, just as we have been able to calculate 2021, we are in a position to calculate 2022 and 2023.

In light of this, it will be a significant challenge for MITERD to arrive at a robust estimate for separate collection of SUPD Bottles for 2022 (due in early 2024) or 2023 (due later in 2024). It is clear that they will not be able to adopt the Ecoembes data for the numerator, as they are currently communicated. As for the denominator, MITERD must apply a criterion of prudence, according to the report commissioned by its own ministry to ENT in 2022, applying a correction of 15% in what is put on the market to account for free riding.

However, in the interim, it is possible to conclude that the separate collection rate of SUPD Bottles will miss the 2023 target by a very significant margin.

Key findings and Recommendations

In the light of this work, we are in a position to estimate that Spain is very unlikely to have met its own mandatory separate collection target (70%) for SUPD Bottles in 2023. This study shows performance in 2021 against this target was only around 36%.

While there are limitations in the data available in Spain to calculate the separate collection rate of SUPD Bottles, they do not limit our ability to reach to conclude that the target is currently being missed by a wide margin. These data limitations should however suggest that Spain's ability to report a robust and precise separate collection rate to the EU (a requirement from 2024 onwards) should be viewed with caution.

As analysed in this report, Spain's 2023 target of 70% separate collection seems certain to be missed.

This scenario coincides with the scenario of the well-known MITERD report carried out by TRAGSATEC, which already stated in 2022 that with the current system it is not possible to meet the targets of separate collection of SUPD Bottles. This conclusion led Spanish legislation to set an intermediate target in 2023, so that, if it is not met, an DRS would be put in place within two years, to ensure compliance with the target of 77% separate collection of SUPD Bottles in 2025.

A DRS is the only change to collection systems that would enable Spain to move rapidly from a collection rate of 36% in 2021, to the target of 77% set for 2025.

In addition, the implementation of a DRS will eliminate the difficulty of reporting to the European Union because it is the most reliable and transparent system, which allows for more detailed statistics, since both marketed and returned packaging are counted at the level of individual packaging items.

Acronyms

Acronym	Meaning
CCAA	Autonomous Communities
CEAP	Circular Economy Action Plan
DRS	Sistema de Deposito, Devolucion y Retorno – in English this is referred to as a DRS: Deposit Return Scheme.
RAP / EPR	RAP: Responsabilidad Ampliada del Productor. In English this is referred to as EPR: Extended Producer Responsibility
EU	European Union
HDPE	High-density polyethylene
MITERD	Ministerio para la Transición Ecológica y el Reto Demográfico
LDPE	Low-density polyethylene
PET	Polyethylene terephthalate
POM	Placed on the Market
PPWD	Packaging and Packaging Waste Directive – EU Legislation regulating packaging waste. First version dates from 2018, this has been revised several times and is now leading to the Packaging and Packaging Waste Regulation.
PRO / PRO	Sistema Colectivo de Responsabilidad Ampliada del Productor, In English this is referred to as an PRO: Producer Responsibility Organisation
SUPD Bottles	Single-use plastic Directive Bottles – this category of packaging is defined in the EU Single Use Packaging Directive as single-use plastic beverage bottles under 3 litres.

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1.0 Introduction

1.1 Single-use plastic Bottles: What is the Problem?

The poor management of plastic waste has significant negative environmental impacts, and also represents a lost economic opportunity. In addition to material pollution from items that are littered, or escape from proper management channels, plastic that ends up in landfill or incineration represents wasted resources, with new items to replace those thrown away requiring new material extraction. This is a particular issue for packaging, which accounts for 40% of plastic use globally, and is overwhelmingly single use. This over-consumption of resources generates both damaging carbon emissions and other negative environmental and pollution impacts for both nature and people. A more circular and more sustainable system is possible, and an essential first step is to ensure that plastic packaging is collected effectively, and can be directed to high quality recycling processes, that ensure material can be used repeatedly over multiple product cycles.

In Spain, in Europe, and internationally, the need for change is increasingly acknowledged. Both Spain and the EU have set legal targets aimed at driving improvements in the separate collection of plastic packaging waste, including plastic bottles specifically. No targets have yet been set globally, but tackling plastic pollution is the focus of ongoing negotiations for a global plastics treaty. Accurate measurement is essential to judge progress against these targets, and crucially to determine the extent to which additional action is needed to meet them. While preliminary figures do exist in Spain for collection rates for plastic bottles, there is concern that current calculations are over-optimistic and over-report actual performance as a result. This approach to calculation is therefore insufficient for the requirements of both Spanish and European law.

Spanish law and European requirements are closely linked in this area. EU legislation requires all Member States to reach specific 'separate collection' targets for certain container types. Separate collection means that specific items that can be recycled are collected in separate containers from the main waste stream so as to maximise the amount and quality of material going to recycling. The EU currently leaves a large degree of freedom to Member States on how targets are achieved but does oblige Member States to monitor and report progress. Spain is therefore obliged under the Single Use Plastics Directive (SUPD) to report on the 2022 separate collection of SUPD Bottles by June 2024.⁵ This is to inform progress toward the EU-wide 2025 collection rate target of 77%.

Responding to this, **Spanish legislation not only requires that monitoring and reporting take place, but additionally specifies that if a collection rate for SUPD Bottles of 70% is not achieved by 2023 then a new waste collection system in the form of a deposit return scheme (DRS, or SDDR in Spanish) would be introduced.** A DRS would see a small refundable deposit charged to consumers when drinks in plastic bottles are purchased, and returned to consumers when the empty bottle is correctly returned for subsequent recycling. The collection arrangements in a DRS not only incentivise consumers to return containers – with established schemes elsewhere in Europe regularly delivering return rates of over 90% - but also ensure that collected material is high quality and suitable for the high value recycling, including repeat use of material in drinks bottles. DRS schemes have also been shown to reduce the amount of material lost as litter.

Spain's law was designed to ensure that sufficient action would be taken ahead of the EU target for 2025. In turn, the EU is now considering, as part of the Packaging and Packaging Waste Regulation

⁵ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

revision, requiring all Member States to introduce a DRS if they fail to reach collection rates of 90% for targeted drinks containers, including plastic bottles, by 2029.

Given the centrality of an accurate understanding of the collection rate for both Spanish domestic and European legal obligations, and stakeholder concerns about current calculation methodologies and source data, **this report has independently assessed both the methodology and calculations available to estimate Spain's plastic bottle collection rate. The findings from this analysis are concerning.**

- Firstly, **the limitations of current Spanish packaging and packaging waste data and monitoring do not make it possible to calculate accurate national estimates for plastic beverage bottles collection rates.**
- Secondly, **the figures presented to date over-estimate Spanish performance.**

This report therefore calculates a best estimate of possible performance that rigorously accounts for uncertainty in the data. This best estimate figure is significantly lower than previously reported figures.

Taken together, these findings imply that Spain will find it impossible to effectively deliver collection rate targets in the required time frame, due to shortfalls in measurement approaches, and a corresponding failure to trigger required policy interventions.

In summary:

- **The analysis of published national waste data conducted for this report demonstrates that Spain is very unlikely to have met its own legal collection target in 2023.**
- **The issues this analysis has highlighted show that in order to reach this national target a radical overhaul of waste data collection and management is required.**
- **Spanish legislation sets a provision for an overhaul of waste management that is required for Spain to meet its international commitments, and this should be acted upon.**
- **Unless this action is taken Spain is unlikely to be able to meet international commitments on collection for SUPD Bottles.**

1.2 Why Does this Data Problem Exist?

Currently Spain's reporting of packaging waste data is almost entirely dependent on the packaging producer responsibility organisation (PRO) in Spain, Ecoembes. Unfortunately, the methodology they employ has significant weaknesses in terms of source data, assumptions, hypothesis validation, representativeness of sampling and replicability. There are two main areas of weakness in the system that give rise to concerns around the validity of this methodology.

- **The first significant weakness is that there is no independent oversight of the data trail managed by the PRO.** Currently, Ecoembes gathers data from the Autonomous Communities (CCAA), and private waste managers, and from this derives figures that go directly to the Spanish Ministry, MITERD, who then report to the EU. There is no transparency in how the data is aggregated and calculated before submission to MITERD. Similarly, the collection rate figures are reliant on accurate POM data, yet this data is entirely managed by Ecoembes with no route for independent verification. This means there has been a lack of challenge and scrutiny around the original numbers submitted, and opportunities for conversations between all stakeholders about how to improve the underlying data position have been missed.
- **The second significant weakness is that the current data compilation and reporting system does not allow for a proper calculation of collection targets, or the disaggregation of data with relating to specific container type as required by EU law.** These structural issues make it difficult to accurately assess the collection rate for SUPD Bottles alone.

In the meantime, over-optimistic estimates have been adopted for official reporting. This in turn means there has been a lack of official recognition that progress towards targets has been insufficient, and as a consequence, an absence of additional action taken to improve collection rates.

It is noteworthy that a DRS would not present the same monitoring problems, as very accurate data on both containers placed on the market and containers returned is collected as part of its regular functioning.

1.3 How Does this Report Contribute to Resolving this Problem?

This project set out to provide an independent analysis of collection rate reporting in Spain for SUPD Bottles. To support this analysis the team also conducted a review of issues in the existing reported data. Stakeholders were also contacted to see if additional cross checking of assumptions was possible. The limited response to some of these requests was in itself interesting and reflects some of the issues in the collection and management of packaging waste data.

The report is structured as follows:

- Section 2: This section draws out the **key legal provisions** in the EU and Spanish legal texts relating to the collection rate of SUPD Bottles.
- Section 3: Existing reported collection rates are scrutinised highlighting **issues in the interpretation and management of waste data.**
- Section 4: The **independent calculated collection rate** method and results are presented.

2.0 Legal Framework for Reporting Collection Rates

This section draws out the key legal provisions in the EU and Spanish legal texts relating to the collection rate of SUPD Bottles. The gaps and ambiguities in legal provisions for the reporting of collection data are explored, casting light on why this is an area of contention. Since the key EU legislation shaping this work is the SUPD and this uses the general term 'beverage containers' to cover bottles and composite beverage packaging, this report uses the term 'SUPD Bottles' to be synonymous with plastic beverage bottles.

The focus of this report is the calculation of a **separate collection rate**, according to the Commission Implementing Decision (EU) 2021/1752. This is distinct from a recycling rate, as not all the material collected will end up being used in recycling processes. The recycling rate is however ultimately constrained by the collection rate – it is impossible to recycle more material than is collected. See Box 1.

Box 1: What is a Collection Rate?

To calculate a collection rate for separately collected materials, the figure for the amount of the target material that is separately collected is divided by the total amount of that material placed on the market originally (POM), as shown here:

$$\text{Collection Rate} = \frac{\text{Separately Collected}}{\text{POM}}$$

- The *numerator* (amount separately collected) is based on the weight of target materials that are collected separately from waste streams in the country of interest.
- The *denominator* is the weight of target materials that are put for sale within the country of interest (POM). In this study we are focussing on all SUPD Bottles sold to consumers in Spain, regardless of how – or if – they are collected post-consumption.

2.1 EU Packaging Circularity and Waste Requirements

This section briefly summarises the policy background for changes in EU requirements around plastic bottles before highlighting the two key pieces of legislation: the revised Packaging and Packaging Waste Directive (2018) ⁶ and the Single-use plastic Directive (2019).⁷

⁶ European Parliament and Council Directive 94/62/EC, 2018, [EUR-Lex - 01994L0062-20180704 - EN - EUR-Lex \(europa.eu\)](#) Amended Directive [Directive - 2018/852 - EN - EUR-Lex \(europa.eu\)](#)

⁷ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

Policy Background

The European Commission adopted its first Circular Economy Action Plan (CEAP) in 2015, outlining a wide-reaching vision for improvements in the environmental performance of products used in the EU across their lifecycles.⁸ Within the CEAP, **plastics were highlighted as a priority sector for action** due to specific challenges associated with their management at end of life. At the same time, **the need for a more stringent approach to packaging waste legislation was also identified**.

As a result, the Commission committed to develop a strategy on plastics in the circular economy, addressing issues such as recyclability, biodegradability, the presence of hazardous substances of concern in certain plastics, and marine litter, and the European Strategy for Plastics in a Circular Economy was published in January 2018.⁹

The 'Plastics Strategy' underlined the need for a separate legislative initiative to tackle the growing problem of single-use plastics, and, with plastic pollution high on the political agenda, the Single Use Plastics Directive (SUPD) was proposed in May 2018. At the same time, the Commission's revised 'Circular Economy Package' of waste legislation was adopted, including revisions to the Packaging and Packaging Waste Directive. The SUPD was adopted a year later, in 2019, and Member States were given till 2021 to transpose its requirements into national law. The period between 2015-2019 was therefore one of rapid and significant changes in legislation pertaining to the environmental performance of single-use plastic packaging in the EU.

Headline Requirements

Two pieces of EU legislation have therefore driven recent policy on single-use plastic beverage bottles:

- The **revised Packaging and Packaging Waste Directive (PPWD)** set higher recycling targets for all plastic packaging (doubling from 25% in 2020 to 50% in 2025), whilst simultaneously tightening the requirements underpinning the calculation and reporting of attainment against these, thereby making them more challenging to meet.
- The **new Single Use Plastics Directive (SUPD)** also introduced several requirements that are applicable to plastic packaging. Many of these focussed on single-use plastic beverage bottles, which are required to:
 - include tethered caps (2024),
 - incorporate recycled content (25% in PET bottles by 2025, and 30% in all Single-use plastic beverage bottles by 2030), and
 - be separately collected for recycling (77% by 2025, 90% by 2029).

Plastic bottles are highlighted as of particular importance because they make up a significant proportion of littered waste, and the material can be used for closed loop recycling if separate collection arrangements are in place to ensure a clean waste stream.

⁸ European Commission, 2015, [First circular economy action plan - European Commission \(europa.eu\)](#). A revised CEAP was adopted in 2020 [EUR-Lex - 52020DC0098 - EN - EUR-Lex \(europa.eu\)](#)

⁹ The Commission to the European Parliament, 2018, A European Strategy for Plastics in a Circular Economy, <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN>

The requirement for the separate collection of single-use plastic beverage bottles in the SUPD was linked closely to the revised recycling targets in the PPWD, with the former envisioned to support the attainment of the latter. In this regard, the recitals in the SUPD state that separate collection targets

“Will have a direct, positive impact on the collection rate, the quality of the collected material and the quality of the recyclates, offering opportunities for the recycling business and the market for the recyclates. It will support reaching the recycling targets for packaging waste set in Directive 94/62/EC to support the attainment of the overall recycling targets) by 2024-25.”

2.2 EU Legal Requirements Specific to SUPD Plastic Beverage Bottles

The above headline requirements require two key determinations in practice that are relevant for this report: what counts as a single-use plastic beverage bottle, and what counts as separate collection. In addition, requirements on when reporting should occur have also been defined by the EU.

These details are set out in two legislative instruments:

1. **The SUPD:** EU Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment.¹⁰
2. **Commission Implementing Decision:** (EU) 2021/1752 of 1 October 2021 laying down rules for the application of Directive (EU) 2019/904 of the European Parliament and of the Council as regards the calculation, verification and reporting of data on the separate collection of waste single-use plastic beverage bottles.¹¹

1. The SUPD: Definition of Items requiring separate collection and reporting requirements.

The SUPD defines the plastic items that require particular legal attention due to their negative environmental impact. Article 9 sets requirements for the separate collection for certain items as specified in Annex PART F:

Beverage bottles with a capacity of up to three litres, including their caps and lids, but not:

(a) glass or metal beverage bottles that have caps and lids made from plastic,

(b) beverage bottles intended and used for food for special medical purposes as defined in point (g) of Article 2 of Regulation (EU) No 609/2013 that is in liquid form.

For these items Article 13 states that within 18 months of the end of a reporting year the Member States are required to report to the European Commission the following:

¹⁰ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

¹¹ European Commission, 2021, Commission Implementing Decision (EU) 2021/1752 of 1 October 2021, [Implementing decision - 2021/1752 - EN - EUR-Lex \(europa.eu\)](https://eur-lex.europa.eu/eli/dec/2021/1752/en)

(c) data on single-use plastic products listed in Part F of the Annex that have been separately collected in the Member State each year, to demonstrate the attainment of the separate collection targets in accordance with Article 9(1);

This means that by June 2024 the Spanish Government is required to report the 2022 collection rate for these bottles to the EU. Within Spain, the Producer Responsibility Organisation (PRO or SCRAP in Spanish) is required to report the preceding year's data by March of the following year (e.g. reporting on 2023 by March 2024). Spain as a country would then be expected to report on 2023 activity to the EU by June 2025 since the SUPD states that official report should be delivered 18 months after the end of the reporting year. MITERD will have the PRO's data for 2023 in March 2024, and will have until June 2025 to elaborate and deliver the report on 2023.¹² Given this schedule, it is expected that MITERD would start the reporting process after April and before the end of the year 2024.

2. Commission Implementing Decision: Method for calculation, verification and reporting of data.

This legal text seeks to provide a harmonised approach to the implementation of the SUPD across the EU Member States. Since the collection systems of different Member States are organised differently the legislation relies on generalised terminology which can be open to a degree of interpretation in different contexts. The key articles of relevance are;

- Article 2.4 establishes when the waste single-use bottles shall be considered as separately collected under certain conditions.
- Article 3 provides the 'Methodology for the determination of the weight of single-use bottles placed on the market'
- Article 4 details the 'Sampling methodology and waste composition analysis to calculate the weight of waste single-use bottles collected as mixed municipal waste or disposed of as litter'

In Section 2.3, after outlining the Spanish legislations of relevance, there is a discussion of how these provisions are dealt with in the Spanish situation.

2.3 Spanish Legal Requirements Specific to Plastic Beverage Bottles

This section reviews the relevant Spanish legislation (including technical guidelines) on the separate collection of waste single-use plastic beverage containers, exploring in detail the provision for the triggering of a DRS. It also compares the approach to calculating the collection rate that is contained in the Spanish legislation with that laid out in the SUPD (article 9), and in the associated Implementing Decision 2021/1752, with the aim of identifying any potential weaknesses or areas of confusion that this may bring.

The two main pieces of Spanish legislation transposing the above EU policies are:

¹² Numerator: Ecoembes is required by article 21 .1 h) of the Royal Decree 1055/2022 to report SCRAPvide to MITERD the separate collection of SUPD Bottles before 31st of May. Denominator: According to the Second Transitional Provision within Royal Decree 1055/2022, there is a reporting obligation of SCRAP's producers to report in 2021 and 2022. POM 2023 is to be reported before the end of the first quarter of 2024

1. **Law 7/2022**, of April 8, on waste and contaminated soils for a circular economy.¹³
 - Law 7/2022 comprises the main provisions transposing the SUPD and Commission Implementing Decision (EU) 2021/1752.
2. **Royal Decree 1055/2022**, of December 27, on packaging and packaging waste.¹⁴
 - This royal decree is specific for packaging and packaging waste. There are several relevant articles cross-referencing Law 7/2022 and expanding several aspects related to the SUPD, the calculation of targets and the implementation of a DRS. Also, the role of the Spanish Autonomous Communities is defined.

The Spanish legislation is described further and compared with that at the EU level below. Note that since legislation in Spain is published in the official language (Spanish), the analysis below is based on an English translation.

2.4 Comparing EU and Spanish Legal Provisions

Several articles in the Commission Implementing Decision (EU) 2021/1752 are relevant given the Spanish context in relation to packaging waste management and operations as well as related data collection, reporting and verification.

2.4.1 EU and Spanish Collection Targets Compared

These are largely aligned, with Spain having set intermediate targets to support EU target achievement. As an overview, Table 1 compares the EU legal targets for collection of plastic beverage bottles, with the targets set out in the Spanish legislation. The intermediate targets set in Spanish legislation are designed to ensure progress towards the EU targets. These collection targets are not the same as recycling targets, but in order to achieve high recycling targets sufficient high-quality material needs to be collected.

Article 59 in Spanish law defines the separate collection targets on SUPD Bottles (applied to those materials defined in Annex IV-E) as 70% by 2023; 77% by 2025; 85% by 2027; 90% by 2029. This is aligned with the targets for the separate collection of Single-use plastic beverage bottles defined in Article 9 and Part F of the Annexes to the SUPD (77% by 2025, 90% by 2029). Annex IV, E defines plastic products subject to the targets in line with the definition in Part F of the SUPD Annex, including:

“Beverage containers with a capacity of up to three litres, including their caps and lids, but not:

a) Glass or metal beverage containers with caps and lids made of plastic.

b) Beverage containers intended for and used for food for special medical purposes, as defined in Article 2(g) of Regulation (EU) No 609/2013 of the European Parliament and of the Council of 12 June 2013, which are in liquid state.” (Annex IV-E).

¹³ Jefatura del Estado, 2022, Law 7/2022, of April 8, on waste and contaminated soils for a circular economy., <https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809>

¹⁴Ministry for the Ecological Transition and the Demographic Challenge, 2022, Royal Decree 1055/2022, of December 27, on packaging and packaging waste, https://www.boe.es/diario_boe/txt.php?id=BOE-A-2022-22690

Table 1 Legal Targets for the Collection Rate of SUPD Bottles

Target Year	Target Collection Rate in EU Legislation (Article 9 and Part F of Annexes to SUPD) ¹⁵	Target Collection Rate in Spanish Legislation (Article 59, Law 7/2022 and Section E of Annex IV) ¹⁶
2023		70%
2025	77%	77%
2027		85%
2029	90%	90%

2.4.2 EU and Spanish Provision for a DRS Compared

A key point of difference in the target requirements is that the SUPD gives member states the option of implementing a DRS to achieve these targets, without making the establishment of such systems contingent on their achievement, whereas Spanish law includes an explicit ‘trigger’ for the introduction of a DRS, if targets are not met by other means.

The EU States:

“In order to achieve that objective, Member States may inter alia:

a) establish deposit-refund schemes (...)”

The legislation in Spain, however, includes a provision triggering the implementation of a DRS if the targets are not met:

“In the event that the objectives set in 2023 or 2027 are not met, at the national level, a deposit and return system for these containers will be implemented throughout the territory within a period of two years that guarantees compliance with the objectives in 2025 and 2029, in accordance with what is established by the regulations regarding packaging and packaging waste. For the implementation of these systems, in addition to plastic containers, other packaging and packaging waste may be included, to guarantee technical, environmental and economic viability of DRS in case of non-accomplishment of the targets” (Article 59.2).

An approach requiring DRS where collection rate targets are not met is also being considered at EU level as part of the Packaging and Packaging Waste Regulation.

The Spanish law clearly lays out that should specific collection targets not be achieved then a DRS should be implemented. The Seventeenth additional provision (Conditions for the implementation of the complementary deposit, refund and return system) of the Act 7/2022 addresses timelines for

¹⁵ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

¹⁶ Jefatura del Estado, 2022, Law 7/2022, of April 8, on waste and contaminated soils for a circular economy., <https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809>

reporting and evaluation and other general methodological provisions for the assessment of the targets.

Point 2 states: "The regulation contained in this additional provision may be subject to regulatory development." This point implies that revisions or additions to the methodology for calculation of attainment against the targets can be developed. There is a precedent for such revisions to be made, as seen in previous revisions of the methodology for calculating recycling targets on packaging waste.

Point 3 states:

"In order to evaluate compliance with the separate collection objectives set in article 59 of this Act, for the possible implementation of a deposit and return system for containers, the Ministry for the Ecological Transition and the Demographic Challenge must evaluate and make public the status of compliance with the objectives set for 2023 before October 31, 2024. Likewise, this Ministry must evaluate and make public the status of compliance with the objectives set for 2027 before October 31, 2028.

The calculation of these percentages will be carried out in accordance with the methodology established in the Commission Implementing Decision (EU) 2021/1752, of October 1, 2021, which establishes provisions for the application of Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 regarding the calculation, verification and reporting of data on the separate collection of waste from single-use plastic beverage containers."

Within the Royal Decree, Article 47 on the mandatory establishment of the deposit and return system for certain single-use domestic containers recalls Law 7/2022 and cross references other methodological provisions both in the Royal Decree and the Act.

"When the objectives established in article 10.4 of this royal decree are not met, and in accordance with the provisions of article 59.2 of Law 7/2022, of April 8, producers who introduce single-use plastic containers into the market with a capacity of up to three litres for mineral and spring water products, juices, nectars, freshly squeezed fruit and vegetable mixes, concentrates for dissolution, refreshing, energy, isotonic beverage and alcoholic beverages, must establish a deposit and return system, within a period of two years.

To guarantee the technical, environmental and economic viability of the implementation of these systems, in addition to plastic containers, cans and cartons for beverages of these products will be included.

This obligation will be fulfilled through individual or collective systems of extended producer responsibility, to which the provisions of section 2 of chapter III of this title will apply, as applicable." (Article 48.1.)

The rest of the article describes how DRS should be implemented in general terms.

2.4.3 EU and Spanish Calculation Approaches Compared

A detailed discussion of requirements follows. However, of critical importance is that these types of provisions have been developed in further technical guidelines in the past at national level. However, at time of writing (February 2024) there is no further provision on data sources and calculation for either the denominator or for the numerator of the collection rate for SUPD Bottles in Spain.

The rules deployed in Commission Implementing Decision (EU) 2021/1752 include several items that are not self-evident in the context of waste management data in Spain:

- There are several available sources and methodological approaches for calculating the denominator, POM figures (see Box 1).
- The calculation of the numerator requires ascertaining the proportion of SUPD Bottles at a specific point of the waste treatment value chain, which is at the output of packaging sorting plants, where separately collected packaging waste has been sorted (separated according to materials and polymers in the case of plastics). The calculation of this proportion does not form part of the current data collection scheme for packaging waste in Spain. This task is typically carried out through waste composition analyses based on proportional representation of SUPD Bottles input relative to other products of the same polymer input to the sorting plant using representative sampling. A detailed methodology to this end has been unavailable so far. The new consideration of data is shown in Section 4.0.

The Royal Decree 1055/2022, of December 27, on packaging and packaging waste provides more detail on reporting requirements and methodology in Spain. There are several relevant articles cross-referencing Law 7/2022 and expanding several aspects related to the SUPD, the calculation of targets and the implementation of a DRS. Also, the role of the Spanish Autonomous Communities is defined.

2.4.3.1 Guidance for Autonomous Communities in reporting of SUPD Bottles

Article 10.4 of the Royal Decree recalls Law 7/2022 regarding the separate collection targets and provides further details on possible “corrections” of the POM figures reported by producers:

“To determine compliance at the national level, the data on the separate collection of single-use plastic beverage containers reported by the Autonomous Communities and the cities of Ceuta and Melilla will be collected in accordance with the provisions of *article 49.3*¹⁷ and will include reference to the information on single-use plastic beverage containers placed on the market in that year provided by producers in accordance with article 16. The information on packaging placed on the market will be corrected, where appropriate, with any possible deviations detected, as stated in article 29.4”.

Article 16 of the Royal Decree addresses information obligations regarding the reporting from producers:

¹⁷ Article 49.3 is a minor provision pointing that Autonomous Community should validate the annual reports sent by the SCRAPs.

"Producers registered in the packaging section of the Registry, or their authorized representatives, will compulsorily compile and send the information contained in section 2 of Annex IV, corresponding to the packaging that they have placed on the market in each calendar year. This information will include in a differentiated manner, among others, that corresponding to plastic products mentioned in sections A and E of Annex IV of Law 7/2022, of April 8." (Article 16.1)

This implies that the reporting of the separate collection targets for Single-use plastic beverage containers shall be delivered separately within the annual reports delivered to the ministry and the AC. However, transparency and public access to this information is restricted, according to article 16.4:

"The information provided will not be public and will only be accessible to the competent authorities for the purposes of inspection and control."

On the role of Autonomous Communities regarding collection targets, Article 29.4 of the Royal Decree recalls Law 7/2022:

"The extended producer responsibility systems must achieve, at a minimum, the separate collection objectives established in article 59.1 of Law 7/2022, of April 8, both at the national and regional levels."

This implies that there should be a regional measurement of both POM figures and collection rates.

Given the sources and availability of data in Spain, the POM data at regional level will necessarily be based either on estimates of the proportion of POM corresponding to each Autonomous Community and how these depart from the national POM figures reported to the PRO/Ministry, or on waste composition studies. The article highlights this point:

"The determination of compliance at the national level will be carried out in the manner provided for in article 10.4. To determine compliance at the regional level, the management data obtained in accordance with the provisions of article 49.1 referring to its territorial scope will be used and will refer to the territorialized data of placing on the market that has been provided by the extended responsibility systems in accordance with the provisions of article 21.1.h), corrected with any possible deviations detected.

The corrections in this section may be estimated based, among others, on waste composition studies of all the waste streams containing waste single-use plastic beverage containers, carried out by the Autonomous Communities or, where appropriate, by the Ministry for the Transition. Ecological and the Demographic Challenge, including those associated with littering, following the methodology and procedures agreed upon within the framework of the Commission for the Coordination on waste."

Waste composition studies are foreseen as a methodological approach to correct any "deviation" detected in the POM figures, although no definition or scope of such "deviations" is provided. Litter is explicitly included within the scope of waste that should be considered to estimate POM figures and refers to the Waste Coordination Committee as the framework body for methodological decisions.¹⁸ This Committee meets to review data on waste and performance against EU targets, among other tasks.

¹⁸ Ministry for the Ecological Transition and the Demographic Challenge, 2022, Waste Coordination Commission, <https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/comision-coordinacion.html>

It should be noted that at the time of writing this report (February 2024) only one Autonomous Community - Navarra - has reviewed its waste plan and has adapted it to Law 7/2022 to be able to report on SUPD Bottles in accordance with Article 59. Their review includes a measure to record data entering sorting plants using a more granular categorisation that will facilitate accurate reporting of SUPD Bottles. The effect of the implementation in the region of Navarra is unknown so far.

So far Navarra is unique in this respect, which highlights the lack of accurate data on SUPD Bottles at the Autonomous Community level overall at present. **This lack of data places serious questions on the means by which MITERD are able to report to the EU data on SUPD Bottles for any year prior to 2024.**

2.4.3.2 Defining which collection routes are to be considered as separate collection

Given the lack of accurate data at a granular level, waste reporting has had to be based on methods that make use of the data that is available. The EU Implementing Decision (2021/1752) provides some guidance on reporting method.

Article 2.4 states that:

“The waste single-use containers shall be considered as separately collected where either of the following conditions is fulfilled:

- a) The waste single-use containers have been collected separately for recycling from any other waste.
- b) the waste single-use containers have been collected together with other waste packaging fractions of municipal waste or with other non-packaging plastic, metal, paper or glass fractions of municipal waste collected separately for recycling, and
 - (i) the collection system does not collect waste likely to contain hazardous substances.
 - (ii) the collection of waste and the subsequent sorting are designed and carried out to minimise contamination of collected waste single-use containers from waste plastics not originating from such containers and other waste.
 - (iii) quality assurance systems are set up by the waste operators in order to verify that the conditions set out in points (i) and (ii) are fulfilled.”

The system in Spain corresponds to condition (b) above, since SUPD Bottles are collected together with other light packaging waste. (More information on defining separate collection is within Section 4.2.1).

2.4.3.3 Point of Measurement for Waste Single Use Bottles

The EU Implementing Decision (2021/1752) provides some guidance on the point of measurement that should be used in data reporting.

Since the situation in Spain should be framed within the context of Article 2.4.b, discussed above, Articles 2.7 and 2.8 then apply:

Article 2.7: "The weight of waste single-use containers collected separately in accordance with paragraph 4, point (b), shall be measured at the output of the sorting operations where they are separated from the other waste with which they were collected."

Article 2.8: "Where waste single-use containers and other packaging waste of the same polymer are present at the output of a sorting operation, the weight of the waste single-use containers shall be proportional to the share of waste single-use containers at the input of a sorting operation. That share shall be determined based on representative sampling and subsequent compositional analysis or by use of electronic registries."

In Spain, SUPD Bottles are sorted along with other plastics and grouped by polymer (PET, HDPE, LDPE and plastic mix) at the output of such sorting operations. There are currently no electronic registries on the amount of SUPD Bottles materials at the point of input. Therefore, it is likely that the calculation of the numerator will need to be based on the sum of the following:

1. an estimate of SUPD Bottles materials at the output of light packaging sorting plants calculated as
 - a. Inputs of each of the polymers to sorting plants multiplied by the share of Single-use plastic beverage bottle materials contained in each polymer (estimated through waste composition studies):
 - b. Output of PET and HDPE from sorting multiplied by the % of Single-use plastic materials contained in PET and HDPE at the input to sorting.¹⁹
2. an estimate of SUPD Bottles contained in fractions that are verified as being separately collected from the so-called "private 'out-of-home' (fuera del hogar)" sector (e.g., from big venues, airports, arenas). This would be calculated as the overall collection of "private 'out-of-home' (fuera del hogar)" light packaging waste multiplied by the share of SUPD Bottles within this stream (estimated through waste composition studies). This approach would need to ensure that Article 2.4(ii) of the SUPD on minimising contamination is fulfilled and, per (iii), that there are sufficient quality assurance systems set up to verify this.
 - c. Amount collected of PET and HDPE through private 'out-of-home' (fuera del hogar) collections * % SUPD materials contained in PET and HDPE in these collections.

Currently, there are significant uncertainties about the eligibility of data reported via this route. Furthermore, the inclusion of HDPE in the Spanish setting is a question for debate, and we discuss this in more depth in Section 4.1.1.

PROs in Spain have better data on the composition of the input to packaging waste sorting plants than on the outputs.²⁰ In fact, a large amount of waste composition studies (>7k samples annually, so far not containing detail on SUPD Bottles) are carried out every year at the input of packaging waste sorting plants. Currently, these studies do not explicitly count for Single-use plastic beverage containers so that they can apply the resulting coefficients to determine the amount of Single-use plastic Beverages at the output of sorting plants, therefore these compositional studies must be

¹⁹ To this end, the exact scope of single-use plastic bottles within scope of this calculation would need to be clearly set out. For HDPE, the inclusion or exclusion of milk and dairy drinks would be particularly important. See Section 4.1.1

²⁰ Since outputs are sorted per material/polymer and are supposed to comply with the agreements on technical specifications for each of the materials, waste composition studies of the outputs are less frequent. The technical specifications per stream and material can be found here: <https://www.ecoembes.com/es/recicladores-y-recogidas-fuera-del-hogar/residuo-municipal/especificaciones-tecnicas-de-materiales-recuperados-etmr>

accordingly retargeted to determine the share of Single-use plastic Beverages. This approach would raise two additional issues for PROs:

- Currently there is a lack of a harmonised and repeatable methodology for waste composition studies (e.g., how to discount humidity and attached materials).²¹
- The fact that the above-described approach to estimate the output of sorting plants with respect to SUPD Bottles assumes that the recovery rate of a given polymer is the same for SUPD Bottles and other items made of that polymer. ²²

2.4.3.4 Use of Waste Composition Analysis to validate data

In the original Spanish law, in addition to setting the targets, Article 59.1 also implicitly allows the use of waste composition studies to calculate of the denominator of the collection rates (i.e., as a proxy for placed on the market [POM] data), stating:

“The introduction of these products into the market may be considered equivalent to the amount of waste generated from them, including those present in littering, in that same year.” (Article 59.1).

The use of waste composition studies to measure “the amount of waste generated” as a proxy for data on SUPD Bottles “placed on the market” [POM] is also foreseen in the SUPD and provided for explicitly in Commission Implementing Decision (EU) 2021/1752 (Article 3(3)).

Some aspects of Article 3 in Commission Implementing Decision (EU) 2021/1752 are relevant to Spain:

Article 3.3 “In cases where Member States determine the weight of single-use containers placed on the market on the basis of the weight of the waste generated from such products as referred to in Article 9(1), second subparagraph of Directive (EU) 2019/904, the weight of that waste shall include the following:

- a) separately collected waste single-use containers, irrespective of whether or not they meet the requirements set out in Article 2(4), points (a) and (b).
- b) waste single-use containers collected as mixed municipal waste.
- c) waste single-use containers disposed of as litter outside of waste collection systems, irrespective of whether or not they have subsequently been collected.

The weight of the containers referred to in the first subparagraph, points (b) and (c), shall be calculated by applying the sampling methodology and the waste composition analysis set out in Article 4.”

This article sets the ground for using waste composition studies to calculate POM figures. All waste streams that are likely to include single-use plastic beverage container materials should be

²¹ Ecoembes commissioned and funded a study about methods for waste composition studies which includes procedures to calculate and discount humidity and attached materials through coefficients. The study was carried out by ANEPMA (Asociación Nacional de Empresas Públicas de Medio Ambiente) and Novotec. It is worth noting that although the report mentions the need for statistical representativity, the procedures for determining humidity and attached materials, coefficients are based on a non-representative sample. The report can be found here: http://anepma.es/boletin/wp-content/uploads/2020/12/Gu%C3%ADa-composici%C3%B3n-de-residuos_v01.pdf

²² This point was already made by the SCRAP in personal communications to ENT during the study of DRS in Catalonia.

considered, along with litter. Article 4 develops waste composition analyses further for mixed waste and litter streams:

"1. The data collection for the waste composition analysis shall be based on surveys and a collection of representative samples. This data collection shall take into account:

(a) seasonal variations of waste single-use containers disposed as litter outside of waste collection systems.

(b) variations in the levels of urbanization.

(c) variations in frequency, types and location of municipal waste collection.

2. The data collection and analysis referred to in paragraph 1 shall cover the entire territory of a given Member State."

The calculation of POM figures using waste composition analyses of mixed waste and littering should therefore be statistically representative of the whole territory of the Member State and use stratification to consider seasonality, the range of rural/ urban development and differing waste collection models.²³ The most relevant consequence of this requirement is a high cost resulting from the number of samples and the amount of waste to be sampled, particularly for mixed waste, given the magnitude of this stream in Spain. This point has been addressed in previous studies about freeriding, where the relevance of having a well-funded nationwide strategy on waste composition studies for mixed waste has already been highlighted.^{24,25}

When consulted, PROs point out that the cost of sampling following the necessary statistical stratification and representation is too high and that sampling mixed waste it is not within the scope of their responsibilities.²⁶

Regarding POM data, the amount of packaging waste subject to Extended Producer Responsibility requirements that is contained in mixed waste is a key issue and is the main source of discrepancies between the available waste composition studies and the mass balances derived from the annual reports of the PROs, as found in previous studies on the subject.²⁷

²³ In ANEPMA's guidelines on methods for waste composition studies, a first approach to the required statistical stratification was already developed.

²⁴ Autoridad Independiente de Responsabilidad Fiscal (AIReF). 2023. Estudio Gestión de Los Residuos Municipales. Madrid: Autoridad Independiente de Responsabilidad Fiscal (AIReF). www.airef.es.

²⁵ Sastre Sanz, Sergio, and Ignasi Puig-Ventosa, 2022, Estudio Sobre El Fraude En Materia de Responsabilidad Ampliada Del productor (RAP) de Los Envases Domésticos Puestos En El Mercado Español, <https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sqecocir/envases/2300623%20informe%20fraude%20RAP%20maquetado.pdf>.

²⁶ <https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sqecocir/envases/2300623%20informe%20fraude%20RAP%20maquetado.pdf>.

²⁷ Mestre Montserrat, María et al, 2017, Estudi Sobre La Viabilitat Tècnica, Ambiental i Econòmica de La Implantació d'un Sistema de Dipòsit, Devolució i Retorn per Als Envases de Begudes d'un Sol Ús a Catalunya, http://residus.gencat.cat/web/.content/home/ambits_dactuacio/tipus_de_residu/envasos/gestio_denvasos/eines_de_gestio_especificades_a_la_normativa_sig-DRS/170616-Informe-DRS-ENT-final.pdf; Puig-Ventosa, Ignasi, Sergio Sastre Sanz, and Pau Morera Font, 2020, Análisis de Los Costes de Gestión de Los Residuos de Envases Ligeros En España; Sastre Sanz, Sergio, and Maria Mestre Montserrat, 2020, Anàlisi de Consistència de Les Dades d'envasos i Residus d'envasos a Catalunya; Sastre Sanz, Sergio, and Ignasi Puig-Ventosa, 2018, Anàlisi de Les Dades Sobre Envases Lleugers a Les Illes Balears, <http://www.caib.es/govern/sac/fitxa.do?codi=3609542&coduo=919&lang=ca>; Tragsatec, and ENT, 2021, Estudio de Viabilidad de La Implantación de Un Sistema de Depósito, Devolución y Retorno (DRS) En España, https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/participacion-publica/210929espana_DRS_ttecent_miterd_web_tcm30-531126.pdf; UPF-ESCI, 2017, Proyecto Ariadna "Estudio de Sostenibilidad Sobre La Introducción de Un DRS Obligatorio Para Envases En España: Análisis Ambiental, Social y Económico

2.5 Conclusions on Legal Framework

The main conclusion from this review of EU and Spanish legislation is that there is no official, consistent methodology set out for the calculation of separate collection rates for Single-use plastic beverage containers in Spain. EU law is deliberately constructed to give Member States sufficient leeway to allow implementation to follow national processes. Clearer national level guidance would therefore be beneficial particularly in identifying the specific data sources to be used and the methodological approach to be implemented.

Both the choice of data sources and methodological approach may be subject to dispute from PROs. This can be seen as both a legal and a practical problem. Not only is a common robust approach not defined in law, but the approaches currently taken in practice vary greatly and are not all sufficiently robust for official reporting. **Regulation, practice, or both will need to change to provide sufficiently accurate estimates to inform policy decisions in Spain.**

Even if the trigger point for the implementation of DRS is clear (non-accomplishment of SUPD Bottles separate collection target in 2023 (70%), to be reported by October 2024) the Spanish legislation relevant to the calculation of these targets is not sufficiently specific on the two main data points to be calculated: POM and collection.

Regarding **POM data**, there is no official regulation, guidance or informal information on the approach to be followed. There are 3 potential sources of data that could be used:

- Data reported from producers to PROs (subject to corrections by the Ministry to include free-riding).
- Data reported from producers to the Ministry's register when this database is fully operational. This data will still require adjustments to account for free riding.²⁸
- Waste composition analyses at national level (not available at the moment). These analyses should target SUPD materials and comprise all relevant waste streams, notably residual waste in particular, in order to calculate the overall amount of SUPD materials, as provided in Commission Implementing Decision (EU) 2021/1752, article 3.3.

Consideration needs to be given to the most suitable approach to data gathering in the Spanish context, given the separate collection model for light packaging waste used in Spain (all light packaging waste is collected together) and the methodological requirements in the SUPD and the Implementing Decision 2021/1752.

The authors of this report view the most suitable approach would be to use data on the proportion of SUPD Bottles at the input to sorting plants to estimate the proportion of SUPD Bottles at the output in bales. To do this it would be necessary to expand waste composition studies at the input of sorting plants and "private 'out-of-home' (fuera del hogar) collections" to include SUPD Bottles among the

Comparativo Con La Situación Actual.", <https://www.esci.upf.edu/es/catedra-unesco-de-ciclo-de-vida-y-cambio-climatico/estudio-ariadna>.

²⁸ This database has been already implemented but given its broad scope and the fact that it integrates information from all the 17 Autonomous Communities, it is expected to be fully operational after 2023 (i.e. data for 2023 will not be complete enough for purposes related to the calculation targets). In principle, the data on POM figures reported to the SCRAP and to the Ministry by producers should be the same. In a previous experience where the Ministry and the SCRAP have different registries for plastic bags, the figures reported to both registries were similar although the total amount reported increased in the first years after the implementation of the Ministry's register.

categories analysed.²⁹, One would then be able to determine the content of these within each relevant polymer group and assume the same proportion of materials after the sorting process .

In the light of these ambiguities the next section of this report provides a commentary on how the lack of methodological clarity is evident in the current implementation of the legal framework.

²⁹ This implies generating a new category explicitly addressing SUPD beverage bottles that in turn should be registered as a proportion of PET (and potentially HDPE). Therefore, the expanded composition analyses should register PET amounts (currently within the scope of waste composition analyses at input) disaggregating SUPD PET amounts and non-SUPD amounts.

3.0 Analysis of Current Separate Collection Rate Claims in Spain

Although 'collection rates' and 'recycling rates' are sometimes referred to interchangeably, they are in fact distinct concepts.

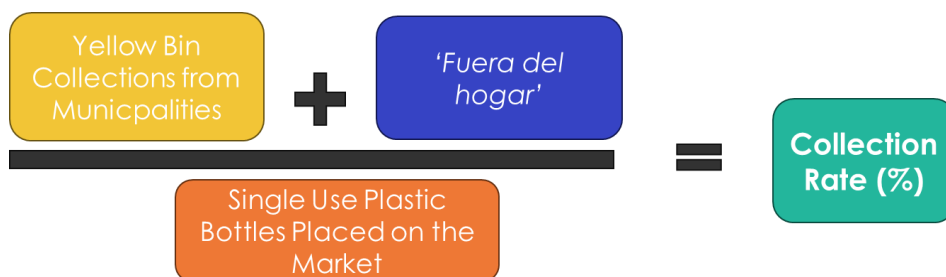
- A **separate collection rate** is defined as the percentage of items or material that is *collected* separately from residual waste streams for the purpose of recycling.
- A **recycling rate** is defined as the percentage of material that is *actually recycled and used again* to make new products. The EU have recently amended how the recycling rate should be calculated, to ensure that only material that enters the recycling process is counted.

These rates, while related to one another, are different for two key reasons:

- Firstly, the material being *recycled* can be sourced from any means of collection. For example, it can be material recovered from pre-sorting of residual waste, not just material in a recycling collection. None of this material is in scope for a *separate collection rate*, though it might increase the recycling rate achieved by the waste system as a whole.
- Secondly, some material may be lost during the recycling process and sent for disposal via landfill or incineration (e.g. when plastic is shredded into flakes, some material will be lost from the process). These losses during sorting, cleaning, and processing will typically lead to a recycling rate that is lower than the collection rate, though high quality separate collections can minimise these losses.

To calculate a collection rate for single-use plastic beverage bottles in Spain, three headline pieces of information are needed, shown in Figure 3-1

Figure 3-1 Headline Figures Needed to Calculate the Collection Rate in Spain



These are described and discussed in greater detail in the next section, but in brief:

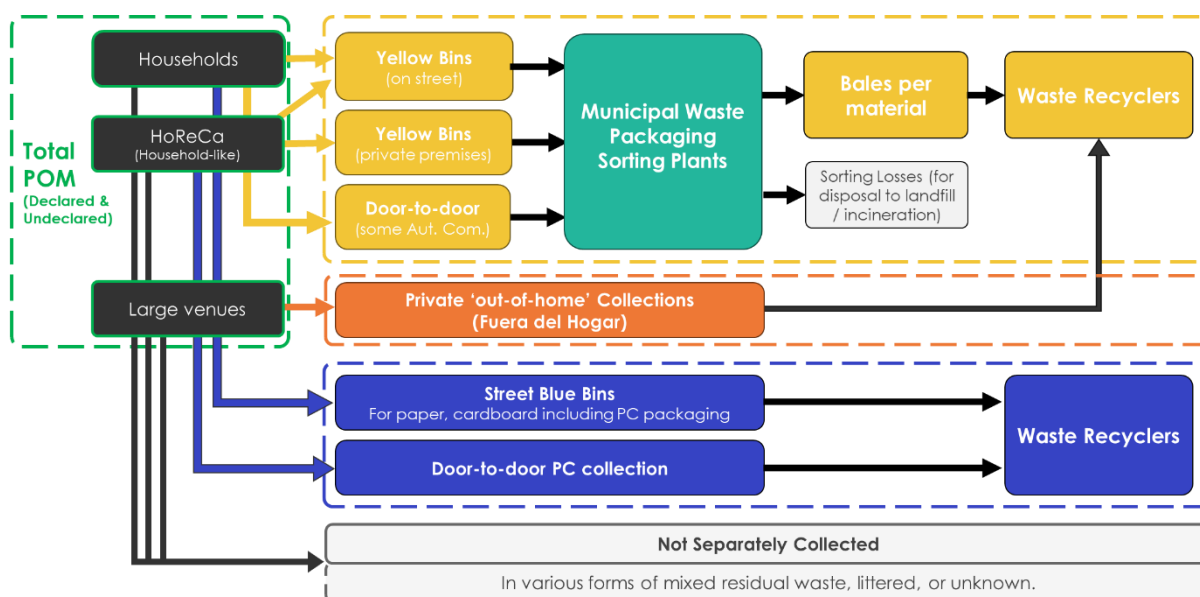
- It is essential to know the amount of single-use plastic beverage bottles **placed on the market**, as this is the denominator in the calculation.
- There are two possible routes for single-use plastic beverage bottles to be returned to separate collections in Spain. The primary one is **'yellow bin' collections** from municipalities (which include both household and commercial collections). The second possibility is **fuera del hogar**, a distinct route managed independently and relating to private collections from specific venues. Together these two components form the numerator for the calculation.

Each of these three components is considered in turn in section 4.0.

3.1 Components of the System Contributing to the Calculation

These required headline figures have to be estimated based on a more detailed breakdown of the different stages in the Spanish packaging waste collection recycling system. This system is outlined in greater detail in Figure 3-2. The figure is structured so that it can be read along with official data, using official sources labelling of flows and processes.

Figure 3-2 Scheme of Packaging Waste Flows in Spain



Source: Authors' diagram

Placed on the Market

Packaging waste is placed on the market (POM) by producers. There are three main points of consumption in terms waste management: households, HoReCa (hotels, restaurants and cafes), other commercial premises, and big venues (such as universities, stadiums, hospitals, factories, business areas, airports, etc.).

Waste generation and collection

Packaging waste generated in **households** can be split into light packaging (metal, cardboard beverage containers, plastic, wood, and other materials) or paper and cardboard packaging. The separate collection of light packaging is managed mostly through the 383,508 street 'yellow bins' provided by municipalities.³⁰

The management of packaging waste from **HoReCa and commercial premises** is similar to households and is also managed by municipalities. Street yellow bins counting towards separate collection can be shared by households and commercial premises (retail and HoReCa). Larger businesses can also have yellow bins for their own use on their 'private premises', to not saturate

³⁰ Ecoembes (2021) Certificación Y Controles De Los Datos De Reciclaje De Envases 2021, https://www.ecoembes.com/sites/default/files/inline-files/corporativo/recicla/certificacion_2021.pdf

street yellow bins, which can be managed either by municipal agreements or by agreements with private operators. Both types of yellow bins (street and private premises) are collected and sent to municipal waste sorting plants (shown in Figure 3-2).

A particular feature of the Spanish system is that some specific big venues, such as airports or football arenas, have their own separate collection services which is also funded by the PRO and called **fuera del hogar** collections. While this is commonly translated to English as 'private out-of-home' collections, this is actually only sourced from a very specific set of locations (with, for example, material from the majority of private hospitality businesses not going via this route, but via the municipally provided collection routes). *Fuera del hogar* is intended to be complementary to the municipal public collection services but not to interfere with them. However, stakeholders have raised significant concerns over whether material collected via this route is in fact separately collected, and about the proportions within this stream assumed to be specific materials, in the case of the current report, single-use plastic beverage bottles under 3 litres. These concerns are discussed in detail in section 0.

Packaging waste not being separately collected may be managed through mixed waste collections, arise in the separate collection of other waste streams (e.g., biowaste), or be disposed of as litter. Collection models where organic and inorganic waste is collected together as mixed residual waste can be referred to as 'wet & wet' collection models, as distinct from 'wet & dry' collection models where the organic and inorganic wastes are collected separately. This distinction is important when considering how to analyse data from different points in the waste stream.

Waste and recycling destinations

Focusing on light packaging, waste generated by households and most of HoReCa is transported to **packaging waste sorting plants**. In these plants, light packaging is received altogether and sorted by material (i.e., plastic, ferrous metals, non-ferrous metals, paper/cardboard, glass, wood) and packed in bales. In the case of plastics, they are segregated by polymer resulting into PET, HDPE, LDPE and plastic mix bales. The resulting bales are then sold through public bids to recycling companies. The non-sorted materials (refuse) are sent to landfill or incinerators.

For its part, waste collected through *fuera del hogar* collections is not sorted at light packaging sorting plants but managed directly by **waste managers**. Within the PRO accounts, waste from *fuera del hogar* has been so far assimilated to "recycled", which indicates an implicit assumption about *all* materials collected being packaging within the scope of Spain's extended producer responsibility (EPR) system, without any further discounting of unsolicited materials. This is highly unlikely, and it is noteworthy that there are significant disproportionate differences in the amounts reported from this route in different Autonomous Communities, implying assumptions about the nature and separation of material via these routes may differ markedly. These concerns are discussed in detail in section 4.3.

Analysing the system specifically in relation to single-use plastic beverage bottles

Single-use plastic containers are usefully viewed as a subsystem of the yellow boxes in Figure 3-2. Light packaging waste received at packaging sorting plants (i.e., inputs to sorting plants) and *fuera del hogar* collections are the two main mass flows to be considered for estimating the collection rate of SUPD materials, which includes plastic beverage bottles. However, the data available on these two streams differs markedly in its availability which affects how the data can be used to reliably estimate a separate collection rate.

3.2 Previous Estimates for Plastic Beverage Bottle Separate Collection and Recycling

Several previous estimates in Spain either relate to *recycling* rather than *collection* rates, over-estimate key elements of system performance, or both. They cannot therefore be used as an accurate reflection of the separate collection rate, and the diversity of estimates highlights that there is insufficient legal clarity on what qualifies as 'separate collection'.

Currently within Spain data on waste items is gathered at two points in the waste management system: as items enter the sorting plants, and after sorting as items enter recycling plants. Only the latter of these is able to include a breakdown of items by material, as this differentiation is only possible after the sorting process. Neither give an accurate account of the collection rate by item type.

- Existing estimates of the collection rate at the **input** to mixed packaging waste sorting plants range from:
 - 43.8% for plastic beverage containers as defined in the SUPD (2021, Tragsatec and ENT, *n.b. Data is from 2018*)³¹
 - 55.6% for all plastics (2017, UPF-ESCI)³²
- Existing estimates of the collection rate based on the weight of **output** material from mixed packaging waste sorting plants ranges from:
 - 46.4% for all plastics (2017, UPF-ESCI)³²
 - 46.8% for PET content from *manual sorting* (i.e. bales) (2013, Tecnomia)³³
 - 54.5% for PET content from *automated sorting* (i.e. bales) (2013, Tecnomia)³³
 - 62.2% for all plastics (2021, MITERD and Ecoembes)³⁴
 - 71.1% for PET bottles under 3L (2021, Ecoembes)³⁵

This is a diverse range of estimates, for a number of reasons. All of these figures, expressed as percentage values, are highly sensitive to differences in how the placed on market figure is determined, as this forms the denominator of the calculation, and is therefore a key element of any calculation as discussed above. Differences also arise due to different approaches to which routes are considered to be separate collection, and how factors like humidity, content, dirt, non-PET bottles, PET material that is not bottles, and other elements of contamination are or are not accounted for.

The 2021 MITERD-Ecoembes figure (62% for all plastics) is the latest data published by the Spanish Ministry and the PRO. It reports a recovery rate for plastic packaging items that have been separately collected from the municipal yellow bins and from the *fuera del hogar* route. Similarly, the 2021 figure

³¹ Tragsatec and ENT (2021) Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España. Informe elaborado por ENT para el Ministerio para la Transición Ecológica y el Reto Demográfico. Available at: https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/participacion-publica/210929espana_DRS_ttecent_miterd_web_tcm30-531126.pdf.

³² UPF-ESCI (2017) Proyecto Ariadna 'Estudio de sostenibilidad sobre la introducción de un DRS obligatorio para envases en España: análisis ambiental, social y económico comparativo con la situación actual'.

³³ Tecnomia (2013) Estudio para la cuantificación del impacto en la gestión municipal de la implantación de un sistema de depósito, devolución y retorno (DRS) para envases de bebidas para la Federación Española de Municipios y Provincias. Available at: http://femp.femp.es/files/3580-1235-fichero/Informe_final_DRS.pdf.

³⁴ [Memoria anual de generación y gestión de residuos \(miteco.gob.es\)](https://www.ecoembestransparencia.com/datos/envases-domesticos-ligeros/#content-datos-recogida); Ecoembes: <https://www.ecoembestransparencia.com/datos/envases-domesticos-ligeros/#content-datos-recogida>

³⁵ Ecoembes, *Ecoembes responde*; within response provided on page 3 to the first question on the page; "what is the separate collection rate for PET bottles?" <https://www.ecoembestransparencia.com/ecoembes-responde/preguntas-frecuentes/> (last as accessed 16/01/2024)

from Ecoembes for PET bottles under 3 litres has a similar assumed coverage. This *fuera del hogar* fraction is of particular analytical concern. Ecoembes state that these are “duly authorised for the management of this type of waste by the competent autonomous community”, but this waste comprises 42% of the total collected material and there is no clarity about where these tonnages are obtained.³⁶ The problems with this approach are analysed in detail in section 4.3.

These differences in approach demonstrate that there is insufficient legal clarity currently on how to calculate a separate collection rate. There is also a lack of transparency on exactly how these calculations are in fact being done in the absence of clear legal requirements. This problem is compounded by a lack of granular primary data on performance (e.g. what fraction of separately collected material is single use beverage bottles), and uncertainty as to whether all material used in calculations has in fact been separately collected in accordance with legal requirements. Particular data challenges are discussed in section 4.0.

3.3 The Need for a Better Separate Collection Estimate

This differences in approach and diversity in range of estimates strengthen the case that there is a pressing need for a better separate collection estimate. The next section of this report considers in turn each of the three headline elements needed to estimate an overall collection rate as shown in Figure 3-1. From this it sets out an estimate for 2021 (the most recent year for which data is available) using the best available data, as well as a replicable method that can be used in future as new data is released, or future studies on key contributing variables are undertaken. Data challenges, how they are addressed in this calculation, and how data can be improved in future, are also described.

³⁶ Ecoembes, *Ecoembes responde*; within response provided on page 3 to the first question on the page; “what is the separate collection rate for PET bottles?” <https://www.ecoembestransparencia.com/ecoembes-responde/preguntas-frecuentes/> (last as accessed 16/01/2024)

4.0 Building a Best Estimate of Spanish Separate Collection Rates

This section highlights a best estimate for each of the headline elements identified above in turn, before providing an overall best estimate for the true rate of separate collection of single-use plastic beverage bottles up to 3 litres for 2021, the most recent year for which data is available. This estimate is fully aligned with the requirements for Spanish and EU separate collection targets.

The calculation method and assumptions are based on a clearly defined scope of material and relevant collection routes. Over 40 data sources and reports were reviewed, with sources ranging from MITERD to Ecoembes data, from other consultancies' market reports to Autonomous Community strategy reports. Additionally, stakeholders were consulted. Ecoembes' reported figures relating to their 71.1% separate collection rate of PET beverage bottles (up to 3 litres) in 2021, have been compared throughout to this assessment's figures, to allow for increased context and ease of comparison between analyses.

4.1 Estimating the Amount of Eligible Single-Use Bottles Placed on the Spanish Market

A key first stage in estimating the amount of material placed on the Spanish market is agreeing the scope of the single-use plastic beverage bottle target overall. The second element is determining how much material is in fact placed on the Spanish market in a given year.

4.1.1 Defining Material in Scope

For the purpose of this report, **the materials and products considered within scope of this project are aligned with Spanish legislation.**

In Spanish legislation, Law 7/2022 transposes the SUPD separate collection targets on single-use plastic products into national Spanish law. Annex IV, E of Law 7/2022 defines that the scope of plastic products that are required to meet the separate collection requirements include "*plastic single-use beverage containers with a capacity of up to three litres, including their caps and lids*".³⁷ **Glass and metal beverage containers are consequently excluded from this requirement, along with beverage containers intended for and used for special medical purposes, or over 3 litres in size**, though this does not mean that there would not be significant benefits in thinking about collection and recycling requirements for other materials in similar ways.

In this assessment, **HDPE bottles have been excluded** from the calculation of the SUPD collection rate. There are several reasons for this. Firstly, HDPE beverage bottles up to 3 litres only make up 6% of the Spanish plastic beverage bottle market, compared to PET bottles' share of 94%.³⁸ This means the PET SUPD bottle separate collection rate represents a valid indicator of the total SUPD rate. Secondly, the data around HDPE beverage bottles collected is more limited compared to PET beverage bottles. For example, unlike for PET, POM data for HDPE beverage bottles up to 3 litres in 2021 was not found to be publicly available. This lack of data hinders a robust assessment. Finally, Ecoembes report solely

³⁷ Jefatura del Estado, 2022, Law 7/2022, of April 8, on waste and contaminated soils for a circular economy., <https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809>

³⁸ Tragsatec, 2021, Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España, https://www.miteco.gob.es/content/dam/mitesco/es/calidad-y-evaluacion-ambiental/sgecocr/envases/210929espana_DRS_ttecent_miterd_web_tcm38-531126.pdf

on the PET beverage bottle collection rate of 71.1%, and do not include HDPE. To be able to compare our analysis to that conducted by Ecoembes requires this assessment to also focus on PET. However, as outlined in Section 2.4.3.3, HDPE beverage bottles should ultimately be considered when calculating a comprehensive separate collection rate of all SUPD Bottles. To achieve this, more transparency is needed on the reporting of HDPE SUPD Bottles POM and separately collected.

Additionally, restricting the analysis to PET beverage bottles 'up to 3 litres' provides alignment to SUPD reporting requirements. The primary exclusion in practice is larger water containers. Data provided by MITERD states that 97% of all beverage containers POM have volumes of less than 2.5 litres, with the exception of water which is sold in containers that can commonly have a capacity of 5 to 8 litres.³⁹ However, of the water containers POM, only 14% of the units have a volume equal or greater than 3 litres, though these larger containers are of course heavier than smaller ones on an item basis.⁴⁰

These distinctions must apply equally not just to material POM, but also to efforts to understand the nature of material collected.

Scope of materials included in this separate collection rate calculation:

- **Single-use PET beverage bottles with a capacity of up to 3 litres, referred to as 'PET SUPD Bottles'.**

4.1.2 Defining Material Placed on the Market

The amount POM is the denominator of the collection rate and is defined by the SUPD as "*the first making available of a product on the market of a Member State*".⁴¹

It should be noted that POM is likely to be different to the amount declared to the PRO, as not all producers report accurately. Free-riding occurs when a producer knowingly, or unknowingly, underreports the quantities of items POM in a Member State. If this goes undetected it presents a financial advantage to the producer as they avoid paying the fees required by their EPR obligations in that location. There are two main types of free-riding which have been identified:

1. Free-riding by companies that completely omit their responsibility and do not comply individually or as part of a PRO.
2. Free-riding by companies that participate in a PRO but underreport the volume of product they place on the market.

Free-riding and underreporting can have a significant overall impact, particularly for certain materials/products. As this issue does not seem to have been included in earlier analyses that rely on PRO figures, accounting for it will impact calculations of the collection rate – reducing it compared

³⁹ According to data provided by Nielsen to MITERD and reported by Tragsatec, 2021, Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España, https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sqecocir/envases/210929espana_DRS_ttecent_miterd_web_tcm38-531126.pdf

⁴⁰ According to data provided by Nielsen to MITERD and reported by Tragsatec, 2021, Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España, https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sqecocir/envases/210929espana_DRS_ttecent_miterd_web_tcm38-531126.pdf

⁴¹ European Parliament, 2019, Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment, <https://eur-lex.europa.eu/eli/dir/2019/904/oj>

to calculations using only the declared figures. Undeclared imports can also distort rates that are reliant on POM figures.

It is noted that MITERD has implemented a registry for packaging to compile POM figures in parallel to the PRO.⁴² This registry is planned to be available in 2024 with data on 2023.⁴³ This data could therefore be used as an alternative to the PRO data in future. There are several different approaches to improving the accuracy of the POM figure used and these are discussed in Section 4.5. However, currently, declared tonnages plus an allowance for free-riding, is the best available method.

Approach to using POM data in this separate collection rate calculation:

- **Data on POM as reported by the PRO, Ecoembes, but modified to account for free-riding.**

4.1.3 How Much Material Is Placed on the Market in Spain?

Ecoembes reported the following on their website in January 2024, however the page no longer appears to be available.

“Las empresas adheridas a Ecoembes informaron en su Declaración Anual de Envases del año 2021 de la puesta en el mercado de 154.434 toneladas de botellas PET de bebidas de hasta 3 litros de capacidad. Este dato también está sujeto a auditorias y procedimientos de control.”⁴⁴

This states that, in 2021, 154kt of PET beverage bottles up to 3 litres were declared to Ecoembes by its members.

This being solely the amount declared – as stipulated by Ecoembes – is interpreted to mean that free-riding has not been accounted for. As part of the G4 working group, Ecoembes alongside some Autonomous Communities conducted studies on potential levels of free-riding and fraud within reporting. They estimated potential additional amounts POM in Catalonia for 2013-2014 at 15.6% and in the Balearic Islands for 2019 at 14.6%.⁴⁵ In the case of plastic packaging, the average figure rises

⁴² Ministry for the Ecological Transition and the Demographic Challenge, 2022, Registration of Product producers. Packaging section, <https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/temas/prevencion-y-gestion-residuos/flujo/envases/registro-productores-producto-seccion-envases.html>

⁴³ MITERD has published a FAQs document related to the use of the registry. This fact along with the information retrieved during informal conversations with MITERD and other stakeholders, point to the possibility of the registry not being fully reliable in the first years of operation and therefore not contributing to the calculation of any legal target.

⁴⁴ Ecoembes, Ecoembes responde; within response provided on page 3 to the first question on the page; “what is the separate collection rate for PET bottles?” <https://www.ecoembestransparencia.com/ecoembes-responde/preguntas-frecuentes/> (last as accessed 16/01/2024)

⁴⁵ Sastre Sanz, Sergio, and Ignasi Puig-Ventosa, 2022, Estudio Sobre El Fraude En Materia de Responsabilidad Ampliada Del Productor (RAP) de Los Envases Domésticos Puestos En El Mercado Español, <https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sgecocr/envases/2300623%20informe%20fraude%20RAP%20maquetado.pdf>

to 21.2 %.⁴⁶ It has also been suggested by stakeholders in the course of this research that the free-riding of PET SUPD Bottles may be higher than this 15%.

Given that it is known and acknowledged by the industry that free-riding is prominent within Spain, it is important that it is accounted for. Based on the reported estimates above, a 15% rate of free-riding has been assumed, which may be conservative for PET SUPD Bottles. **With 154kt declared, and 15% free-riding, the total amount placed on market is 178kt.**

Accounting for free-riding, and making no other changes in assumptions, would already reduce Ecoembes' currently reported Spanish separate collection rate by 9 percentage points. In practice, further reductions are necessitated by close analysis of municipal yellow bin collections, and fuera del hogar, as described below.

4.2 Estimating the Volume of Material Collected in Municipal Yellow Bins

This section first confirms that municipal yellow bin collections align with the separate collection requirements. Secondly, as there is no single point where the amount of separately collected single-use beverage bottles in scope for the Spanish separate collection target is measured, a step-by-step method is set out identifying how this figure can be best calculated from the available data. If the data available were to be improved, the approach and assumptions used could be updated accordingly.

4.2.1 Defining Separate Collection

As outlined in Spanish Law 7/2022, separate collections are defined as the collection of municipal waste in different fractions under local jurisdiction in order to *“facilitate the increase in the rates of preparation for reuse and recycling and will result in the achievement of substantial environmental, economic and social benefits and in the acceleration of the transition towards a circular economy”*.

⁴⁷ In addition, the definition of separate collection according to Article 11.1 of 2.1.2 Royal Decree 1055/2022 excludes the inorganic fraction of wet-dry systems and waste which is recovered from mixed residual waste streams.⁴⁸ These are not considered to be separately collected and are thus not included in this analysis, even if some SUPD Bottles are later recovered and recycled.

‘Yellow bin’ collections meet the requirements of separate collection. The municipal waste collection services gather waste from both collective yellow bins on streets and private premises and yellow bins at businesses such as schools. The yellow bins are used to collect mixed light packaging including SUPD Bottles, as well as other plastic containers (such as pots, tubs and trays), plastic films, metal containers (such as steel and aluminium cans and trays), and beverage cartons. The contents of

⁴⁶ Sastre Sanz, Sergio, and Ignasi Puig-Ventosa, 2022, Estudio Sobre El Fraude En Materia de Responsabilidad Ampliada Del Productor (RAP) de Los Envases Domésticos Puestos En El Mercado Español, <https://www.miteco.gob.es/content/dam/mitesco/es/calidad-y-evaluacion-ambiental/sqecocir/envases/2300623%20informe%20fraude%20RAP%20maquetado.pdf>

⁴⁷ Jefatura del Estado, 2022, Law 7/2022, of April 8, on waste and contaminated soils for a circular economy., <https://www.boe.es/buscar/act.php?id=BOE-A-2022-5809>

⁴⁸ So far, PROs have reported the material recovered from the so called “wet-dry” collection model as recovered from “separate collection”, whereas MITERD have already stated that this collection model cannot be considered separate collection. The amounts collected through wet-dry models should not therefore be accounted for in the numerator of the collection rates.

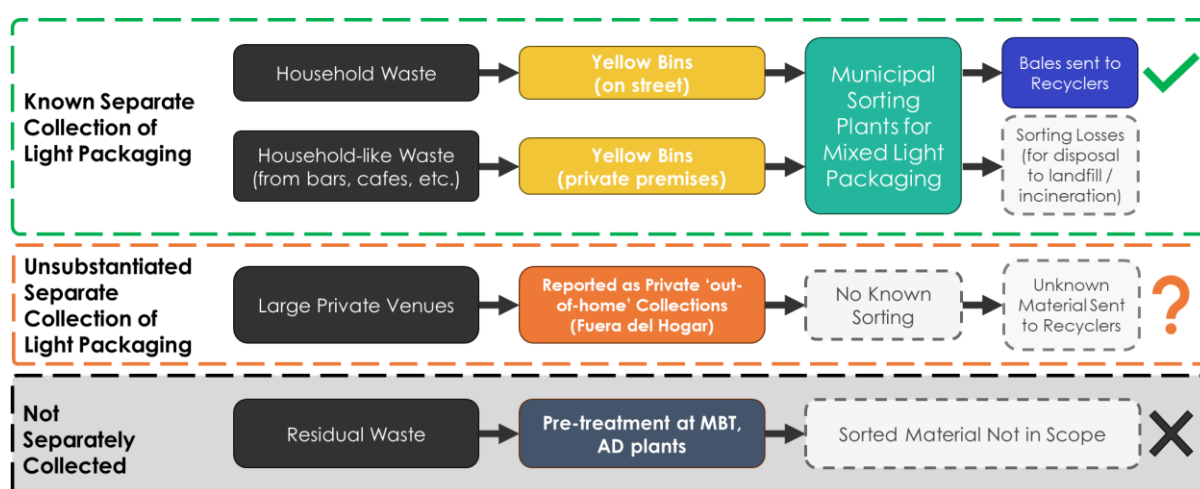
these containers are sent to one of the 95 lightweight packaging sorting plants in Spain.⁴⁹ After being sorted at these plants, the bales of the sorted plastic fraction are sent on to approved recyclers.

The case of material reported as being collected via the **fuera del hogar** route it is less clear. This is discussed in more detail in Section 4.3.

An overview of the collections systems which can be defined as separate collections can be found in Figure 4-1.

As there is no one point in the process where the total amount of SUPD Bottles separately collected are directly measured, the next section identifies how this fraction of the waste stream can be calculated from the available data (see commentary in Section 4.5 on how this could be improved in future).

Figure 4-1: Overview of Collection Systems Which Can Be Defined as Separate Collections



Inclusion of municipal yellow bin collections (and some fuera del hogar):

- **Items disposed of in yellow bins (on street and private premises) and taken to municipal sorting plants where quantities are assessed.**

4.2.2 How Much Material Is Separately Collected via Municipal Yellow Bins?

PET SUPD Bottles are separately collected along with other mixed light packaging in yellow bins. This mixed packaging stream is delivered to and sorted into a mixed plastic packaging fraction at municipal sorting plants. These plants annually report figures for both the total received and sorted plastic fractions to MITERD, who collate and publish the data. The most recent year of data is from

⁴⁹ Ecoembes, 2016, Light Weight Packaging Sorting Plants, <https://ecoembesthecircularcampus.com/web/app/uploads/2021/01/light-weight-packaging-sorting-plants.pdf>

2021, showing a total of 376kt of mixed plastic packaging were sorted. For context, this is an increase of 25% from 2018 (from 301kt to 376kt).⁵⁰

This is a wet weight (i.e., the bottles may still contain some liquid), and includes contamination of non-plastic materials (which might be other recyclable material like paper, or even non-recyclable material) and out-of-scope plastic materials (some of which may be PET, but out of scope for the separate collection targets – e.g. non-beverage bottles, over-size bottles, or trays – and some may be other plastics).

This MITERD data is the basis for the calculation because it:

- **directly represents** the separately collected yellow bin material from 2021;
- is the **earliest point** of consistent measurement of this stream;
- is **annual data**, meaning the calculation can potentially be repeated for other years;
- is **transparent**, with each plant clearly identifying input and output tonnages;
- is **disaggregated**, allowing for each Autonomous Community to assess themselves individually; and
- Spanish legislation allows for the output of initial sorting to be assumed equal to the amount collected.

Firstly, moisture and dirt are removed from the overall bale weight, leaving a dry weight. According to the Tragsatec report, almost all plastic beverage bottles covered by the SUPD in Spain are PET (94%).⁵¹ As explained in the Section 4.1.1, the calculation focuses on the amount of PET bales sorted out of the separately collected yellow bin stream. Then, contamination and other PET materials found within the bales are removed from the weight. This results in the weight equivalent of PET SUPD Bottles (still including caps and labels).⁵²

Using Spanish data and studies, coupled with market expertise and, where necessary, Eunomia's knowledge of practice across Europe, a best estimate has been developed. The overall approach, and assumptions used, are shown in Figure 4-2.

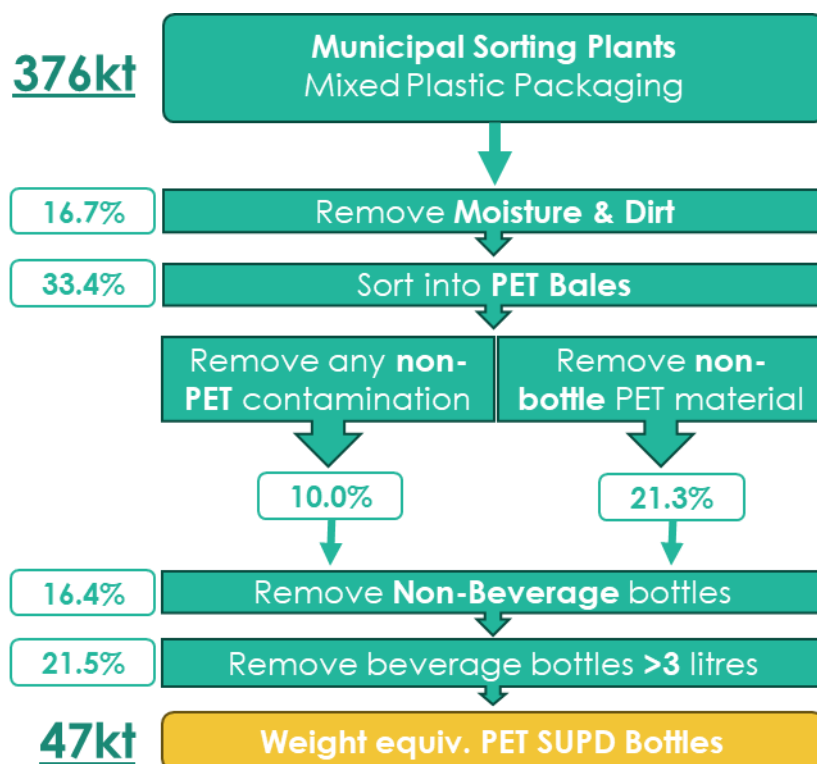
These data points have been selected as the best and most appropriate available and represent a best estimate. For some elements of the calculation, alternative estimates can be made, and these have also been considered (see discussion of sensitivity scenarios in this section, and Section 4.4).

⁵⁰ MITERD, 2021, Residuos de Competencia Municipal 2021, <https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/publicaciones/memoria-anual-generacion-gestion-residuos.html>

⁵¹ Tragsatec report 2018 sales (POM) data of all beverage bottles. Tragsatec and ENT, 2021, Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España. Informe elaborado por ENT para el Ministerio para la Transición Ecológica y el Reto Demográfico, https://www.miteco.gob.es/es/calidad-y-evaluacion-ambiental/participacion-publica/210929espana_DRS_ttecent_miterd_web_tcm30-531126.pdf

⁵² 'The weight equivalent of PET SUPD Bottles (including caps and labels)' is abbreviated to 'the amount of PET SUPD Bottles' throughout this report, with the sole purpose to ease reading.

Figure 4-2: Mass Flow of PET SUPD Bottles from Yellow Bins



The percentages used in Figure 4-2 are considered best for the following reasons:

- **Moisture, Content and Dirt:** A Spain specific figure of 16.70% moisture, content and dirt was reported for all light packaging, not just plastic bottles, in 2012.⁵³ Following the method of this report, this percentage is applied at the very start of the calculation, as it is considered to be most closely representative of all mixed plastic packaging. However, a more tailored approach could be taken if further (and more recent) analyses were to be conducted to get an SUPD Bottle specific (or even a PET bale specific) percentage input instead.
- **PET Bales:** As estimated in a recent market report, of about 369kt of plastic packaging collected via EELL in Spain in 2018, 123kt was reported as being PET – which equates to 33% of the estimated input plastic stream. This percentage is used to assess the portion of the plastic output stream that is sorted into PET bales.
- **Removal of Non-Bottle Materials from Bales:**
 - **Non-PET Contamination:** 10% is based on our understanding of the market. On a European-level, the average levels of PET bale contamination can be slightly less than this.⁵⁴ However, for Spain, there are multiple stakeholder inputs suggesting that Spain

⁵³ Applus+ (on behalf of Dirección General de Calidad y Evaluación Ambiental y Medio Natural), 2012, Plan Piloto de Caracterización de Residuos Urbanos de Origen Domiciliario - Informe de Resultados, https://www.miteco.gob.es/content/dam/mitesco/images/es/Informe%20final%20resultados%20Plan%20Piloto%20Caracterizaci%C3%B3n_tcm30-193005.pdf

⁵⁴ Reloop, 2020, 'Getting the Numbers Right: A discussion paper on calculating & reporting separate collection of plastic beverage bottles' quotes PRE as saying non-PET in PET bottle bales was 8%.

has notably above-average European levels of non-PET contamination. Additionally, ASERPET (Spanish Association of PET Recyclers) have argued for much higher figures.⁵⁵ Contamination certainly enters the recycling system in Spain. Although not directly applicable here, for 2023, Ecoembes reported that 31.9% of material deposited in yellow containers was not packaging.⁵⁶ Therefore, the selection of 10% here is considered conservative relative to some of the sources available in Spain. Any increase in the amount of non-PET contamination assumed would decrease the amount assumed of PET SUPD Bottles separately collected. This sensitivity is tested in Section 4.2.2.1.

- **Other PET Materials:** 21% is sourced from a Spanish market report.⁵⁷ Previous Economía work for confidential private clients has also arrived at similar figures.

These steps result in 72kt of PET bottles remaining (representing 69% of the dry PET bale weight). However, not all of these PET bottles are eligible for the SUPD separate collection target.

- **Removal of Non-Beverage Bottles:** The European average for non-beverage bottles as a proportion of all PET bottles is relatively consistently at about 9%.⁵⁸ This assumption is conservative in the case of Spain, with stakeholder input suggesting the Spanish market could have a larger market share of non-beverage bottles. One market assessment suggests this could be as high as 24%.⁵⁹ The recent EU average and older Spanish datapoint have been averaged to get a non-beverage bottle fraction of 16%. Further market research could be done to refine this input. Any increase here would decrease the figure assumed to be separately collected, and in turn decrease the collection rate. This sensitivity is tested in Section 4.2.2.1.
- **Removal of Beverage Bottles over 3 litres:** The vast majority of beverage containers placed on market have a volume below 3 litres (>97%), with the exception of water bottles. By unit, 14% of water bottles are reported as equal or greater than 3 litres (normally over 5 litres) and almost all plastic water bottles are PET (>99%). ENT reported 4.2bn units (i.e., 88.6kt) of PET water bottles up to 3 litres were declared to Ecoembes in 2018. It is assumed that 4.2bn units is equal to 86% of the PET water bottle market. This results in an estimated 0.7bn units greater than 3 litres being sold.⁶⁰ Based on these proportions, it is assumed that 21% of PET beverage bottles are over 3 litres. Specific market research or producer reporting could be done to produce a figure for this input that is less derived.

Overall, this analysis shows a best estimate of 47kt of PET SUPD Bottles are separately collected via yellow bins, which is 25% lower than the 63kt reported by Ecoembes.

⁵⁵ As presented to Spanish Senate on 27 April 2015 and verified by Recircula.

⁵⁶ Ecoembes, 2024, Recycling of domestic plastic, metal, brick, paper and cardboard packaging managed by Ecoembes grew by 3.5% in 2023, <https://www.ecoembes.com/es/resultados-ecoembes-2023>

⁵⁷ Afi & Aneabe, 2020, Análisis de condicionantes para el desarrollo de la industria de PET reciclado en España; p.6, citing Aneabe, 2018, and it does note that 'other PET' includes films, trays and other PET.

⁵⁸ Derived from ICIS & PRE, 2024, PET Market in Europe: state of Play – data (in 2022); Aligns with other (Economía) reports: PETCore & PRE, 2022, PET Market in Europe: State of Play (9%) & with ZWE, 2022, How Circular is PET (8%).

⁵⁹ Afi & Aneabe, 2020, Análisis de condicionantes para el desarrollo de la industria de PET reciclado en España; p.7, citing Aneabe, 2017 & 2018 & ANEP, 2017.

⁶⁰ According to data SCRAP provided by Nielsen to MITERD and reported by Tragsatec, 2021, Estudio de viabilidad de la implantación de un Sistema de Depósito, Devolución y Retorno (DRS) en España, https://www.miteco.gob.es/content/dam/miteco/es/calidad-y-evaluacion-ambiental/sgecoci/enevas/210929espana_DRS_ttecent_miterd_web_tcm38-531126.pdf

4.2.2.1 Sensitivity Scenarios: Yellow Bin Tonnage

There are limitations in the Spanish data used for this part of the calculation, in terms of both coverage (some key elements of interest are not measured directly and must be extrapolated; have only been measured in specific contexts; or have only been subject to single studies) and timing (some key elements have not been measured recently). Scope for improvement in primary data is discussed in Section 4.5. However, to test the sensitivity of some of these data points, scenarios have been developed. The sensitivity scenarios below aim to highlight the importance of robust, current, and transparent data reporting when assessing a separate collection rate.

These alternatives do not however change the overall conclusions of this report. Indeed, by only changing two calculation elements, the amount of PET SUPD Bottles calculated as separately collected reduces considerably. The changes explored were:

- **Scenario 1:** The **non-beverage** portion of PET bottles was changed from the average of 16% up to the 24% reported in the Afi & Aneabe report.⁶¹ The resulting amount of PET SUPD Bottles collected from yellow bins consequently decreases to **43kt** from 47kt.
- **Scenario 2:** Non-beverage input remains at 24%, and additionally **non-PET contamination** could be higher than 10%, which is a conservative input. Considering the level of non-packaging contamination within the yellow bins reported by Ecoembes is 32%⁶², the overall non-PET contamination after only initial sorting could be as high as 20%. This results in **37kt** collected.
- **Scenario 3:** Additionally, an Ecoembes data point is tested. Ecoembes report 142kt of PET bales being outputs of municipal sorting plants in 2021 (i.e., 38% of MITERD's reported total of plastic outputs).⁶³ Using 38% instead of 33%, with all the other best estimate assumptions shown in Figure 4-2, results in 53kt being separately collected via yellow bins. Combining this scenario with Scenario 1 input results in **49kt** collected, and combining all three scenarios results in 42kt collected.

This would mean that, with all the sensitivity tests, the calculated weight equivalent of PET SUPD Bottles separately collected from yellow bins varies from 37-53kt. Though, the best estimate remains at 47kt.

The impacts of these scenarios on the overall collection rate are described in Section 4.4.1.

However, first, to fully assess the separate collection rate, in addition to the yellow bins, reporting for the fuera del hogar fraction must also be examined, and this is done in the next section.

⁶¹ Afi & Aneabe (2020) *Análisis de condicionantes para el desarrollo de la industria de PET reciclado en España*; p.7, citing Aneabe (2017 & 2018), ANEP (2017).

⁶² Ecoembes, 2024, Recycling of domestic plastic, metal, brik, paper and cardboard packaging managed by Ecoembes grew by 3.5% in 2023, <https://www.ecoembes.com/es/resultados-ecoembes-2023>

⁶³ Ecoembes, Portal de Transparencia - within response provided on page 3 to the first question on the page; "what is the separate collection rate for PET bottles?", <https://www.ecoembestransparencia.com/ecoembes-responde/preguntas-frecuentes/>

4.3 Estimating the Volume of Material Collected via Fuera del Hogar

The volumes of eligible material from qualifying separate collection for **this fraction is not transparent. However, the headline volume of 47kt of PET beverage bottles reported by Ecoembes is not considered credible in this analysis.**

The reported 47kt from fuera del hogar sources is 75% of the reported 63kt reported by Ecoembes as collected from yellow bins (a tonnage figure that the analysis above suggests should be lower). Questions therefore arise as to whether all of the tonnage reported for fuera del hogar is in fact both eligible PET SUPD Bottles, and subject to separate collection within the requirements of Spanish law.

4.3.1 The Weaknesses in Current Reporting for *Fuera del Hogar*

As mentioned, data for single-use plastic beverage bottles up to 3 litres in the fuera del hogar route is limited and not transparent, making detailed analysis impossible. However, there are four key reasons to suggest that the amount reported to date Ecoembes is a very significant overestimate. Key reasons to question the reported headline amount include:

- Reporting lacks transparency, with no published independent verification or audit.
- The reported volumes are too high relative to other collection routes. 47kt is 75% of the reported 63kt from yellow bin stream.
 - However, the most up to date figures from Ecoembes report there being 397,721 yellow containers across Spain, and only 57,643 recycling points and 310 RECICLOS machines at locations of fuera del hogar collections. The recycling points and machines combined represent only 14.6% of the number of yellow bins.
 - For all plastics reported recovered by Ecoembes, the amount from fuera del hogar in 2021 is 19% of the yellow bins (107kt divided by 570kt).

It is considered unrealistic for the PET SUPD Bottle ratio to be so significantly higher than the bins ratio and the overall plastic tonnage ratio.

- A very small number of Autonomous Communities account for a very large amount of material reported for this fraction. This disproportionate share does not relate to differences in either population or headline levels of economic activity between Autonomous Communities, and there is no explanation as to why performance might vary in this way. For example, in the 2021 data, three Autonomous Communities – Valencia, Madrid, and Andalucia – accounted for 67% of the total plastic recovered (107kt) from fuera del hogar.⁶⁴ However, Catalonia which has a larger population than Madrid and Valencia, and hosts a large international airport, only contributes 3.4% of all fuera del hogar. Lack of transparency limits the ability to understand the variation in these figures and casts doubt on how consistently they have been measured and reported.
- Waste managers authorised by the Autonomous Communities are allowed to self-certify the waste quantities that they handle. This makes it impossible to verify the validity of the

⁶⁴ Of the total 17 Autonomous communities and two autonomous cities.

quantities reported. "The certification of the data related to waste that comes from the managers authorized by the autonomous communities is certified by them, as agreed in the signed contracts and the waste regulatory regulations"

- Historic reporting by Ecoembes shows a significant unexplained jump in reported volumes from fuera del hogar on several occasions.
 - From 2015 to 2018, the total plastic reported recovered via fuera del hogar increased from 92kt to 100kt (mostly attributable to a 7% jump happening from 2016 to 2017). There is no published explanation for such a dramatic apparent change.
 - There was then a 30% drop from 2018 to 2020, assumed due to the Covid pandemic (down to 70kt). Over the same time period, reported yellow bin tonnage increased by 16%. From 2020 to 2021, in just one year, an increase in plastic from fuera del hogar of 53% was reported (from 70kt to 107kt). This significant 2021 change occurred with no visible impact to the yellow bin data (which showed mild growth of 4% from 2020 to 2021, similar to the previous year). While a gradual recovery of performance post-pandemic might be expected, for 2021 to show such a significant jump is surprising.

Even where single-use plastic beverage bottles are separately collected, known as fuera del hogar, it is likely that these figures might need to be interrogated in a similar way to the approach taken to municipal yellow bin collections – an analysis that reduced the amount of material previously reported for that route when conducted. Overall, current reporting of fuera del hogar tonnages for PET SUPD Bottles by Ecoembes are not considered credible, a view that was also expressed by Spanish stakeholders and experts. Given the lack of transparency it is challenging to propose an alternative, but the next section sets out a more credible figure.

4.3.2 How Much Material Is Separately Collected via the Fuera del Hogar Route?

Due to a lack of data and transparency, it is not possible to perform a comparable analysis to that conducted in Section 4.2.2 for municipal yellow bin collections. However, analysis for this report suggests that **a more realistic estimate for single-use plastic bottles separately collected as part of the fuera del hogar fraction is likely to be around 18kt**. This is based on Ecoembes' reported split of plastic collected from fuera del hogar and municipal collections in 2021. Each stream reported that 107kt and 570kt of plastic was sent to recyclers, respectively. This ratio was considered too pessimistic because the fuera del hogar stream should contain a greater proportion of SUPD Bottles compared to yellow bins. Therefore, we have doubled the ratio assumed to come from fuera del hogar compared to municipal yellow bins. With yellow bin tonnage being 47kt, fuera del hogar is proportionally assumed to be 18kt.⁶⁵

There is scope for much greater transparency in relation to the fuera del hogar fraction, as data is not currently shared in a way that facilitates external scrutiny and verification.

⁶⁵ Ecoembes, Portal de Transparencia, <https://www.ecoembestransparencia.com/datos/envases-domesticos-ligeros/#content-datos-seleccion>

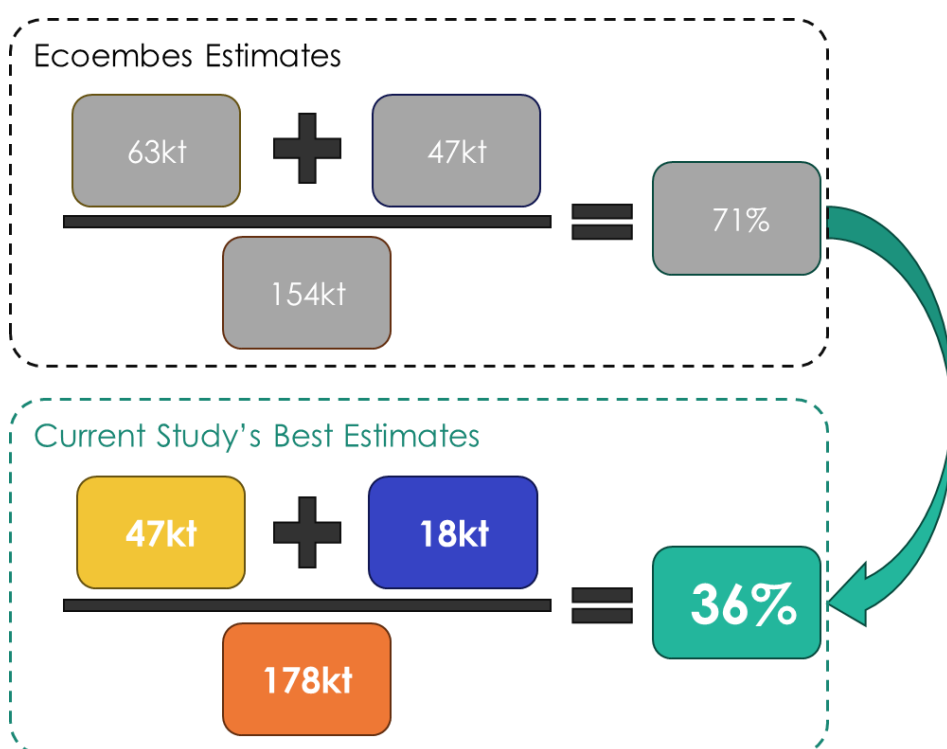
4.4 Best Estimate of Separate Collection of Single-Use Plastics Beverage Bottles

The best estimate for separate collection in Spain is the summation of the yellow bin calculation (47kt) and the fuera del hogar estimate (18kt) over the amount POM (178kt). This results in a separate collection rate of 36%.

This is very different to the reports from Ecoembes, as shown in Figure 4-3.

This is also 34 percentage points below the 2023 target of 70%, and 41 percentage points below the 2025 target of 77%. Missing the 2023 target of 70% would legally trigger the implementation of a DRS in Spain.

Figure 4-3: Best Calculation Compared to Ecoembes Reporting



4.4.1 Sensitivity Scenarios

4.4.1.1 Sensitivity of Yellow Bins

The two sensitivity scenarios in Section 4.2.2.1 highlighted the potential for different figures to be used in some parts of the calculation. **In all the alternatives tested, the separate collection rate fell far below the 2023 Spanish target of 70%.**

Keeping fuera del hogar at 18kt;

- Scenario 1, in which the estimate of the non-beverage portion of PET bottles was increased, resulted in a collection rate of 34%,

- Scenario 2, in which the non-PET contamination is considered to be higher, resulted in a collection rate of in 31%,
- and Scenario 3, in which an Ecoembes data point on PET bales is tested, resulted in 40%;
- Scenario 1 and 3 combined results in 37% and all three Scenarios results in a collection rate of 33%.

Still, none of these estimates are close to the 70% target. The conclusion is that the most accurate scenario remains at 36%.

4.4.1.2 Sensitivity of Free-Riding

Another potential sensitivity is the level of free-riding. As free-riding occurs in Spain, it should be accounted for in the collection rate calculation. There are Spanish sources and stakeholders that assume estimates above 15% (such as a 2022 report estimating 21% free-riding for plastic packaging⁶⁶). However, even if free-riding is not accounted for in the amount of PET SUPD Bottles POM, the collection rate using the best estimate's numerator only increases from 36% to 42% for 2021 - still far away from the 70% target for 2023.

4.4.1.3 Sensitivity to Fuera del Hogar Estimation

There is significant uncertainty around the reported fuera del hogar figures mainly due to the lack of transparency of the system and its reporting. However, changing this estimate does not change the overall conclusion of this report that the Spanish separate collection rate is very far from the 70% target. For example, for each additional 1kt collected via fuera del hogar the overall collection rate increases by only 0.56 percentage points. In other words, a 10kt change – up or down – would only result in a 5.6 percentage point change.

4.5 Scope for Improvement in Spanish Data Sources

For the calculation of the separate collection rate, two main data inputs are required: placed on market figures (denominator) and the separate collection of the products targeted by the SUPD (numerator), which in turn is dependent on an estimate for municipal yellow bin collections, and an estimate for fuera del hogar.

For **placed on market**, there are only two elements to consider: the amount declared and the level of free-riding. There is scope to improve producer declarations and enforcement, but it is unlikely free-riding will be totally eliminated. More work can be done to determine a national figure for free-riding that is kept up-to-date, as the evidence available is relatively limited. Crucially, free-riding must always be considered in any realistic assessment of the separate collection rate.

Alternative approaches to estimating placed on market data (e.g. use of sales monitoring databases, or use of waste composition data) have drawbacks, and are unlikely to replace the approach above, although they may be useful supplementary data for understanding free-riding in some cases. In particular, better compositional data from sorting plants, which is also highly desirable

⁶⁶ Sastre Sanz, S. and Puig-Ventosa, I., 2022, Estudio sobre el fraude en materia de responsabilidad ampliada del productor (RAP) de los envases domésticos puestos en el mercado español. Madrid: Ministerio para la Transición Ecológica y el Reto Demográfico, [2300623informefrauderapmaquetado_tcm30-569728.pdf \(miteco.gob.es\)](https://www.miteco.gob.es/2300623informefrauderapmaquetado_tcm30-569728.pdf)

in order to better understand the nature or material being collected (see below), could provide a further sense-check on placed on market claims.

The largest area for improvement is the **fuera del hogar**. The lack of transparency and auditability, as well as its unrealistically high tonnage compared to that collected from yellow bins makes the 47kt a 'black box' data point – unusable for any robust assessment of the Spanish market. The weaknesses are discussed in detail in Section 4.3.1. In summary however, to improve the situation, more data is needed on:

- what is being collected (i.e., compositional studies, including breakdowns of moisture, content, dirt, different material types, and of items targeted under EPR and other policy targets);
- how it is being collected (i.e., is it truly separate collection); and
- traceability: where it is being collected from, with robust explanations around scale (to allow for Autonomous Community level assessments that make comparative sense to those without insight into commercially sensitive contracts).

Even for **municipal yellow bin collections**, the current configuration of data monitoring, collation, and reporting regarding packaging waste subject to EPR in Spain lacks transparency, and detailed and up-to-date source information is not always available. Better data in the future might enable the best estimate presented above to be refined. Several of the studies and sources used in this assessment are not annual data and may age over time.

There is also a particular need for more detailed, regular, and standardised waste compositional studies. Current waste composition analyses of separately collected packaging waste, typically carried out at the entrance of packaging sorting plants, should be modified. Rather than simply targeting materials (e.g., PET, HDPE, LDPE, etc.) the sampling methodology should be reviewed to target specific products. A new sampling strategy should also ensure basic statistical standards (e.g., confidence intervals, etc.), consider relevant stratification criteria (e.g., rural/urban, tourism, etc.) as well as the calculation of coefficients to discount moisture and other attached non-packaging materials, particularly biowaste and liquids. These waste composition analyses should be monitored by the Ministry and made publicly available in a transparent and reproducible manner.

In turn, the waste composition studies at the output of the packaging waste sorting plants (e.g., on bales) do not accomplish the minimum statistical requirements (e.g., seasonality, comparability) and do not address the products targeted by the SUPD. Again, more, standardised studies, with transparent reporting, would improve understanding.

As an example of current limitations, to support this project, we approached all the Autonomous Communities to see if they had additional data that could be used in validating a collection rate. However, there was no data available for publication yet. Whilst independent initiatives by Autonomous Communities would be useful examples, a national approach would provide greater consistency and is essential to allow national conclusions to be drawn.

5.0 Conclusions

Plastic packaging accounts for 40% of the plastic used globally. Most of this packaging is single-use, and the majority is not recycled. This poor resource and waste management has significant environmental consequences, from the challenges caused by packaging at end of life in terms of disposal and littering, to the damage caused during material extraction and reduction. Plastic bottles have been flagged as a particular concern in both Spain and at EU level – they also represent a significant opportunity to benefit from circular economy principles as they are typically made from high value material that can be recycled effectively if collected efficiently and appropriately.

The need to deliver high collection and recycling rates for these items is acknowledged in both Spanish and European law. The EU has set targets for overall plastic recycling and the collection of plastic bottles specifically. These targets are reflected in Spanish law, which requires a collection rate of 77% by 2025 aligned with the EU but also contains an additional provision that in the event targets are not met by 2023, then a DRS must be introduced to drive higher collection rates. DRSs elsewhere in Europe deliver collection rates of over 90% for plastic beverage bottles and other drinks containers. Collected material is also high quality and suitable for high value bottle-to-bottle recycling. DRS systems also reduce litter in the wider environment. In turn the EU is setting ever higher collection targets for plastic beverage bottles and is considering requiring DRS from Member States that do not have one as part of the Packaging and Packaging Waste Regulation.

Accurate measurement is essential to judge progress against these targets, and crucially to determine the extent to which additional action is needed to meet them. While estimates have been made previously for the collection rate for plastic packaging and single-use plastic bottles in Spain, there is significant concern that current calculations are over-optimistic – and over-report actual performance as a result.

Given the centrality of an accurate understanding of the collection rate for both Spanish domestic and European legal obligations, and stakeholder concerns about current calculation methodologies and source data, this report has independently assessed both the methodology and calculations used to estimate Spain's plastic bottle collection rate. The findings from this analysis are concerning.

Both Spanish and EU law set clear requirements for the separate collection of PET bottles up to 3 litres in size, covering both what constitutes 'separate collection' and the precise packaging items that should be included (single-use PET beverage bottles up to 3 litres in size, including their caps and lids). The trigger point in Spain for the implementation of DRS for plastic beverage bottles is therefore theoretically clear, relating to the non-accomplishment of the single-use plastic beverage container collection target in 2023, with the figure to be calculated by October 2024.

Legal requirements for separate collection and reporting in the EU

The SUPD requires that Member States demonstrate that by 2025 they have achieved a separate collection rate of 77% for SUPD Bottles.

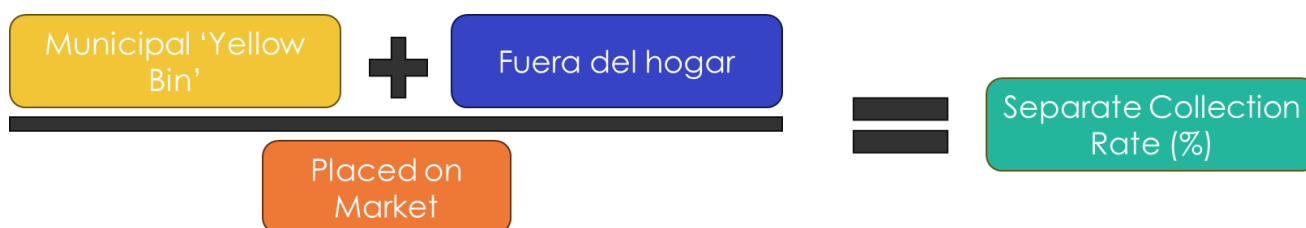
Spanish legislation not only requires that monitoring and reporting take place against SUPD targets, but additionally specifies that if a collection rate for SUPD Bottles of 70% is not achieved by 2023 then a new waste collection system in the form of a deposit return scheme (DRS) would be introduced. A DRS would see a small refundable deposit charged to consumers when drinks in plastic bottles are purchased, and returned to consumers when the empty bottle is correctly returned for subsequent recycling. DRS is widely acknowledged as the most reliable means of achieving high separate collection rates of beverage containers and Spain's law was therefore designed to ensure that sufficient action would be taken ahead of the EU target for 2025.

Both Spanish and EU law set clear requirements for the separate collection of plastic bottles up to 3 litres in size, covering both what constitutes 'separate collection' and the precise packaging items that should be included (single use beverage bottles up to 3 litres in size, including their caps and lids). The trigger point in Spain for the implementation of DRS for plastic beverage bottles is therefore theoretically clear, relating to the non-accomplishment of the SUPD bottle collection target in 2023. The Ministry must assess and make public the status of compliance with the targets set for 2023 by 31 October 2024. The calculation of those percentages shall be carried out in accordance with the methodology set out in Implementing Decision (EU) 2021/1752.

What is clear is that **three key headline figures are needed to calculate the separate collection rate in Spain** (see Figure 5-1).

- The numerator (amount separately collected) is based on the weight of target materials that are collected separately. In Spain there are two routes of interest: the **municipal 'yellow bin' stream** from households and businesses, and the **private stream called 'fuera del hogar'**, or 'outside of home' which comprises collections from select venues.
- The denominator is the weight of target materials that are **placed on the market** (POM). This includes all SUPD Bottles sold to consumers in Spain, regardless of how – or if – they are collected post-consumption.

Figure 5-1 Components of the separate collection calculation



However, the question of how these requirements should be applied in practice to produce transparent, reliable estimates has not yet been made clear enough by the Spanish authorities.

To date, the Ministry has not implemented the methodology of the Implementing Decision (EU) 2021/1752 to enable the Autonomous Communities to report the required data, which is essential to ensure a reliable, homogeneous and reliable reporting of the objectives of Article 9 of the SUP Directive.

This report sets out a clear, transparent, and replicable approach, that complies with all available requirements, and that can be updated as new primary data becomes available to calculate the separate collection of SUPD Bottles for the financial years 2022 and 2023. In this report the calculation is provided for 2021, using the most recent available data.

Calculating the separate collection rate for PET SUPD Bottles

To date Ecoembes has reported a provisional separate collection rate of 71.1% for 2021 for PET SUPD Bottles. **The current study identifies that this estimate is far too high, and instead arrives at a best estimate of 36%, far below the Spanish targets for 2023 and 2025.**

Calculating the amount of material placed on the market

All stakeholders agree that some PET SUPD Bottles are placed on the market in Spain without being officially reported – so-called ‘free-riding’. An estimate of these tonnages should be included in calculations of the collection rate. This study proposes 15% as a credible figure for the amount of undeclared material, according to the "Study on fraud in the field of extended producer responsibility (EPR) of household packaging in the Spanish market" commissioned by the MITERD to the consulting firm ENT (published in December 2022), which would raise the estimate of position in the market (i.e. the denominator in the calculation) up to **178 kilotonnes (kt)**, compared to the 154kt estimated by Ecoembes.⁶⁷ Making just the one change to include this in the separate collection calculation would reduce the separate collection rate reported by Ecoembes to 62%. This is already below the 70% target for 2023 established in Law 7/2022.

Calculating the amount of material collected in municipal yellow bins

The number of PET SUPD Bottles collected from municipal ‘yellow bins’ are not currently measured directly, and a calculation therefore needs to be built step-by-step:

- The calculation starts by removing moisture, content and dirt within the plastic packaging output stream of sorting plants. This step is first based on the scope of data available.
- From this, the amount sorted into PET bales is then estimated.
- Other contamination (e.g., non-PET items) and non-bottle PET materials (e.g. PET trays) in bales need to be accounted for and removed.
- Finally, not all PET bottles are eligible for the separate collection target, so two further components must be accounted for and removed – non-beverage bottles, and beverage bottles above 3 litres.

Credible Spanish data sources exist for most of these variables. Eunomia has drawn on these data in developing its best estimate of the current separate collection rate for PET SUPD Bottles, drawing on extensive experience from across the EU to make adjustments necessary to fill all data gaps. The best estimate in this report of the amount of material eligible for inclusion in the separate collection target for SUPD Bottles is **47,000 tonnes, 16,000 tonnes less than those declared by Ecoembes.**

Calculating the amount of material collected *fuera del hogar*

Reporting of *fuera del hogar* material is not transparent, and previous published figures significantly overestimate its potential contribution to separate collection. Key problems with the data presented by Ecoembes for this fraction include:

- **The lack of data transparency**, with no published audit or detailed underlying data.
- **Unfeasibly high reported tonnages of material** relative to the better understood and analysed municipal yellow bin stream; in addition, a small number of Autonomous Communities appear to account for a very large proportion of the reported tonnage, suggesting a lack of consistency in approaches to reporting. Similarly, historic data shows unexpected jumps in performance, with no real ability to explain or interrogate changes.

⁶⁷ MITECO, Estudio sobre el fraude en materia de responsabilidad ampliada del productor (RAP) de los envases domésticos en el mercado español, 2022, [2300623informefrauderapmaquetado_tcm30-569728.pdf \(miteco.gob.es\)](https://www.miteco.gob.es/contenedor/2300623informefrauderapmaquetado_tcm30-569728.pdf)

- Finally, given the adjustments discussed above that are required for the municipal yellow bin stream, adjustments to headline reporting to account for similar **contamination and non-target material** should also be made.

Due to the lack of detail, the data published by Ecoembes is impossible to cross-examine or verify. SUPD Bottles

Despite the difficulties in studying this flow of material, in which Ecoembes declares 47,000 tonnes, all the avenues we have explored to try to obtain estimates, place us in a range of between 9,000 and 18,000 tonnes, that is, between 38,000 and 29,000 tonnes lower than the amount Ecoembes declares, which does not have any technical proportion with the metrics of the yellow container.

We consider the best estimate of separate collection of PET SUPD Bottles in this stream to be 18,000 tonnes. It should be noted that there is significant uncertainty in this flow and that we have opted for the most conservative figure. If we had opted for 10,000 tonnes less, the impact on the rate of separate collection of PET SUPD Bottles would be in the order of 5.6 percentage points lower, i.e. even further away from the objectives of Spain 2023 and the European Union 2025.

Separate collection rate of PET SUPD Bottles

Using the data and methodology outlined above to calculate the denominator and numerator for the separate collection rate calculation, **this study's best estimate for the separate collection rate in Spain is 36% for 2021** – well below the 2023 target of 70%. (See Figure 5-2).

This methodology is repeatable once 2022 and 2023 data are available. The approach is also repeatable for HDPE SUPD Bottles, again when data is available. This research has not identified clear reasons to expect a significant improvement in collection for 2022 and 2023.

Figure 5-2 Best Calculation of Separate Collection Rate for PET SUPD Bottles



This result has been obtained with a very rigorous and conservative methodology. In this way, sources or hypotheses with less traceability and representativeness have been discarded.

We wanted to take advantage of the extensive research work carried out to explore other alternative scenarios. Thus, by changing some assumptions for the calculation of the contribution to the numerator of the "municipal yellow bin", estimates of 31%, 33%, 34% and 37% were obtained. In an extreme scenario, combining all the sources and hypotheses that would yield the highest index, 40% has been obtained.

This study assumes free-riding at 15%, using a Spanish source. It is widely accepted that free-riding takes place, perhaps even to a greater extent than shown. However, even if free-riding is ignored, the other elements of the preferred calculation here would mean the separate collection rate being achieved was still only 42%, far below the 70% target.

Scope for data improvement

There is a need to improve primary data for all SUPD Bottles – but better data will not change conclusions.

Placed on market data should account for free-riding as described above and some EU countries have well developed research methods for better estimating this. Understanding of the municipal yellow bin stream would be significantly improved by more detailed, frequent, and standardised compositional data analysis on inputs and outputs at sorting plants. Currently neither MITERD nor Autonomous Communities have an agreed comprehensive approach for this. This must also fully align with the legal requirements specifying 'separate collection'. A better understanding of composition in relation to SUPD Bottles would also help sense-check placed on market data and the extent free-riding. Finally, the *fuera del hogar* data must be opened up so that it can be cross-examined and assessed in a comparable way to municipal yellow bin collections.

These limitations apply to 2021 data and will not have been resolved in time for the 2022 and 2023 data that is expected soon. However, just as we have been able to calculate 2021, we are in a position to calculate 2022 and 2023.

In light of this, it will be a significant challenge for MITERD to arrive at a robust estimate for separate collection of SUPD Bottles for 2022 (due in early 2024) or 2023 (due later in 2024). It is clear that they will not be able to adopt the Ecoembes data for the numerator, as they are currently communicated. As for the denominator, MITERD must apply a criterion of prudence, according to the report commissioned by its own ministry to ENT in 2022, applying a correction of 15% in what is put on the market to account for free riding.

However, in the interim, it is possible to conclude that the separate collection rate of SUPD Bottles will miss the 2023 target by a very significant margin.

Key findings and Recommendations

In the light of this work, we are in a position to estimate that Spain is very unlikely to have met its own mandatory separate collection target (70%) for SUPD Bottles in 2023. This study shows performance in 2021 against this target was only around 36%.

While there are limitations in the data available in Spain to calculate the separate collection rate of SUPD Bottles, they do not limit our ability to reach to conclude that the target is currently being missed by a wide margin. These data limitations should however suggest that Spain's ability to report a robust and precise separate collection rate to the EU (a requirement from 2024 onwards) should be viewed with caution.

As analysed in this report, Spain's 2023 target of 70% separate collection seems certain to be missed.

This scenario coincides with the scenario of the well-known MITERD report carried out by TRAGSATEC, which already stated in 2022 that with the current system it is not possible to meet the targets of separate collection of SUPD Bottles. This conclusion led Spanish legislation to set an intermediate target in 2023, so that, if it is not met, an DRS would be put in place within two years, to ensure compliance with the target of 77% separate collection of SUPD Bottles in 2025.

A DRS is the only change to collection systems that would enable Spain to move rapidly from a collection rate of 36% in 2021, to the target of 77% set for 2025.

In addition, the implementation of a DRS will eliminate the difficulty of reporting to the European Union because it is the most reliable and transparent system, which allows for more detailed statistics,

since both marketed and returned packaging are counted at the level of individual packaging items.

