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CONSORZIO NAZIONALE IMBALLAGGI

DEPOSIT RETURN SYSTEMS
EGEN STUDY II

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CHAPTER 1: Summary of the key results of the quick scan in ten countries

DRS recycling: implementation & reason to be a DRS

Currently, deposit return systems (DRS) for recycling are running in thirteen EU Member States. DRS has a long history in Europe, but in their current form the first one was introduced in 1984 (Sweden). Latvia, Malta and Slovakia were the latest Member States in 2022. Several other Member States are considering or have take initial steps to implement DRS in the coming years (Portugal and Romania).

Broadly speaking, introduction of DRS in Europe has occurred in three waves. Early adopters (Sweden, Norway, Finland) have a long history of DRS. The introduction of the current DRS in these countries can be seen as a response to the introduction of new types of packaging on the market (especially plastic packaging). This cohort of countries is followed by countries like the Netherlands and Germany. In these countries, the introduction of DRS can be seen as a response to the increase of packaging waste and related discussions on responsibility for the costs of waste management.

Countries like Lithuania, Malta and Latvia make the third wave. In these countries, the introduction of DRS can be seen as a response to increase in packaging waste combined with the introduction and alignment with EU-policies (and targets).

	Country (Name):
1984	Sweden (Returpack)
1989	Iceland (Endurvinnslan)
1996	Finland (PALPA)
1999	Norway (Infinitum)
2002	Denmark (Dansk Retursystem)
2003	Germany (Deutsche Pfandsystem)
2005	Netherlands (Statiegeld Nederland), Estonia (Eesti Pandipakend)
2005	Estonia (Eesti Pandipakend)
2006	Croatia (FZOEU)
2016	Lithuania (USAD)
2022	Malta (BCRS)
2022	Slovakia (Správca Záloh)
2022	Latvia (SIA Depozīta Iepakojuma Operators)

Reference: Unesda

DRS recycling: scope & coverage

Materials: the large majority of DRS for recycling in Europe cover plastic, metal and glass packaging (seven out of ten countries). Sweden and Norway only cover plastic and metal, while the Netherlands cover only plastic (but they will expand their scope to metal in 2023).

Product groups (included): soft-drinks and water are included in all systems, while beer is included in all systems except the Netherlands. Overall, a trend can be observed to expand to product groups like alcoholic beverages, mixer drinks, juices, sport drinks.

Product groups (excluded): milk and milk-based beverages are excluded from all DRS. Juices (or types of juices) are excluded from some DRS (like Netherlands, Sweden) as well as (strong) alcoholic beverages (Denmark, Estonia, Lithuania, Netherlands). Exclusion of smaller bottles is getting scarce (esp. with Netherlands changing its system in 2021) and is limited to items smaller than 0.1 or 0.2 L.

Material:	Country (Material type):
Plastic:	Croatia (predominantly PET), Denmark (predominantly PET), Estonia (predominantly PET), Finland (predominantly PET), Germany (predominantly PET), Iceland (predominantly PET), Latvia (only PET), Lithuania (only PET), Malta (only PET), Netherlands (only PET), Norway (predominantly PET), Slovakia (only PET), Sweden (predominantly PET).
Metal:	Croatia (aluminum, tinplate), Denmark (aluminum), Estonia (predominantly aluminum), Finland (aluminum), Germany (aluminum), Iceland (aluminum), Latvia (aluminum), Lithuania (aluminum, steel), Malta (aluminum, steel) Norway (aluminum), Slovakia (aluminum, steel), Sweden (aluminum, tinplate)
Glass:	Croatia, Denmark, Estonia, Finland, Germany, Iceland, Latvia, Lithuania, Malta

DRS recycling: take-back network

Types of take-back points: retailers are the main take-back point in all systems, except Iceland (working with return facilities). Distinction is made between large and small retailers, with small retailers either partly or fully exempted. Retailers have the possibility to collect materials manually or with a RVM (with/without compactor). Research in the Netherlands and Norway show that consumers bring most of the packaging back to locations with RVMs, e.g., large retailers.

Some DRS provide separate deposit banks (Denmark, Sweden) and many facilitate interaction with the informal economy (NGOs or vulnerable groups). This latest aspect increases the societal character of the DRS and contributes to a broad societal endorsement (see also pictures left).

Out-of-home locations included in half of the systems, in some cases voluntary. Norway anticipating on the growing number of groceries delivery services.

Examples of interaction with the informal economy: Dansk Retursystem introduced deposit shelves to public waste bins with the slogan “Giv din pant videre” (Pass on your deposit; picture: Twitter). The Icelandic scouting organization is one of the shareholders of the DRS Endurvinnslan. The collection bin refers to this with the name “Graenir Skáter” (Green Scouts; picture: Graenir Skáter facebook). Reverse vending machines in Norway feature an option for the deposit to be donated to the Norwegian Red Cross (picture: The Knowledge Exchange Blog)

DRS recycling: take-back network

Network density: a dense take-back network provides consumers with convenience, resulting ideally in a higher collection rate. The density of the network can be calculated in different ways.

In the first place with the inhabitant per take-back point ratio. This indicator is calculating the number of inhabitants that (on average) makes use of a take-back point. The average for all ten DRS is 1,620 inhabitants per take-back point. Five DRS, have a relatively similar ratio in the range of 1,000 – 1,500. Iceland is however, a clear outlier with a 6,068 to one ratio due to its different network (no retailers, but central locations). Norway and Germany, on the other hand, have relatively many take-back points per inhabitant: ratios of 358 and 640 inhabitants per take-back point, respectively.

A second way to look at network density is the number of take-back points per square kilometer. DRS differ substantially on this indicator with 372 times more DRS/km^2 in the highest (Germany) than in the lowest case (Iceland). However, three broad groups can be made, i.e. (1) low density networks (Iceland, Finland, Estonia); (2) medium density network (Croatia, Denmark, Lithuania, Norway, Sweden); (3) high density network (Germany, Netherlands).

Detailed information on the geographical coverage of the ten systems is not readily available. However, it should be noted that the geographical spread of the take-back networks follows the spread of retailers (due to the dominance of this take-back location in most DRS) closely. This means that we can expect that the density of the systems is much higher in urban areas, where more shops are located.

It should be noted that the data on this sheet has been collected in 2020 during the former DRS study and this data has not been updated in 2022. Therefore, this sheet doesn't include the new DRS countries which have implemented a DRS system from 2022 onwards.

Density*	Country (Name):
. 372	Germany (Deutsche Pfandsystem)
. 356	Netherlands (Statiegeld Nederland)
. 079	Denmark (Dansk Retursystem)
. 053	Croatia (FZOEU)
. 043	Lithuania (USAD)
. 041	Norway (Infinitum)
. 034	Sweden (Returpack)
. 019	Estonia (Eesti Pandipakend)
. 016	Finland (PALPA)
. 001	Iceland (Endurvinnslan)

** Density is calculated by the number of take-back points per km^2*

DRS Recycling: Anti-Fraud

Anti-Fraud measures in deposit return systems

Various measures can be implemented in DRS systems to prevent misuse and fraud. Examples of fraudulent activities may be shipment of packaging material abroad and submitting it for higher deposit fees by removing logos and barcodes, or creation of fake barcodes. Measures to prevent this vary per country, but common examples include

- Licensing: Producers participating in the DRS must register their packaging and company, obtaining a license for participation.
- Unique identifiers: Packaging materials included in the DRS may have distinct markings like QR codes or barcodes for traceability.
- Special ink: Although expensive, special inks can be used to enhance security, but this measure is not commonly implemented due to the associated burden on producers.
- Camera monitoring: Reverse vending machines equipped with camera surveillance, as mandated in Sweden, can detect fraudulent activities, despite increasing costs for retailers. Returpack compensates these costs through higher handling fees.
- Monitoring and auditing: Counting and verifying the returns versus total deposits allow the detection of suspected fraudulent activities in specific regions or collection points.

Yet, fraud is generally low and tends to be isolated in specific areas or stores. Overall, costs of implementing these measures often outweigh the benefits and standardized rules are typically sufficient to minimize fraud.

Fraud within DRS systems is low. This is mostly a result of the systemic features implemented at take-back points:

Take-back points using RVM's are automatically secured by the functioning of the RVM, which requires barcodes to correspond with the labelling, size and type of material that is handed in. This minimizes the risk of fraudulent actions as the packaging needs to meet four different criteria. Additionally, the data is automatically sent to distribution centers, also covering the risk of returning packaging multiple times.

Manual take-back points use sample checks of the bags that are filled with returned packaging. If one of the bags has a lower volume, all bags are assumed to have a lower volume and an investigation into this specific take-back point will be started.

Due to these services, fraud is very limited and additional, usually expensive measures, are redundant.

DRS recycling: return rates

Overall return rates: the ten DRS report (very) high return rates (the number of collected packaging divided by the amount of packaging put-on-market). Taken together, the ten DRS have return rates of 90% for plastic, 89% for glass, and 91% for metal.

Differences per fraction: it is interesting to see that differences exists between the return rates of different material fractions in one country. In some countries this difference is quite substantial, i.e. Iceland (8%), Lithuania (8%) and Croatia (12%). On average the return rate for metal is the highest (91%), closely followed by plastic (90%) and glass (89%).

Declined return rate in NL: the Dutch DRS has been recently extended with the inclusion of a deposit on small plastic bottles. This significantly lowered the overall return rate. The return rate on large plastic bottles is in 2021 still 95% which equals the return rate of 2019. It is expected that the return of smaller plastic bottles will also improve over time, which should bring the overall return rate for plastic on approximately 90%.

System:	Data source	Plastic		Glass		Metal		Average	
		2021	2019	2021	2019	2021	2019	2021	2019
Croatia (FZOEU)*	External study	88%	89%	93%	90%	81%	79%	88%	86%
Denmark (Dansk Retursystem)	Annual report	95%	94%	93%	88%	92%	90%	93%	91%
Estonia (Eesti Pandipakend)	Annual report	87%	87%**	85%	87%	88%	88%	87%	81%
Finland (PALPA)	Palpa website	90%	90%	98%	87%	97%	95%	95%	91%
Germany (Deutsche Pfandsystem)*	Estimation based on external studies	97%	97%	NA	NA	99%	95%	98%	96%
Iceland (Endurvinnslan)	Personal communication with Endurvinnslan	90%	85%	82%	83%	91%	86%	88%	85%
Lithuania (USAD)	Annual report	92%	92%	84%	85%	92%	93%	89%	90%
Netherlands (Statiegeld NL)*	Estimation based on external studies	84%	95%	-	-	-	-	84%	95%
Norway (Infinitum)	Annual report	93%	89%	-	-	92%	90%	92%	90%
Sweden (Returpack)	Website of Returpack	86%	84%	-	-	89%	86%	88%	85%
Average:		90%	88%	89%	87%	91%	89%	90%	88%

* Data for Croatia is for 2020, which is derived from a Reloop study. Numbers for the German DRS are for 2020 as well and based on estimations because a central administration of return data is missing. Data on the Netherlands is from 2021 before the extension with aluminum cans in 2023 and based on estimation as well.
** In the last DRS study the wrong collection rate has been reported for plastic material in the Estonian DRS, this has been corrected in this study.

DRS recycling: share of packaging waste collection

Share of packaging waste collection: the ten DRS included in this study run complementary to other (packaging) waste collection systems, like EPR-systems and curb-side systems. This means that the materials that are collected by these systems are only a share of the total packaging waste.

The share of plastic packaging that is collected by these systems is smallest for the plastic fraction, ranging from 26% for Croatia to only 4% for the Netherlands. For the Netherlands, this amount will increase with the inclusion of small PET-bottles in the DRS from 2021 onwards.

For glass, a distinction can be made between systems that collect a relatively large share of glass packaging (Croatia, Finland, Iceland) and systems with a more limited share (Estonia, Denmark, Lithuania). The availability of data on both metallic as well as aluminum packaging in Eurostat has significantly improved in Eurostat in comparison with 2018. The available data for 2020 shows that DRS include relatively large shares of metal packaging waste. This is linked to the limited amount of packaging groups that rely on metals, besides beverage cans (which are included in the DRS).

System:	Plastic		Glass		Metal		Average	
	2020	2018	2020	2018	2020	2018	2020	2018
Croatia (FZOEU)	26%	24%	63%	51%	13%	50%	34%	41,7%
Denmark (Dansk Retursystem)	8%	7%	16%	17%	76%	76%	33%	33,3%
Estonia (Eesti Pandipakend)	8%	7%	17%	18%	89%	NA	38%	12,5%
Finland (PALPA)	9%	10%	54%	58%	75%	NA	46%	34%
Germany (Deutsche Pfandsystem)	12%	NA	NA	NA	35%	NA	23,5%	NA
Iceland (Endurvinnslan)	9%	NA	51%	NA	81%	NA	47%	NA
Lithuania (USAD)	13%	15%	12%	11%	16%	NA	13,7%	13%
Netherlands (Statiegeld NL)	4%**	4%	-	-	-	-	4%	4%
Norway (Infinitum)	9%	10%	-	-	71%	NA	40%	10%
Sweden (Returpack)	9%	9%	-	-	67%	68%	38%	38,5%
Average:	11%	11%	36%	31%	58%	65%	35%	35,7%

* Percentages are calculated by dividing the reported amounts collected by the DRS (from websites, annual reports) by the total packaging waste generated included in Eurostat waste statistics for 2020.
** Data for the Netherlands is for 2019, because that is the most recent data which is available in Eurostat.

DRS recycling: economic size of the DRS

Total revenues from deposit fees: the focus of the quick scan was on macro-dimension performance indicators and thus collected aggregated data. This means that it was not yet possible to get an in-depth understanding of the costs of the different DRS. To get a first understanding of the economic aspects of the DRS, information on the total revenues from deposit fees of the ten systems was collected.

During the last DRS study on quick scan countries (2019) we investigated total deposit fees that are received by system operators as well as their revenue streams. To increase consistency in the presented data we have now analysed the received deposit fees by DRS operators for 2021. If this data was not available, we made an estimation based on total amount of units put on market. With all systems being not-for-profit organizations, total revenues can be seen as a proxy for total costs of the system.

Average revenues of the DRS per inhabitant is €39.67, with the lowest ratio in Lithuania (€7.01) and the highest in Iceland (€68). A broad distinction becomes visible between the more expensive systems in countries with high GDP (Norway, Germany, Iceland, Finland, Denmark) and cheaper systems in countries with a lower GDP (Croatia, Lithuania). However, the cases of the Netherlands and Sweden show that this doesn't have to be the case.

The DRS in Germany, Croatia and the Netherlands are less transparent on economic data. As such the economic size of their Deposit Return Systems is based on estimations for which data from external studies and reports are used. For the other quick scan countries data concerning the economic size of their DRS is retrieved from internal reports on DRS.

System:	M€	€/Capita
	2021	2021
Croatia (FZOEU)	M€ 58.1	€14.91
Denmark (Dansk Retursystem)	M€ 309.5	€52.85
Estonia (Eesti Pandipakend)	M€ 35	€26.28
Finland (PALPA)	M€ 360	€64.97
Germany (Deutsche Pfandsystem)	M€ 4,810	€57.81
Iceland (Endurvinnslan)	M€ 25.3	€ 68
Lithuania (USAD)	M€ 19.6	€7.01
Netherlands (Statiegeld NL)	M€ 285	€16.26
Norway (Infinitum)	M€ 336.4	€62.2
Sweden (Returpack)	M€ 274.7	€26.36
Average:	M€ 651.4	€39.67

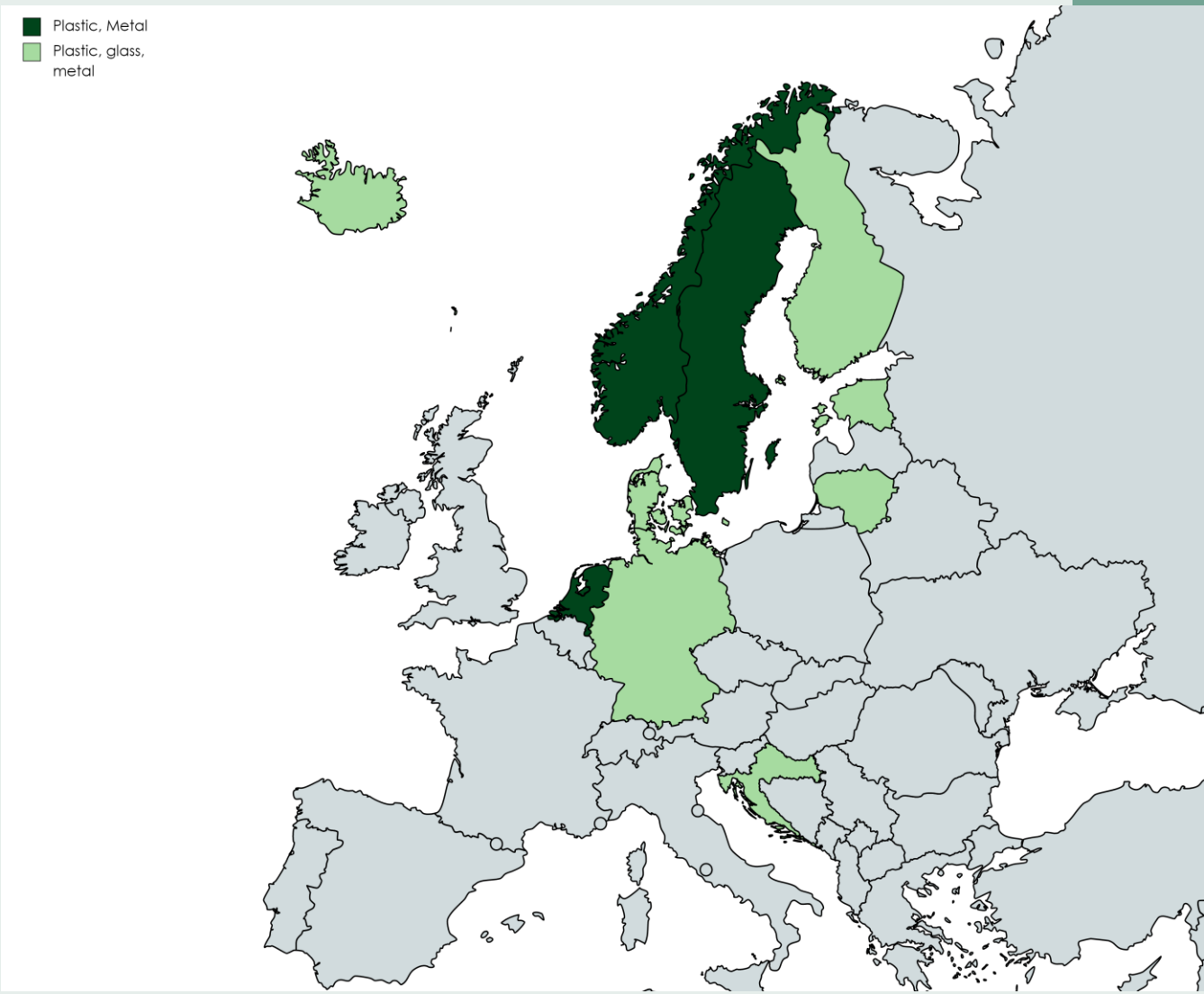
CHAPTER 2: Overview of DRS for recycling

DRS for recycling: Materials included

During the first phase of this study ten European countries which have implemented a DRS have been assessed. The figure provides which materials are included in DRS in individual countries on the moment these countries have been analysed.

The figure illustrates that in all DRS countries at least plastic and metal beverage packaging materials are included in the European deposit return systems for recycling. However, it should be noted that the Dutch have only recently included metal beverage packaging in their DRS (from April 2023 onwards).

Furthermore, it can be seen that the majority of the DRS for recycling have a return system in place for plastic, glass as well as metal beverage packaging. If the DRS for recycling relies mainly on reverse vending machines where input materials are automatically recycled (and often compacted), this could be a reason to exclude glass packaging from a DRS for recycling.

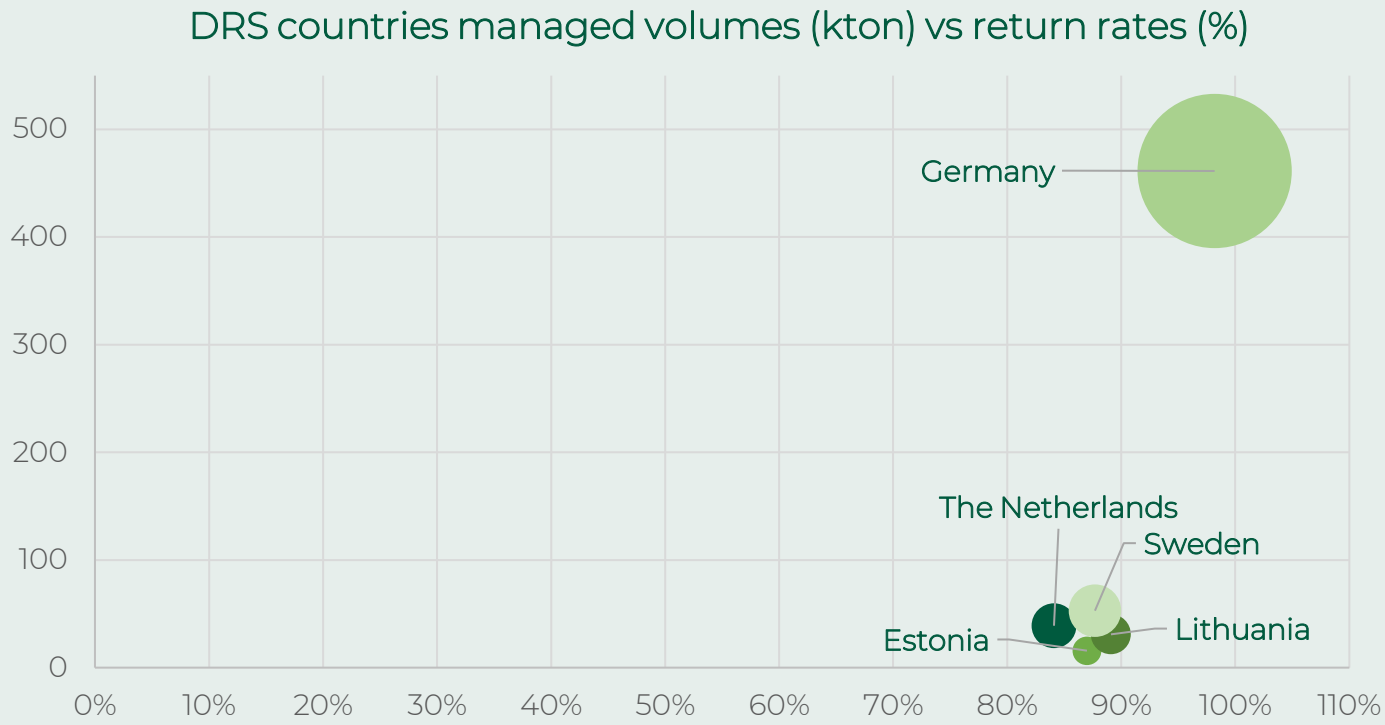


DRS for recycling: Total amount of materials

As can be derived from the figure on this slide, the German DRS is by far the largest DRS for recycling in Europe. Besides the system is managed relatively successful, as 98,2% of all the materials that are included in the DRS are returned and recycled.

In comparison to the other European (case study) countries, the German DRS successfully manages a large volume of beverage packaging material. The return rates of other European DRS range between 84-89%. While the 2nd largest European DRS (Sweden) only manages around 53 kton of material and the smallest European DRS (Estonia) manages 15,8 kton.

Despite the relatively large volumes that are managed by the German DRS, they are able to realize very high average return rates for all material streams. An important reason for this is the relatively high flat deposit rate (€0,25) that is applied to single-use beverage packaging within Germany as well as strong social norms and convenient DRS for recycling system (e.g. density of take back network).

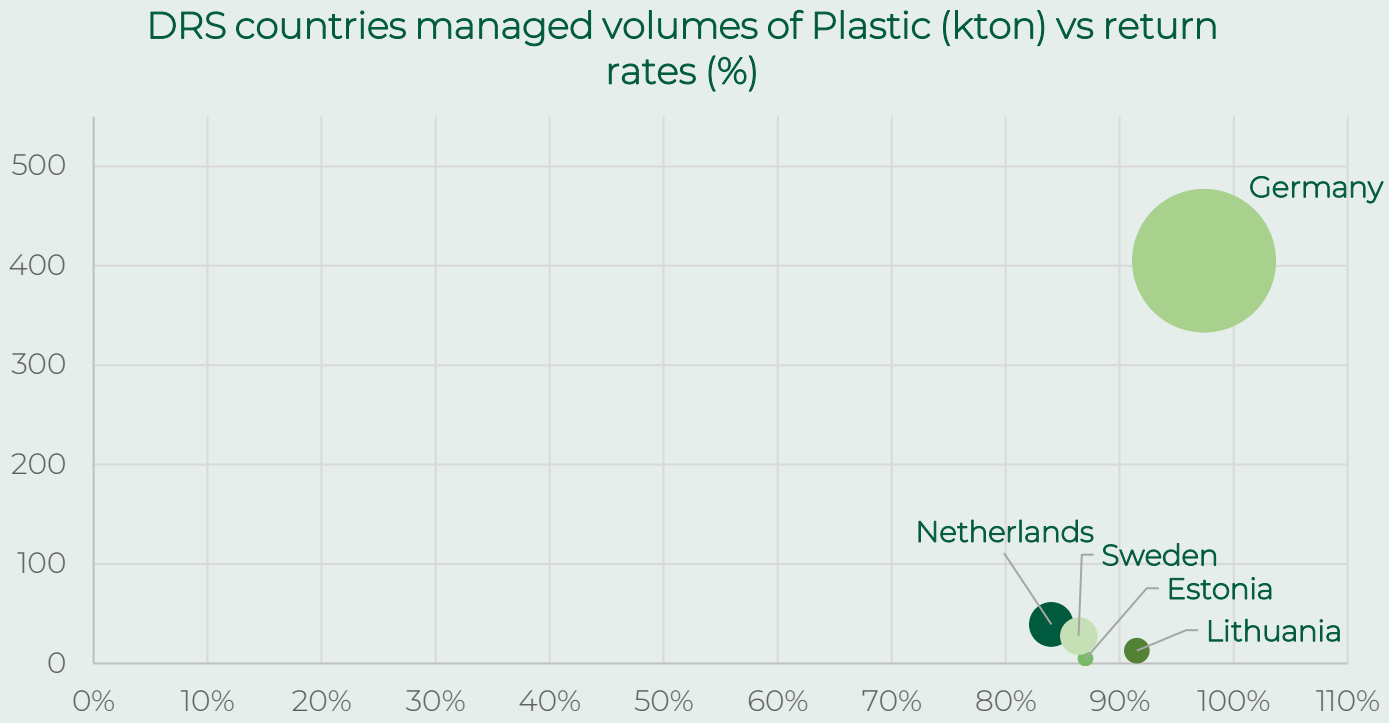


DRS for recycling: Plastic

The figure on this slide concerning plastic recycling resembles more or less the figure on total packaging managed by DRS for recycling. As all case countries include plastic packaging in their DRS for recycling. Furthermore, plastic packaging represents the majority of managed packaging volumes in each DRS country. This explains why this graph is relatively in line with the overview of total packaging managed by DRS for recycling.

Concerning plastic recycling it can be seen that the German DRS for recycling is the most effective system, both in return rate (97,4%) as well as in managed volumes (kton). Besides Germany, also Lithuania achieves a relatively high return rate for plastic packaging with 91,5%.

The countries that are lagging behind are Estonia, Sweden and the Netherlands with return rates of 87%, 86,4% and 84%, respectively. As such, the Dutch DRS for recycling has currently the lowest return rate for plastic packaging. This can be explained by the recent inclusion of small plastic bottles in the Dutch DRS for recycling which significantly lowered the average return rate of plastic packaging.

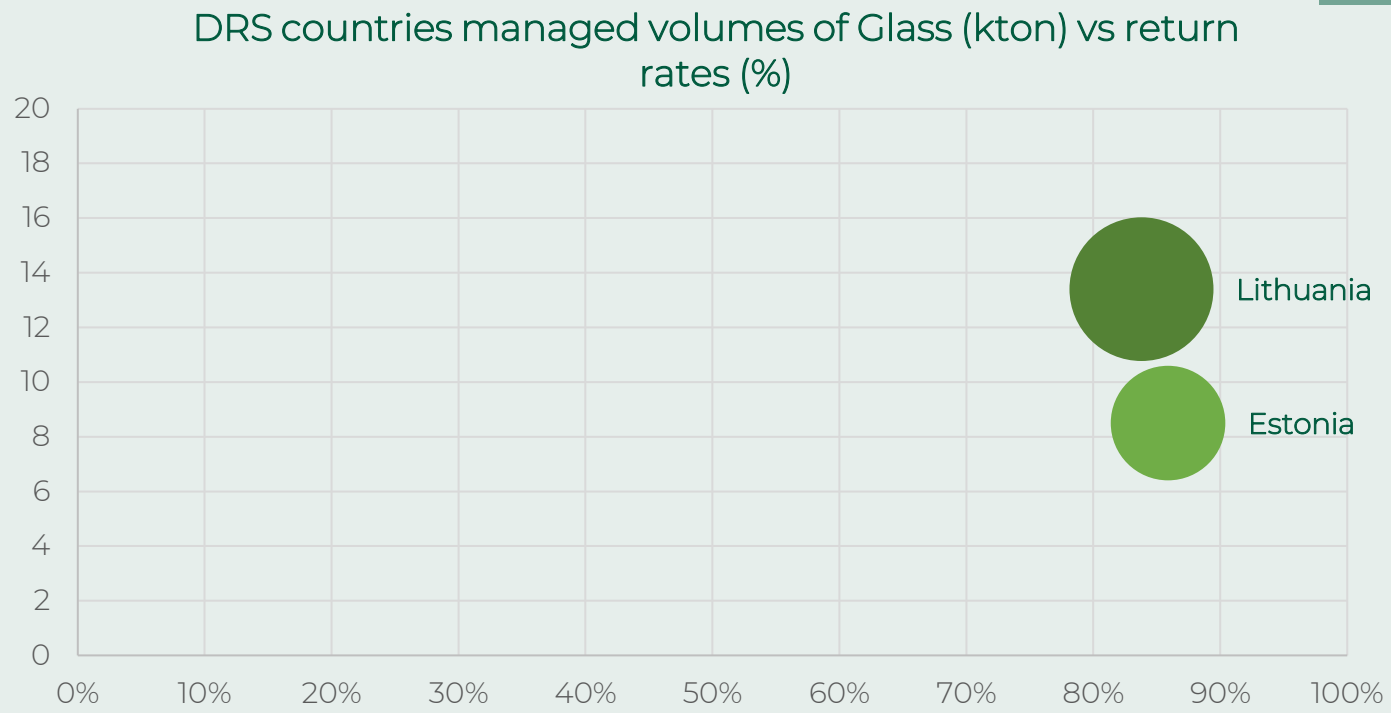


DRS for recycling: Glass

Regarding glass collection by DRS for recycling it is interesting to see that Estonia performs slightly better in glass recycling than Lithuania. While Lithuania has a higher average return rate for all packaging materials. As both countries apply the same deposit fee to each type of packaging material, it is probably related to the inclusion of different material groups in the DRS for recycling (e.g., (strong) alcoholic beverages, wine bottles).

Overall, Estonia has realized a return rate of 85,9%, while Lithuania only realized a return rate of 83,9% for their glass packaging. The Lithuanian return rate for glass packaging is significantly lagging behind in comparison with their return rates for plastic and metal packaging.

While Lithuania has more than twice the amount of inhabitants in comparison with Estonia, the Lithuanian DRS only manages around 1.6 times the amount of glass packaging when compared with Estonia. This implies that more glass beverage product groups are included in the Estonian DRS for recycling than in the Lithuanian DRS for recycling.

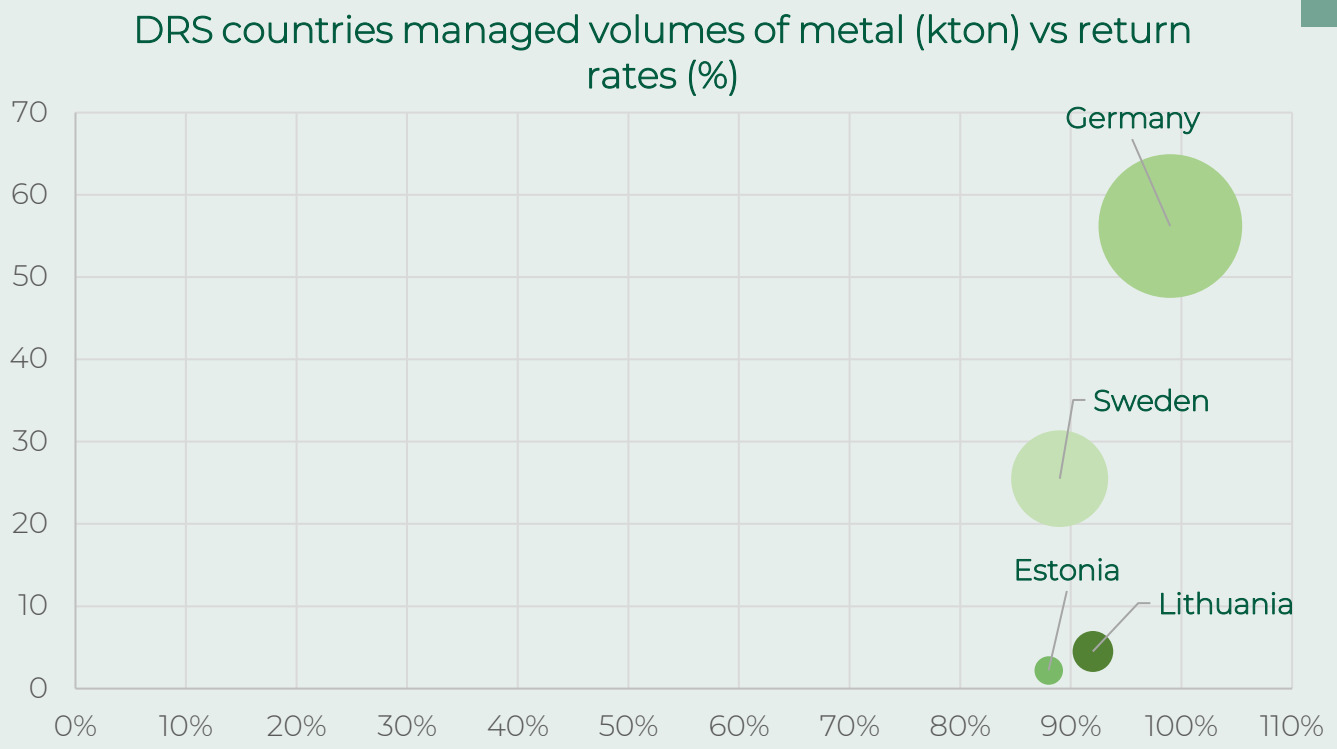


DRS for recycling: Metal

Regarding metal recycling performance of DRS for recycling it can be seen that Lithuania achieves a relatively high return rate again, outperforming both Estonia and Sweden. However, the German DRS for recycling is again the most effective system with a return rate of 99% for metal packaging.

It can be seen that the Swedish DRS for recycling manages a relatively large amount of metal packaging, with 25.5 kton of metal packaging annually circulating the system. This is approximately half the amount of metal packaging that is managed by the German DRS for recycling. While for plastic packaging the German DRS for recycling is responsible for almost ten times the amount of plastic packaging that is managed by the Swedish DRS for recycling.

The Dutch DRS for recycling has been excluded from this graph as metal packaging is only recently included in their DRS for recycling, from April 2023 onwards. This study uses data from 2021 to assess the return rates of national DRS for recycling, at that moment in time metal packaging was not part of the scope of DRS for recycling.

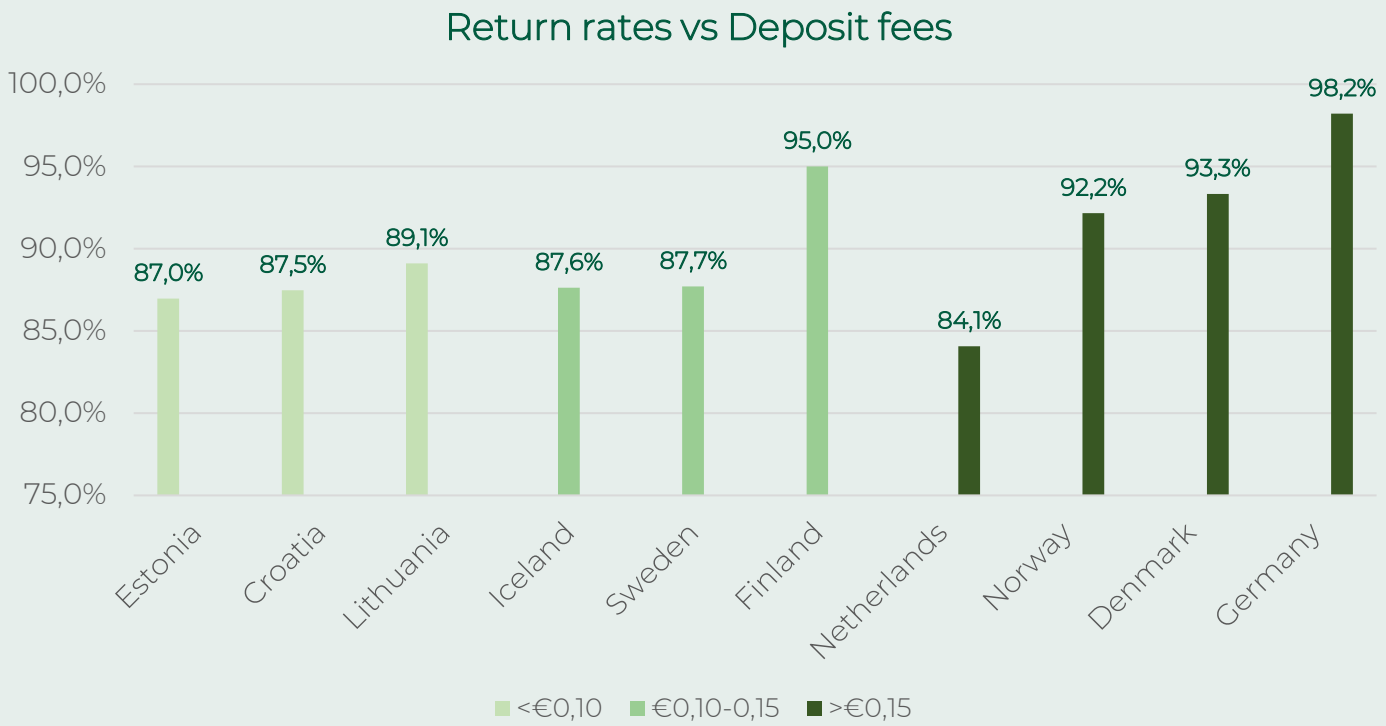


DRS for recycling: Return rate vs deposit fee

The DRS countries have been categorized among the deposit fee structure which is implemented in their DRS. Broadly speaking, three groups of countries can be distinguished:
(I) countries that apply an average deposit fee of 10 eurocents or lower, such as Estonia and Lithuania where a flat rate deposit (€0.10) is implemented;
(II) countries where an average deposit fee of 10 – 15 eurocents is used, e.g., Iceland with a flat rate deposit of €0.12 and Finland with a deposit fee of €0.10 or €0.15 depending on the packaging material;
(III) countries that implemented an average deposit fee of more than 15 cents. For instance, Germany that installed a flat rate deposit fee of 25 eurocents for DRS for recycling, or the Netherlands that applies a deposit fee of €0,15 or €0,25 depending on the material.

Overall, the figure illustrates the higher the deposit fee, the more packaging items are returned and recycled by Deposit Return Systems (higher return rate). The average return rates of the countries where a deposit fee of more than 15 eurocents is implemented, is significantly higher than the return rates of other countries. Except for the Netherlands, their lower average return rate is caused by the recent inclusion of small plastic bottles in the DRS. It is expected that their average return rate will increase to 90% in coming years.

Nevertheless, successful individual cases can be seen in the groups with lower deposit fees as well, e.g., Finland. A reason for this is the fact that return rates are not only determined by deposit fees, but also by density of the take-back network, strict social norms, etc.



DRS for recycling: Deposit fees

The previous slide highlighted the average deposit fee structure which is applied in ten European DRS countries. In the table on this slide, we have comprehensively assessed the deposit fees as implemented by the five case study countries.

Within the DRS for recycling two different deposit fee structures can be distinguished:

1. A flat rate deposit fee, where only a single deposit value is implemented, independent of material type or size of the packaging material.
2. A differentiated deposit fee, where different deposit fees are applied depending on the type of material or the size of DRS items.

A higher deposit fee should encourage stakeholders to return the most valuable packaging items and as such maximize the return rate for these packaging material groups. However, the DRS in Germany shows that a flat rate deposit system can also realize relatively high return rates, as the system is easier for consumers and producers.

	Plastic		Glass	Metal
	Small bottles (PET <1L)	*Large bottles (PET >1L)*		
The Netherlands	€0.15	€0.25	-	€0.15 (from 04/2023)
Germany	€0.25		€0.25	€0.25
Lithuania	€0.1		€0.1	€0.1
Estonia	€0.1		€0.1	€0.1
Sweden	€0.1	€0.19	-	€0.1

DRS for recycling: Revenues and costs

The collected Economic data concerning the most important revenues and costs of individual DRS are showcased on this slide. The German DRS is by far the largest European DRS, but it is interesting to see that it is also the most expensive DRS (€/Ton). Both in absolute numbers as well as in €/capita.

Furthermore, it can be seen that both Lithuania and Estonia have a relatively expensive DRS as well (€/capita). This is probably caused by the relative low number of inhabitants in Lithuania and Estonia: 2.8 million and 1.3 million, respectively. One needs a certain density in their take-back network and the implementation of a DRS includes certain fixed costs, which becomes relatively expensive for less densely populated countries. The Dutch DRS is relatively cheap, as it is such a densely populated country.

Lithuania and Estonia may have a relatively expensive DRS, both countries do have a very transparent reporting system. These countries provide annual financial and management reports for their DRS systems. While the Dutch and German DRS doesn't have any official reports concerning the performance and operation of their DRS. In Sweden a sustainability report is provided each year, which gives limited insights in the financial performance of their DRS.

Economic data – DRS for Recycling*

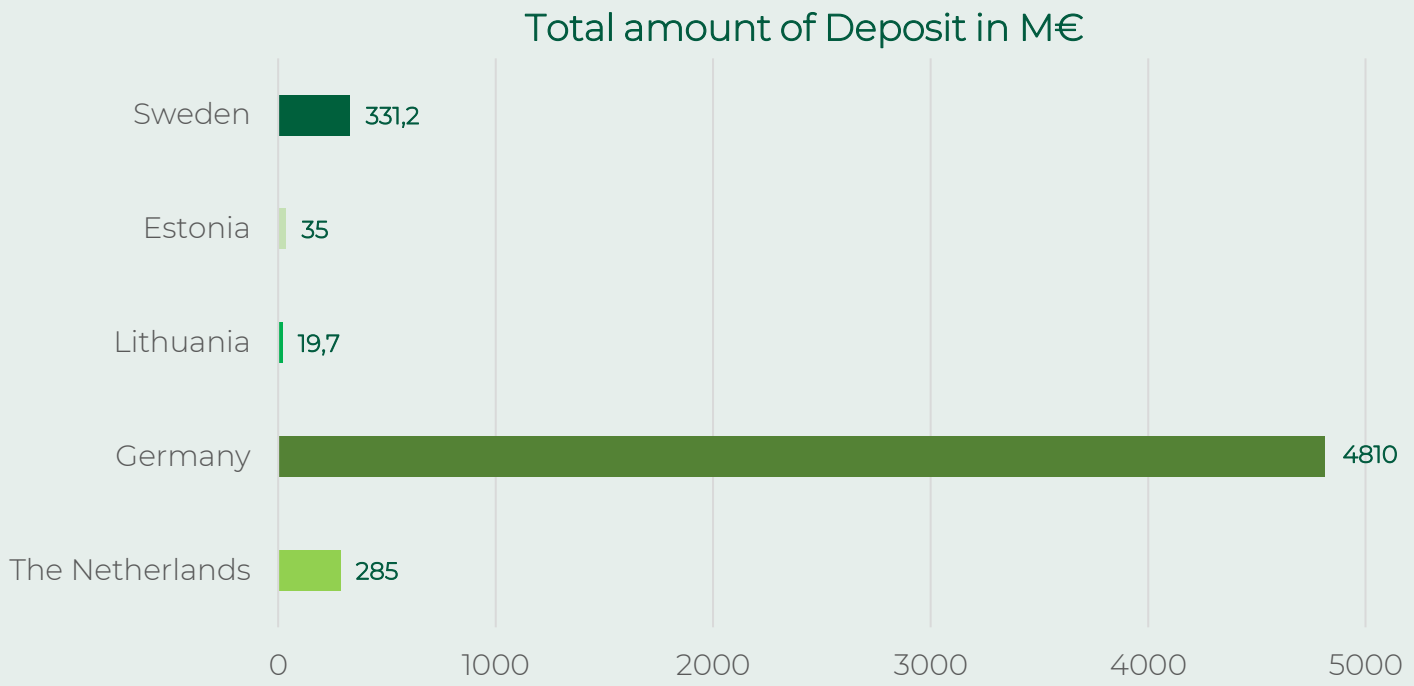
	The Netherlands		Lithuania				Estonia				Sweden				Germany	
	€/Ton	€/capita	€/Ton			€/capita	€/Ton			€/capita	€/Ton			€/capita	€/Ton	€/capita
Deposits																
Paid	6,053	13.7	517			5.2	2,082			22.3	5,847			28.4	10,479	56.7
Unredeemed	1,144	2.6	185			1.8	382			4.1	745			2.6	192	1.1
Managed	7,197	16.3	702			7	2,463			26.4	6,591			32	10,671	57.8
Costs																
			Plast	*Glass*	*Metal*	*Total*	*Plast*	*Glass*	*Metal*	*Total*	*Plast*	*Glass*	*Metal*	*Total*		
Handling fee	934.3	2.1	540.5	67	1,106.1	439.9	4.4	1,015.8	126	2,078.8	704.2	7.5	843.6	-	2,147	1,454.7	7.0	N/A	N/A
Other costs	N/A	N/A	661.6			6.6	246.5			2.7	710.4			3.4	N/A	N/A
Total costs	N/A	N/A	1,101.4			11.0	950.7			10.2	2,165.1			10.4	25,551.3	13.8
Revenues and transparency																
			Plast	*Glass*	*Metal*	*Total*	*Plast*	*Glass*	*Metal*	*Total*	*Plast*	*Glass*	*Metal*	*Total*		
Producer fee	656.6	1.5	861.3	106.8	1,762.6	700.9	7	284.4	35.3	582.1	197.2	2.1	685.5	-	1,744.6	1,182.1	5.7	N/A	N/A
Other Revenues	N/A	N/A	379.1			3.8	478.9			5.1	N/A			N/A	432.6	2.4
Transparency	Limited		Good				Good				Limited				Limited	

*Deposits, costs and revenues that are provided for the Netherlands, Sweden and Germany are estimations based on available data, such as the amount of materials that fall under the responsibility of their DRS for recycling.
**The handling and producer fee in €/T are calculated by multiplying the average handling or producer fee per individual item with the number of items per ton of specific material streams. As such, a relative low amount of costs is allocated to heavy weight material streams (i.e., glass) which has a low number of items per ton in comparison with plastic and metal packaging.

DRS for recycling: Total amount of Deposit

This graph highlights the total amount of Deposit that is managed by individual European DRS. The German DRS clearly is the largest European DRS, while the Estonian and Lithuanian DRS are relatively small.

On the one hand this is caused by the number of inhabitants in each country. On the other hand, this is also determined by the deposit amount which is charged to each packaging item. Lithuania and Estonia both have a flat deposit rate of €0,10, while in Germany a flat deposit rate of €0,25 is implemented.



DRS for recycling: Sale of material

Besides (unredeemed) deposit fees, another important revenue stream of DRS for recycling is the sale of collected materials. When beverage packaging items are collected by the DRS, they can be recycled into high quality secondary materials. As DRS provide a relatively clean source of materials.

Estonia and Lithuania both report on the revenue that is generated by selling the collected materials. In 2021, the Estonian DRS earned €6.4 million by selling their collected materials. For Lithuania, sale of collected materials amounts even to €10.6 million.

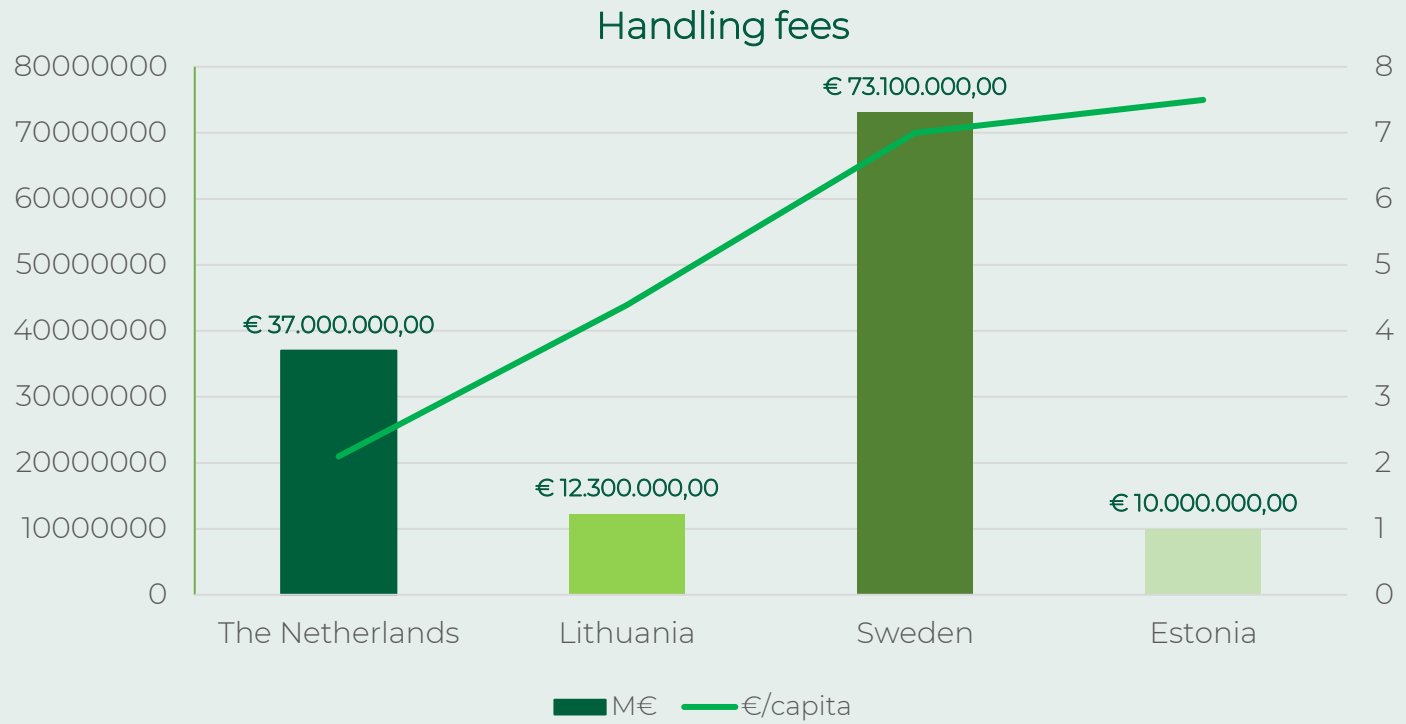
Data on sale of collected materials is not available for the Dutch or Swedish DRS for recycling. For Germany, an estimation has been made based on externally reported key figures. As they have a relatively large DRS, their revenue generated by sale of materials is also high (€140 - €250 million).

DRS for recycling: Handling fees

As already mentioned, the Swedish, German and Dutch DRS only provide limited information on the (financial) performance and operation of their DRS. As such, an extensive analysis of cost streams can only be conducted for Lithuania and Estonia.

Besides paid deposit fees, one of the most important cost streams for DRS operators are the handling fees which are paid to retailers or redemption centers.

It is interesting to see that the handling fees in Lithuania are just a bit higher than in Estonia (in absolute numbers). While Lithuania has more than twice the number of inhabitants compared to Estonia. As such, their costs for handling fees are relatively low when compared from a €/capita perspective. Moreover, the density of their take-back network is also significantly higher than in Estonia (see slide 6).

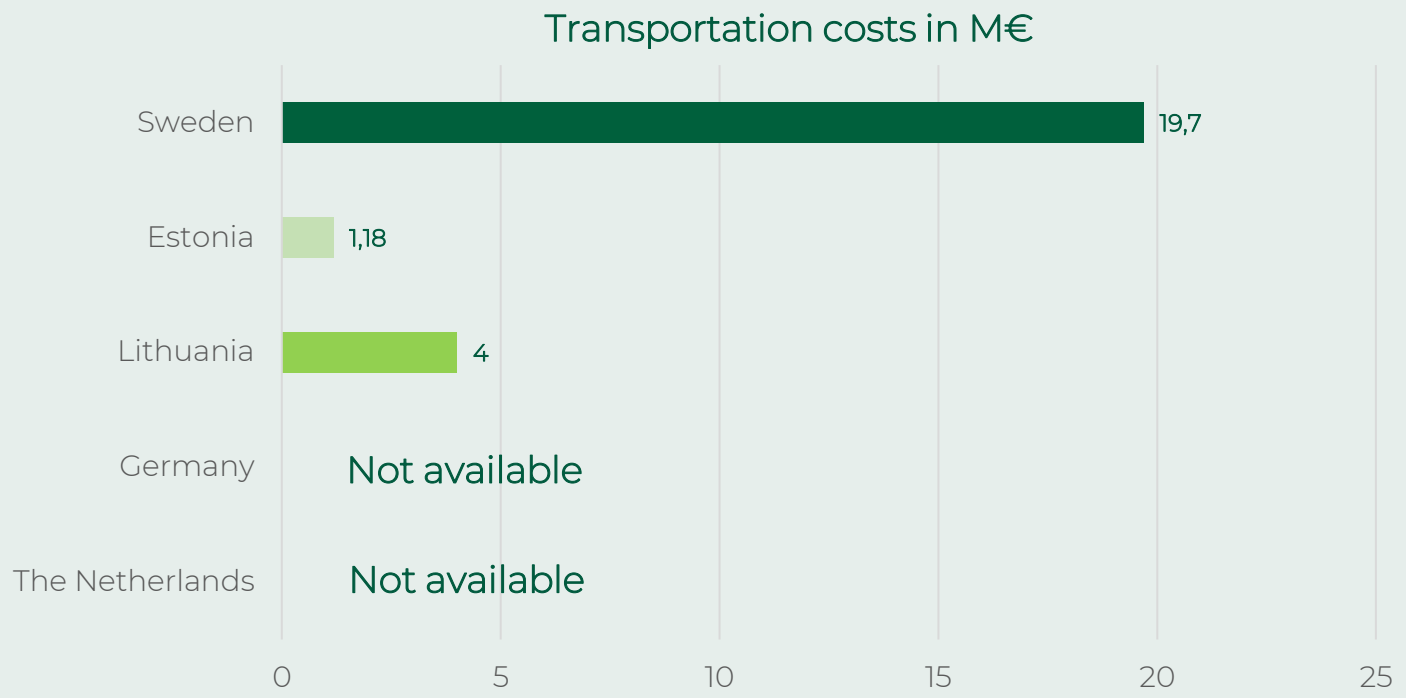


DRS for recycling: Transportation fees

The sustainability report of Sweden provides their transportation costs as percentage of their total purchase costs (€36.45 million). As such their annual transportation costs are approximately €19.7 million.

The transportation costs in Estonia and Lithuania are significantly lower; €10 million and €12.3 million respectively. The difference in transportation costs can be explained by the difference in size between Sweden and Estonia as well as Lithuania.

However, it should be noted that Sweden has significantly more inhabitants than both Estonia and Lithuania. Meaning that the difference in relative transportation costs is significantly smaller, when the Swedish DRS (€1.89) is compared to Lithuania (€1.43) and Estonia (€0.88) in €/capita.

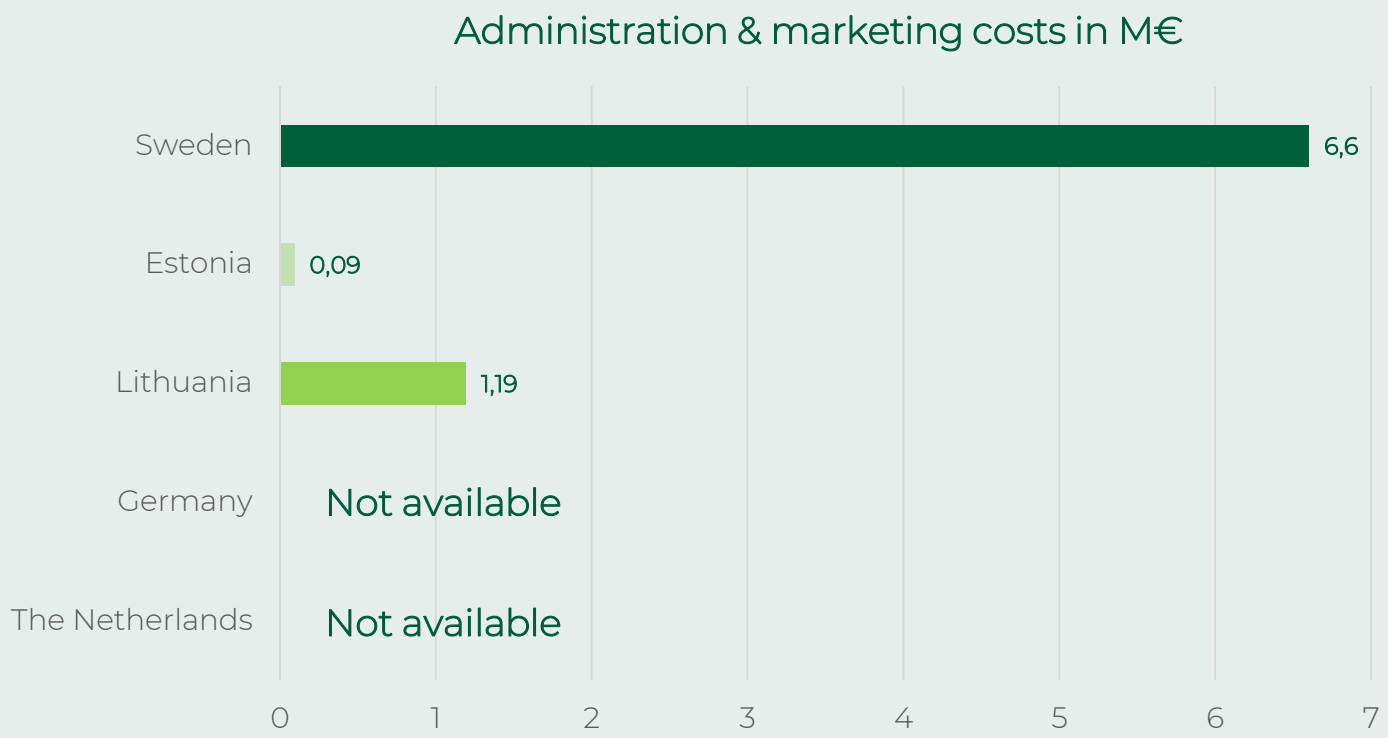


DRS for recycling: Administration & marketing costs

Regarding the marketing and administration costs, it can be concluded that Sweden has again the highest costs for marketing and administration (€6.6 million). While Estonia spends the least costs on marketing and administration (€0.09 million).

When the absolute numbers are translated to a €/capita ratio, it is noticed that Estonia only spends 7 eurocent per capita on marketing and administration. While this is 43 eurocent in Lithuania and 63 eurocent concerning the Swedish DRS.

Interesting about Estonia is that their DRS has relatively low marketing & administration, as well as transportation costs. However, they spend significantly more on handling fees, when compared on a €/capita ratio to Lithuania.



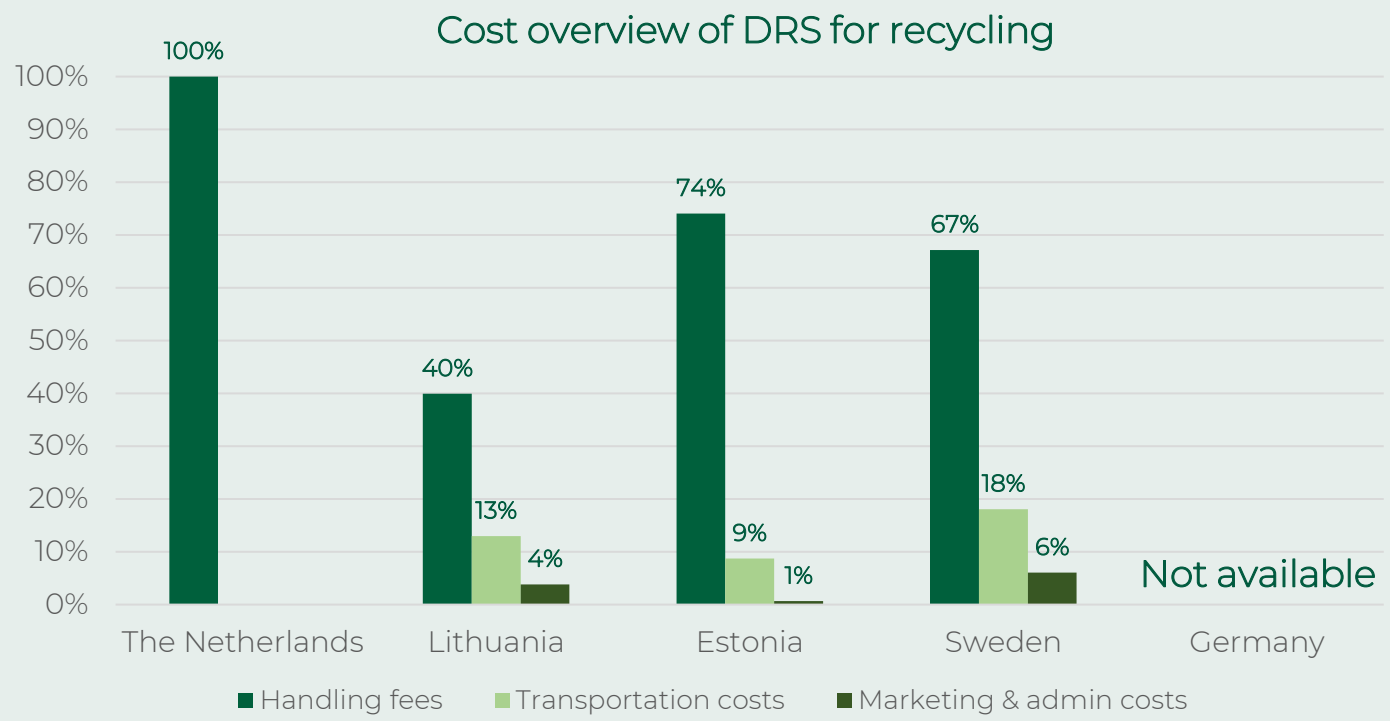
DRS for recycling: Total costs

A comprehensive overview of the most relevant cost items for each DRS for recycling is provided on this slide. For the Dutch DRS only an estimation could be made of the costs related to handling fees, based on the collected materials. The cost items for Sweden are also estimated, while the different types of costs for Estonia and Lithuania are based on data from their annual reports. Unfortunately, the required data for Germany is unavailable and therefore, no graph is provided for the German DRS for recycling.

It can be seen that the most costs in each DRS for recycling are made in order to compensate retailers for their expenses, by means of a handling fee. Besides handling fees transportation of material as well as necessary marketing and administration costs are also important cost items in national DRS for recycling.

Based on an assessment of the financials of the five case study DRS for recycling, the costs are on average distributed as follows:

- Handling Fees costs: 60,3 %;
- Trasportation costs: 13,3 %
- Marketing and Administration costs: 3,6 %

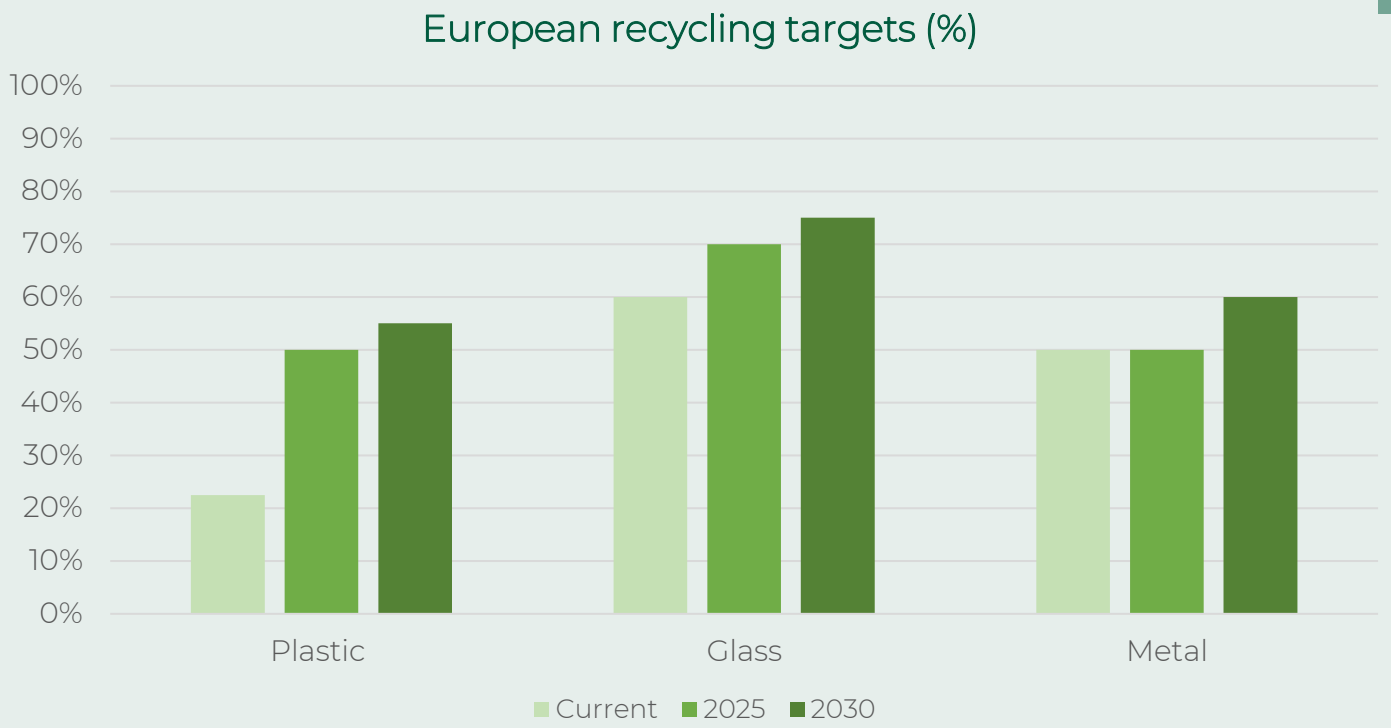


EPR vs DRS: European legislative targets

The European Commission is increasingly focusing on recycling of materials. As such, the EU has established legislative targets for recycling of different material streams, which will be implemented from 2025 onwards. The recycling target for 2025 is set at 65% for all materials and at 70% from 2030 onwards.

Besides these general packaging material targets, the EU has established separate goals for individual material streams (see figure). These European recycling targets are a percentage of the total weight of packaging material streams. As is illustrated by the figure, 50% of plastic packaging must be recycled in 2025 and from 2030 onwards this will be 55%. This implies a significant increase from current recycling efforts of European countries.

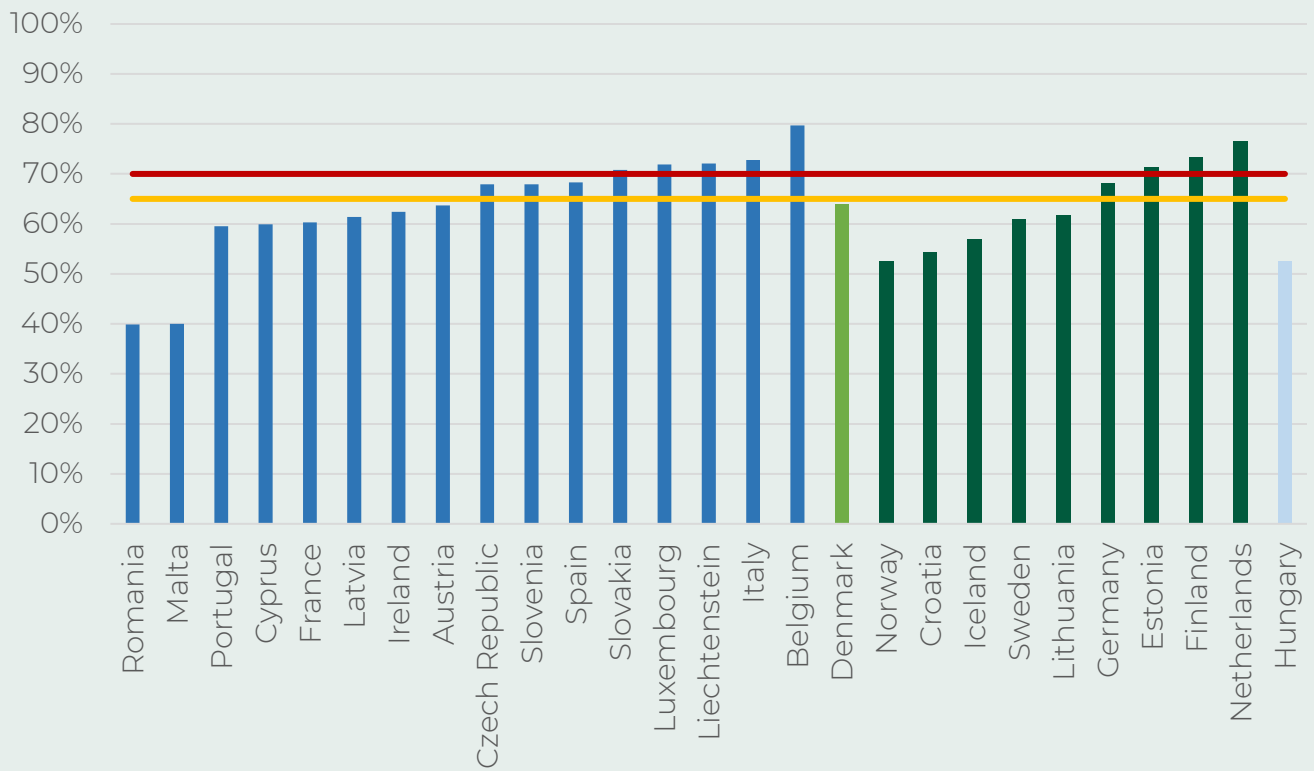
For glass even more ambitious recycling targets are established. In 2025, 70% of glass packaging should be recycled and from 2030 onwards this is 75%. However, this is a relatively small increase as the current recycling target is already at 60%. For metal, recycling targets for 2025 and 2030 have been established as well, 50% and 55% respectively.



EPR vs DRS: Total recycling performance

The graph on this slide shows that countries with different systems (DRS versus other systems) perform almost equally, i.e. countries with DRS reached on average a recycling percentage of 64% in comparison to 63% for countries with other systems. From both groups of countries successful cases can be identified that are already in line with upcoming European legislative targets e.g., the Netherlands, Finland, and Estonia (all DRS countries), as well as Belgium, Italy, Liechtenstein and Luxemburg (all non-DRS countries).

However, both groups of countries also present countries that are significantly lagging behind such as Croatia and Norway (both DRS countries) as well as Hungary, Malta and Romania (non-DRS countries). The following slides provide graphs for individual packaging material streams in order to get a more comprehensive understanding of the recycling performance regarding packaging material.



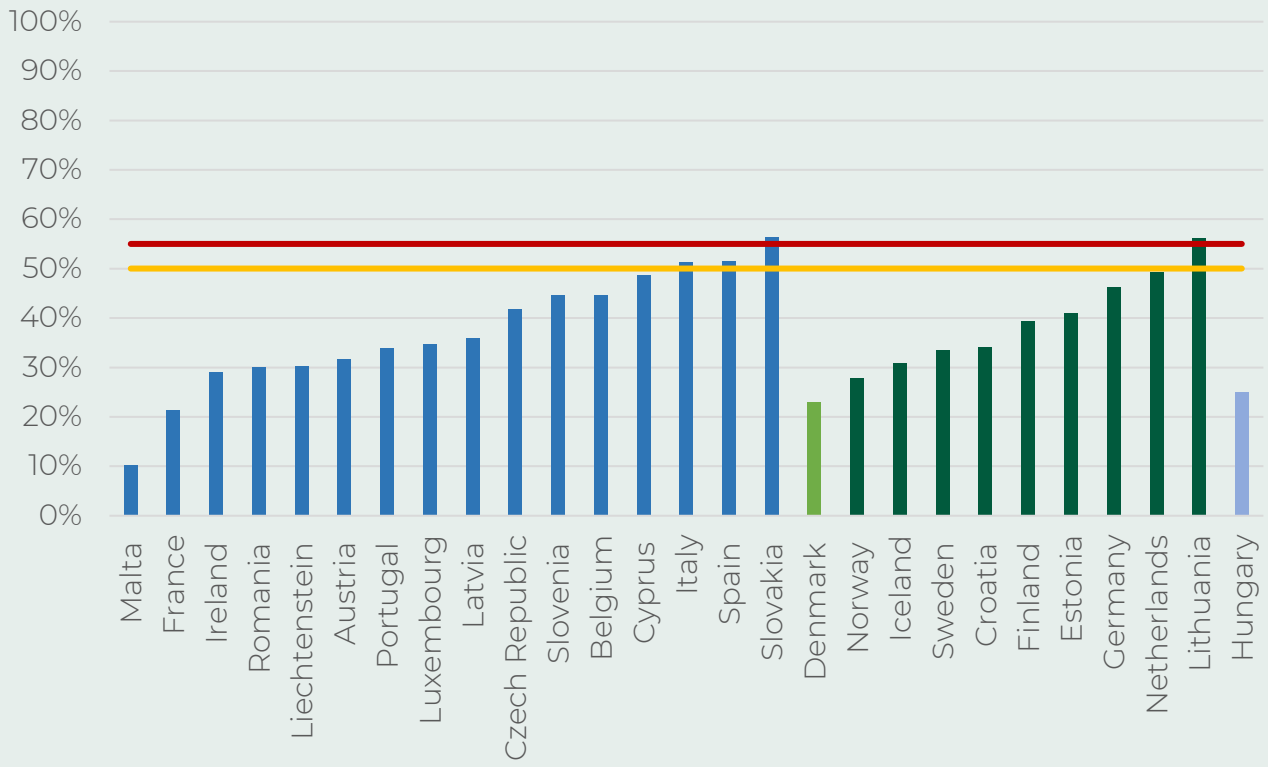
Legenda:
EPR
DRS
EPR+DRS
Tax Service Compliant

EPR vs DRS: Plastic recycling performance

The average rate of plastic recycling, however, still remains at 37% for 2020 and therefore shows that attention needs to be directed towards this packaging stream. The recycling rates for countries where a DRS for recycling is implemented lies at 38%, the average recycling rate for countries without a DRS is 37%. Which is only a minor difference.

Overall, it can thus be concluded that a significant number of countries, independent of their waste collection system, need to make large improvements in order to achieve the upcoming European legislative targets. This can be explained by the fact that plastic packaging is probably the most difficult material to recycle as it is so widely used as packaging material within various economic sectors.

There are however, some countries which are on track regarding the upcoming legislative targets. From the group of countries without DRS these are Slovakia, Spain, Italy, and Cyprus. While for the countries with DRS these are Lithuania, the Netherlands and Germany.

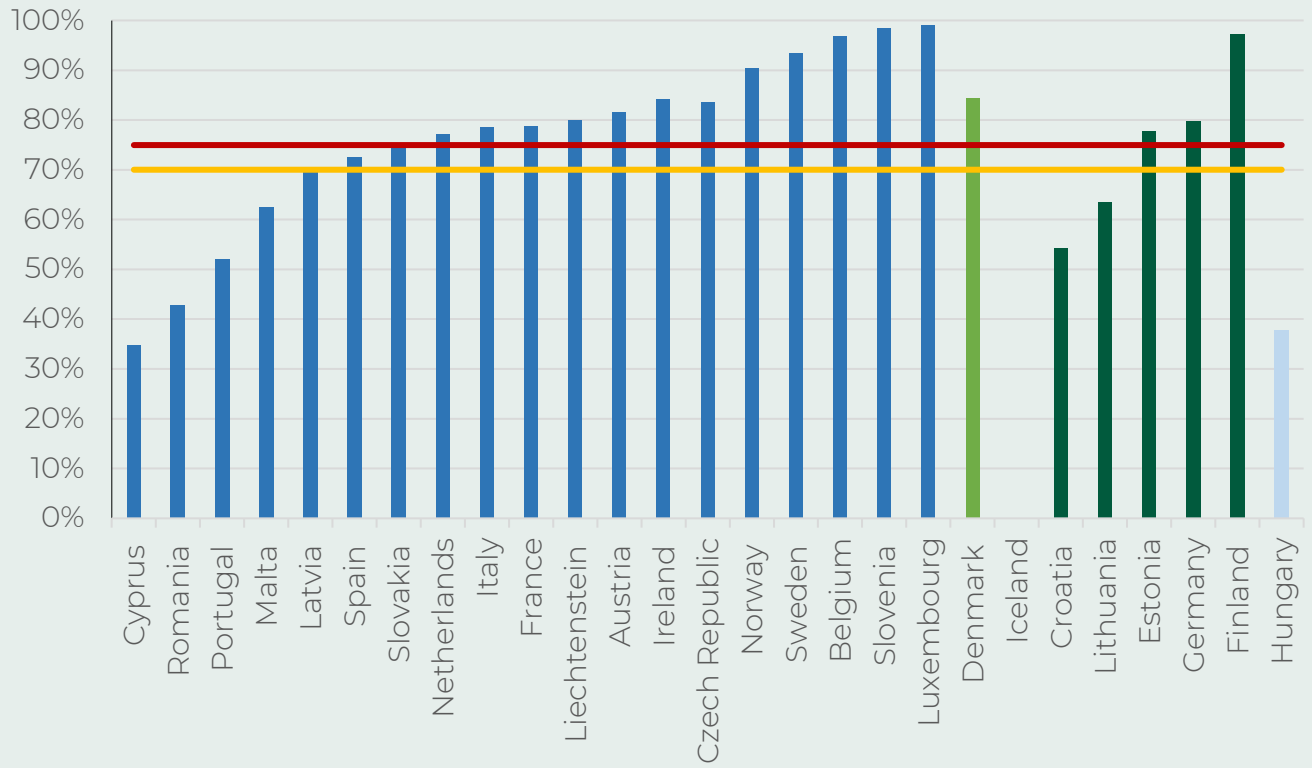


Legenda:
EPR
DRS
EPR+DRS
Tax Service Compliant

EPR vs DRS: Glass recycling performance

Presenting the recycling performance for glass packaging, this figure indicates that the average recycling rate for glass in most European countries is already at the level set for 2030. The average recycling rate among all European countries is relatively high with 75%.

There are, however, performance differences between various European countries. Most countries with an EPR and DRS system (e.g., Finland, Estonia, Germany and the Netherlands) already comply with upcoming 2030 targets. Another conclusion that can be derived from the figure above, is that DRS countries already realized upcoming EU targets or are relatively close to these targets. While for the countries without DRS some countries are significantly lacking behind (e.g., Romania, Cyprus and Hungary).



Legenda:
EPR
DRS
EPR+DRS
Tax Service Compliant

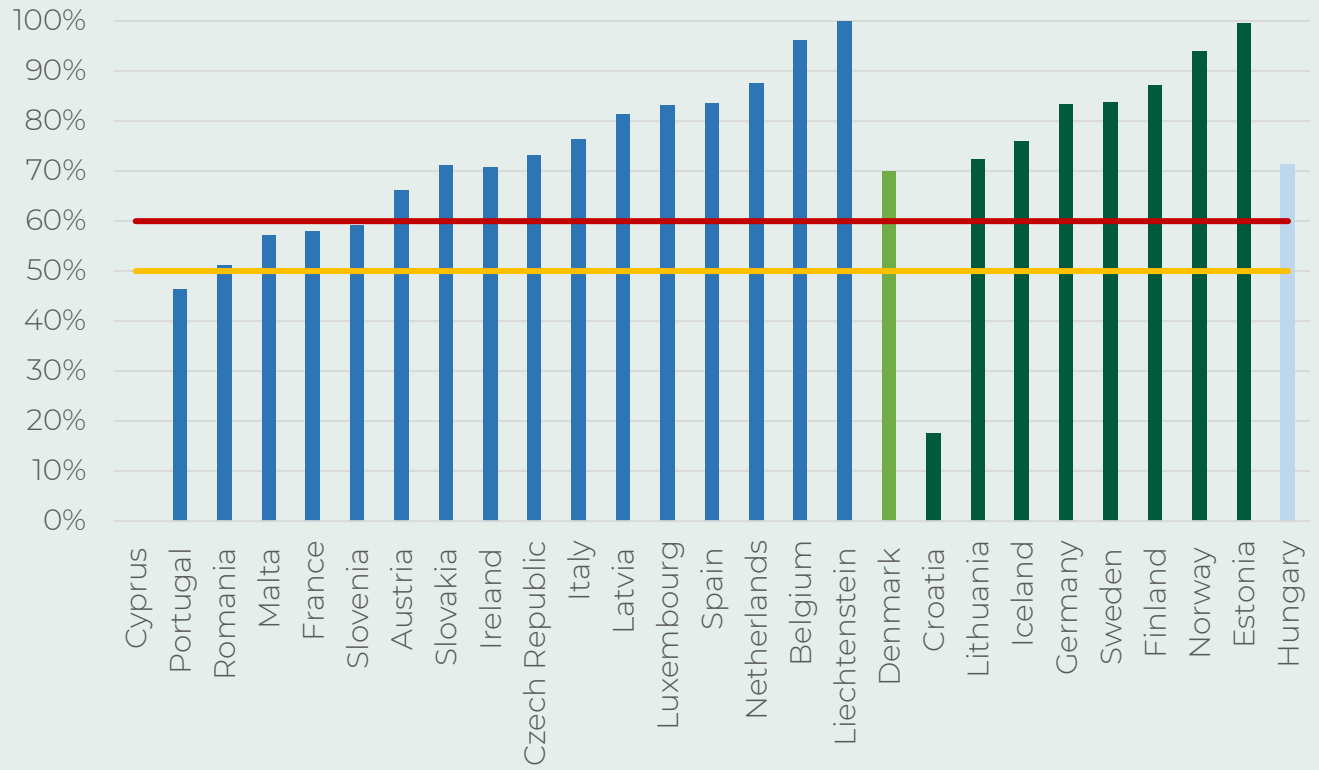
EPR vs DRS: Metal recycling performance

Concerning the DRS countries mainly Finland, Norway, Estonia, Sweden, and Iceland, show strong metal recycling rates ranging from 76% to 100%. These countries both leverage producer responsibility and consumer engagement through deposit systems, which has resulted in high recycling outcomes.

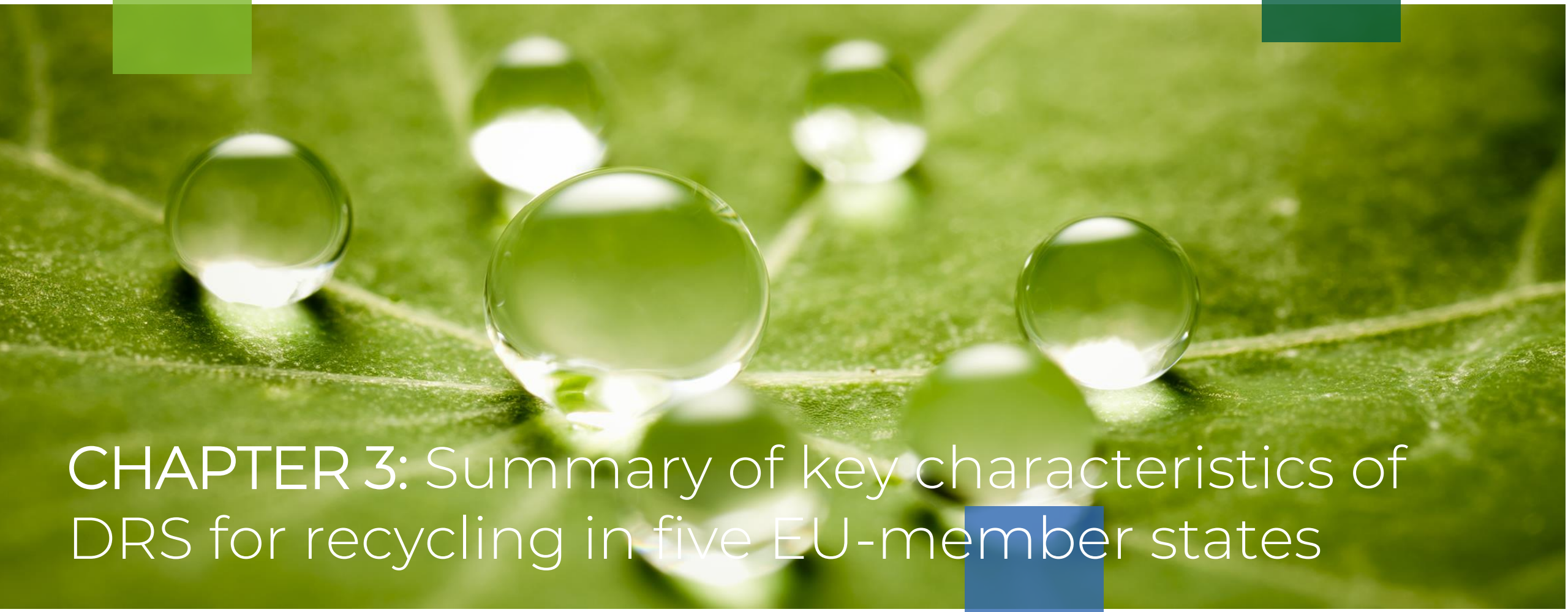
As such, almost all countries that implemented a DRS as well as EPR system have already achieved 2030 targets, except for Croatia which is seriously lacking behind.

Nevertheless, successfully implemented EPR systems are seen as well such as in Liechtenstein, Belgium, Spain, Luxembourg, Latvia and the Netherlands, demonstrating high metal recycling rates ranging from 80% to 100%. The Netherlands recently implemented a DRS for metal packaging as well (from April 2023 onwards), which might even further improve their metal recycling rate.

Countries with lower metal recycling rates, such as Romania, Portugal, and Croatia, should further improve their recycling efforts to align with upcoming European recycling goals.



Legenda:
EPR
DRS
EPR+DRS
Tax Service Compliant



CHAPTER 3: Summary of key characteristics of DRS for recycling in five EU-member states

Netherlands: Statiegeld Nederland

Type of DRS:	DRS recycling (PET, from April 2023 onwards metal cans will be included)
Legal basis deposit:	Mandatory (Packaging Act, i.e. Verpakkingsverordening Productschap Dranken 2003, latest update Amendment Besluit Beheer verpakkingen 2019)
Deposit-subjected packaging:	Soft drinks, water
Mandatory participation DRS:	Yes
Date of implementation:	2005, 2021, 2023
Organization type:	Not-for-profit
Shareholders:	Foundation according to Dutch law with an independent director, governed by representatives of take-back-points (Centraal Bureau Levensmiddelenhandel) and producers (Federale NL Levensmiddelenindustrie). Foundation is financed by the Dutch EPR-system (Afvalfonds Verpakkingen)
Deposit fee:	PET: >1L: €0.25 ; <1L: €0.15 Cans: €0.15

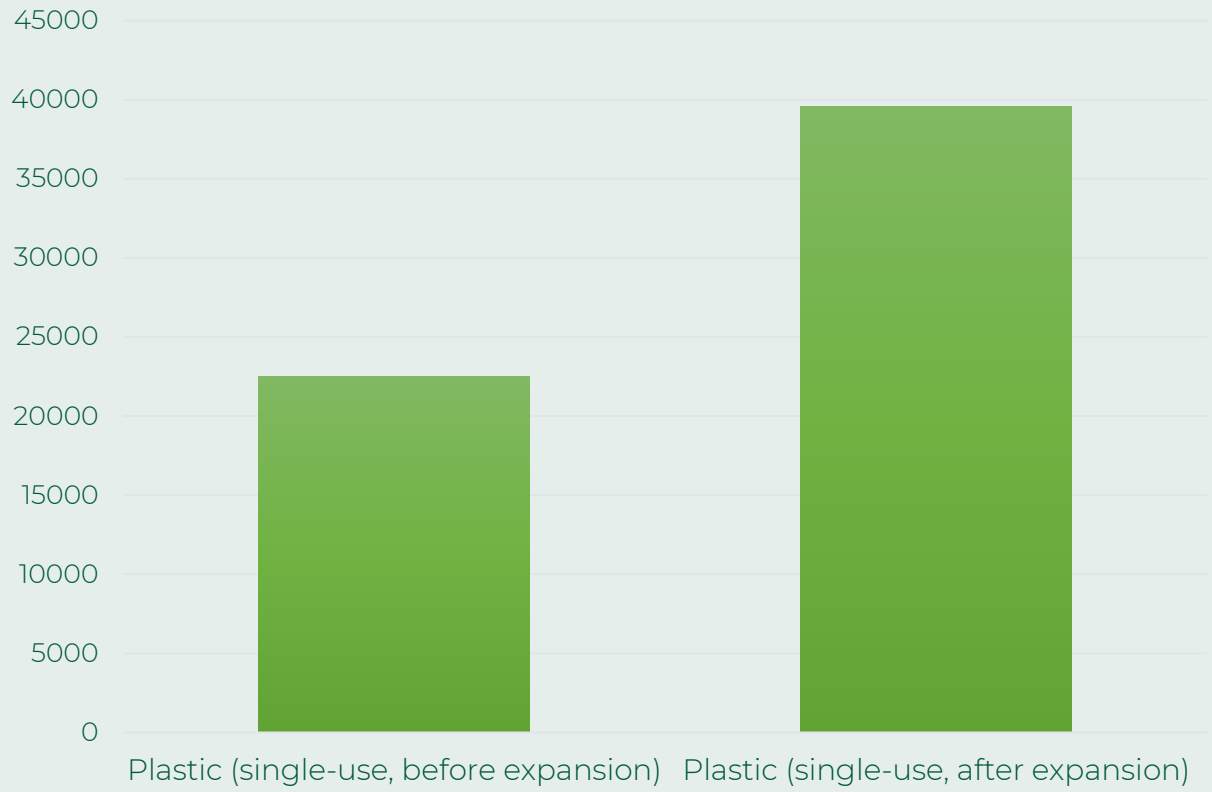
Implementation date:

DRS was initially initiated and implemented before the implementation of the EPR-scheme. Upon revisions of EPR and DRS, a formal link was established between DRS and the EPR (Afvalfonds verpakkingen) as packaging under DRS fall within responsibility of EPR.

Netherlands: Statiegeld Nederland

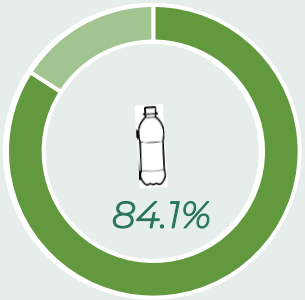
Materials (in tons) under responsibility:

*Before 2021, the Dutch DRS had a responsibility for a total of **22,500** tons of packaging materials. With the inclusion of small plastic bottles this has been increased to approximately **39,600** tons of packaging materials.*



Return rates:

*Average return rate of Statiegeld Nederland is **84.1%** (in 2021)*



Plastic (single-use)

The Netherlands: Statiegeld Nederland

Market size of DRS 2019 (before expansion): Tons of plastic packaging under responsibility of DRS (versus total plastic packaging generated)	Tons:	% of total:
Plastic packaging:		
- *Total generated:*	523,000	100%
- *Put-on-market DRS fraction:*	22,500	4.3%
- *Collected DRS fraction:*	21,375	4.1%

The Netherlands: Statiegeld Nederland

Journey of the deposit through the system:

1. The producer sells packaging to a retailer and receives the price and the deposit.
2. The retailer then sells this to a consumer and receives the price + the deposit.
3. The producer informs Statiegeld Nederland on a periodic basis on the amount of packaging put-on-the-market. The DRS drafts an invoice that is subsequently sent by the EPR-scheme (Afvalfonds Verpakkingen). The invoice specifies the deposit and producer fees (for the DRS) and the waste management fee (for the EPR)
4. When the bottle is returned by the consumer, she receives back the deposit from the retailer. The bottles are collected by the wholesaler (producers), transported to their distribution center, and hereafter to the counting center of Statiegeld Nederland.
5. Statiegeld Nederland scans the bottles (via EAN-code) and calculates the deposit (and handling fee) to be received by the retailer.
6. Statiegeld Nederland sends the collected bottles back to the producers (to sell or recycle the material), or, for smaller producers, Statiegeld Nederland sells the material and distributes the sales revenues.

The Netherlands: Statiegeld Nederland

Board members and their responsibilities

Statiegeld NL has an independent chairman and includes representatives both of the Central Bureau for Food Trade and the Federal Dutch Food Industry. All board decisions are made by an absolute majority vote.

The board consists of eight members, with 38% of retail representatives and 50% industry representatives. Statiegeld Nederland is responsible for both the coordination and implementation of the DRS.

Cooperation between EPR and DRS system for collection of packaging materials, incl. sharing of costs

There is a formal link between the EPR and DRS. The EPR holds final responsibility to achieve set targets, set by law. Statiegeld Nederland operates individually but is supervised by the EPR. The EPR does not finance the DRS. The EPR ensures producer compliance while Statiegeld Nederland provides for the collection and recycling of packaging material.

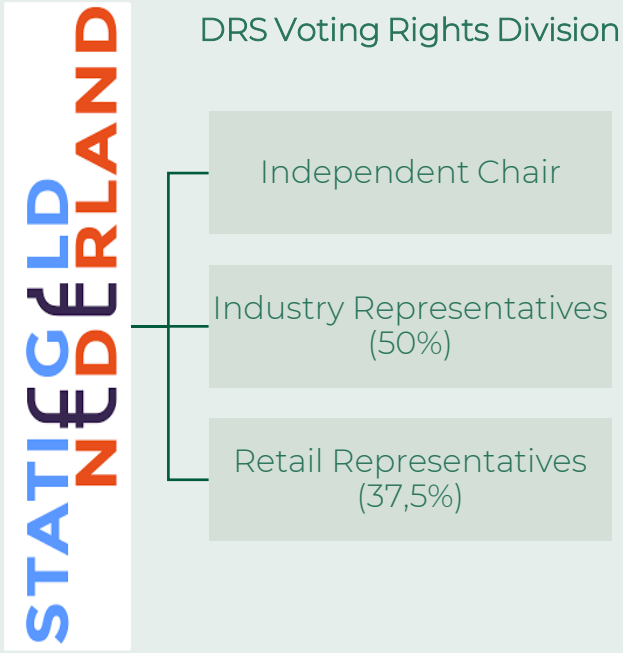
The Netherlands is the only case study where a clear link and collaboration between the DRS and EPR exists.

Waste status of packaging collected by DRS for recycling

Waste is defined as “all substances, preparations or other products belonging to the categories (…) which the holder thereof discards, intends to discard or must discard.”

Transparency

Statiegeld Nederland provides limited transparency on their system’s performance. Basic information on the systems operator is available.



Role of the DRS Operator: Supervisory

Responsible for law enforcement, system financials and system improvement.

The Netherlands: Statiegeld Nederland

	Responsibilities system operator:		If not, who:
Financial:	Collect deposit and producer fees from producers (based on put-on-market)	Yes	
	Pay out redeemed deposits and handling fees to retailers (based on collected materials)	Yes	
	Pay out fee to transportation and other subcontractors	Yes	
	Sale of collected materials to recyclers	No	Producers
Operational:	Efficient organisation of transport and sorting of collected materials	Shared	Producers (shared)
	Baling and sorting of materials collected with RVMs	Yes	
	Counting and sorting of manual collected materials	Yes	
	Administration and handling of invoicing	Yes	
	Reporting statistics to responsible authority	Yes	

The Netherlands: Statiegeld Nederland

Financial overview (details next slides):

Relevant costs and revenues for system operator

Type of operating costs:	*Relevant?*
Handling fees	*V*
Transportation costs	*V*
Admin & marketing costs	*V*
Other operating costs	*V*

Type of revenues:	*Relevant?*
Unredeemed deposit fees	*V*
Sale of collected materials	*-*
Producer and registration fees	*V*
Other operational revenues	*V*

The Netherlands: Statiegeld Nederland

Total operating cost:

The financial costs of the Dutch DRS for recycling are not publicly available. To get a basic understanding of the most important operating costs, during the DRS study which has been conducted in 2021 an employee of 'Statiegeld NL' has been interviewed. The interviewee has specified the most important costs (qualitatively). In descending order of importance:

- Handling fees;
- Transportation costs;
- Costs related to counting and administration;
- Marketing and communication costs.

The Netherlands: Statiegeld Nederland

Economic data on the Dutch DRS for recycling is not publicly available. In order to get an idea of the size of the system an estimation of the deposit fees and producer fees is provided.

Total deposit fees

(deposit received, paid, & unredeemed)

DRS recycling

Total deposit fees received	M€ 285.0	€ 16.26	per capita
Total deposit fees paid	M€ 239.7	€ 13.67	per capita
Total unredeemed deposit fees	**+ M€ 45.3**	**€ 2.58**	per capita

Break-down estimation (deposits)

Large PET bottles

Amount of large PET bottles (>0.75L):	600 million
Deposit value large PET bottles (>0.75L):	€0.25
Deposit received large bottles (>0.75L):	**M€150**

Small PET bottles

Estimated amount of small PET bottles (<0.75L):	900 million
Deposit value small PET bottles (<0.75L):	€0.15
Deposit received small bottles (<0.75L):	**M€135**
Total deposit fees received	**+ M€285**

Total producer fees

Large PET bottles

Amount of large PET bottles (>0.75L):	600 million
Producer fee large PET bottles (>0.75L):	€0.0188
Producer fee large bottles (>0.75L):	**M€11.28**

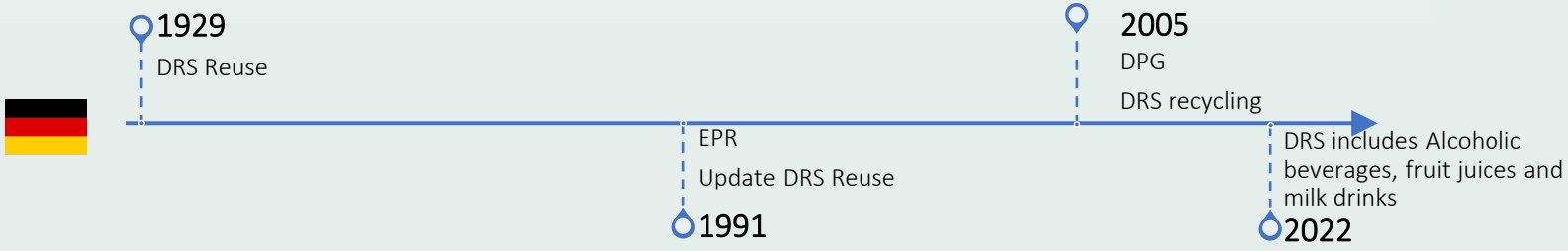
Small PET bottles

Estimated amount of small PET bottles (<0.75L):	900 million
Producer fee small PET bottles (<0.75L):	€0.0164
Producer fee small bottles (<0.75L):	**M€14.76**
Total producer fees	**+ M€26.04**

Germany: Deutsche Pfandsystem

Type of DRS:	DRS recycling (aluminum, PET, glass) 
Legal basis deposit:	Mandatory (Packaging Ordinance, 1991; VerpackG, 2019)
Deposit-subjected packaging:	Water, beer and mixed drinks containing beer (incl. alcohol-free beer), carbonated/non-carbonated soft drinks, mixed alcohol drinks, sparkling wine, mixed sparkling wine drinks*, wine and mixed wine drinks*, wine-like drinks and mixed drinks*, alcohol products and other mixed drinks containing alcohol*, fruit juices and vegetable juices*, non-carbonated fruit nectars and non-carbonated vegetable nectars*, milk and mixed milk drinks and other drinkable milk products**
Mandatory participation DRS:	Yes
Date of implementation:	2005
Organization type:	Not-for-profit
Shareholders:	Industry: 50% German Retail Federation e.V. (HDE), 50% Federation of German Food and Drink Industries e.V.
Deposit fee:	€0.25
Implementation date:	

DPG was implemented in 2005, after the implementation of the national EPR-system. No formal link between DRS and the EPR systems, nor between DRS reuse and DRS recycling. DRS for recycling was introduced to preserve refillable packaging on the German market.



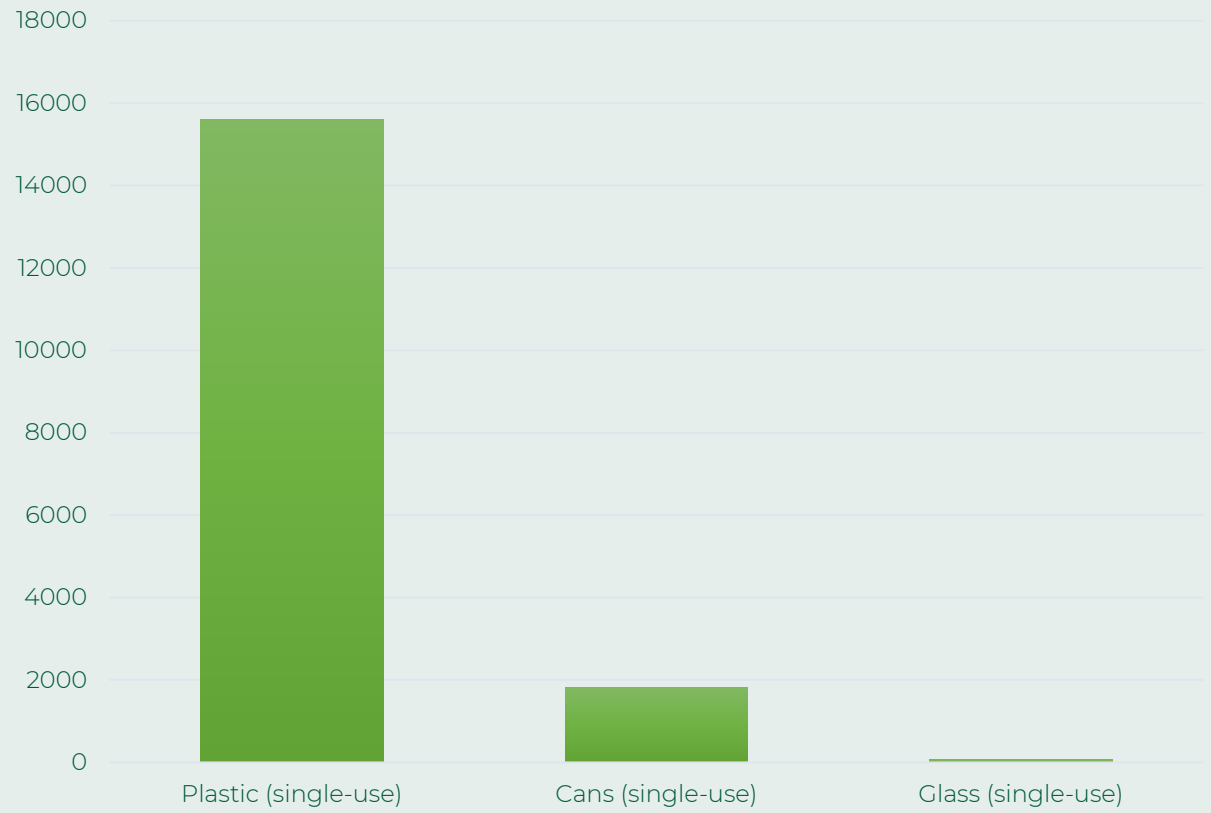
** from 1 January 2022*

*** from 1 January 2022 except (mixed) milk drinks in plastic bottles (only to be included from 1 January 2024)*

Germany: Deutsche Pfandsystem

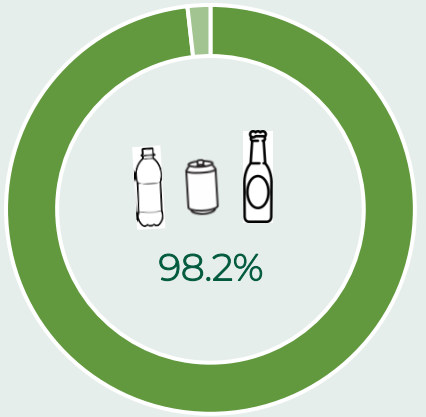
Beverage containers (in liters) under responsibility:

In 2020, **42.6 billion** liters of beverages were consumed in Germany. The total share of DPG-packaging was estimated at **42.7%**, i.e., **18.2 billion** liters of beverages:



Return rates:

DPG reports an overall return rate between **98,2%** (for all materials combined)



Germany: Deutsche Pfandsystem

Market size of the DRS in 2020:

Data on the volumes of the DPG-system are mainly reported in liters and not specified per fraction. Using a combination of data sources an estimation is made for the market size of the DRS in terms of fraction of total packaging waste generated (for plastic and cans):

	tons:	% of total:
Plastic packaging:		
- *Total generated:*	3,302,500	100%
- *Put-on-market DRS fraction:*	405,080	12.3%
- *Collected DRS fraction:*	394,548	11.9%
Cans packaging:		
- *Total generated*	160,600	100%
- *Put-on-market DRS fraction*	56,784	35.4%
- *Collected DRS fraction*	56,216	35%

Germany: Deutsche Pfandsystem

Journey of the deposit through the system:

1. Before entering the market, the producer has to apply for a “global location number” (GLN, via GS1) and register with the DPG. The DPG has formulated a standardized Terms and Conditions of Participation, obliging the producer to respect the framework conditions and standards set by the system operator.
2. Hereafter, the producer has to register in the DPG System Database. This System Database will ensure – at a later step – that retailers can determine which producer to claim a deposit from. Producers are subsequently required to apply mandatory labelling with specific DPG ink on their packaging. DPG marking can only be applied by certified can manufacturers and label printers.
3. The producer then sells the product to a retailer and receives the price + the deposit.
4. The retailer then sells this to a consumer and receives the price + the deposit.
5. When the bottle is returned by the consumer, she receives back the deposit from the retailer. The retailer can subsequently claim the deposit back using the information from the DPG System Database. The retailer can settle the deposit invoice himself or make use of a refund claimant service provider. Also, the producer can make use of a service provider (deposit account service provider) instead of handling requests himself.
6. The retailer does not receive a handling fee but becomes the owner of the collected packaging materials. Unredeemed deposits stay with the producers.

Germany: Deutsche Pfandsystem

Board members and their responsibilities

The German DRS management is characterized by dual leadership: The DPG board consists of equal numbers of retail and industry representatives. The same applies to the eight-member advisory board. DPG establishes overall framework conditions to be operated by the DRS and ensures compliance with regulations.

Cooperation between EPR and DRS system for collection of packaging materials, incl. sharing of costs

The EPR scheme in Germany was implemented prior to the DRS for recycling. Only from 2003 onwards, it became mandatory to collect single-use packaging.

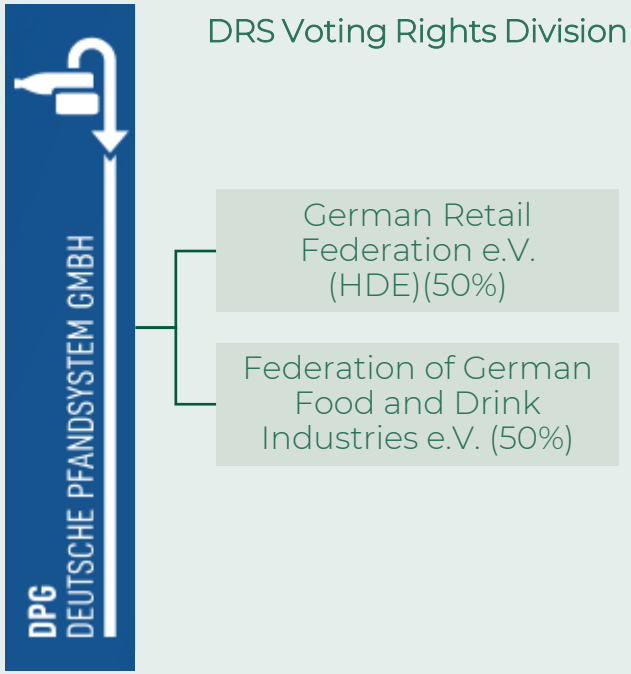
The DRS for recycling falls under the responsibility of the PRO Deutsche Pfandsystem. There is no formal link between the DRS and PRO and both systems operate independently.

Waste status of packaging collected by DRS for recycling

There is no definition of waste in German legislation on packaging material. This may indicate that the definition of waste is addressed by other laws or regulation.

Transparency

Deutsche Pfandsystem provides limited transparency on the operational and financial performance of their DRS for recycling. Basic information on the system's management is available.



Role of the DRS Operator: Administrative

Administrative – Providing a legal framework for DRS stakeholders.

Germany: Deutsche Pfandsystem

	Responsibilities system operator:		If not, who:
Financial:	Collect deposit and producer fees from producers (based on put-on-market)	No	Not relevant
	Pay out redeemed deposits and handling fees to retailers (based on collected materials)	No	Producers (only redeemed deposits)
	Pay out fee to transportation and other subcontractors	No	Retailers
	Sale of collected materials to recyclers	No	Retailers
Operational:	Efficient organisation of transport and sorting of collected materials	No	Retailers
	Baling and sorting of materials collected with RVMs	No	Retailers
	Counting and sorting of manual collected materials	Partly (certification of sorting plants)	
	Administration and handling of invoicing	No	Retailers
	Reporting statistics to responsible authority	Yes	

Germany: Deutsche Pfandsystem

Financial overview (details next slides):

Relevant costs and revenues for system operator

Type of operating costs:	*Relevant?*
Handling fees	-
Transportation costs	-
Admin & marketing costs	V
Other operating costs	-

Type of revenues:	*Relevant?*
Unredeemed deposit fees	-
Sale of collected materials	-
Producer and registration fees	-
Other operational revenues	V

DPG does not have direct tasks or responsibilities in managing the material or financial flows of the system. Its activities (and costs) are restricted to the management of the nationwide system, including guarantee the reliable operation of the DPG System Database, develop binding labelling standards, maintain legally compliant contracts for all system partners, implement IT interface management, and marketing and the public relations work.

Germany: Deutsche Pfandsystem

Economic performance of the German system:

Detailed and up-to-date information on the economic performance of the system operator of the German system wasn't available for the current study. In order to get a better understanding of the economic performance of the full system, an extrapolation of data from older studies was made (see next sheets). This extrapolation provides an overall order-of-magnitude calculation of the costs and benefits per stakeholder in the system. It is important to emphasize that the used data and key assumptions, weren't verified by the actors and organizations above.

Key assumptions:

- Deposit amount per unit (PET & cans): € 0.25 (Roland Berger, 2008)
- Total annual costs (2008): M€793 (Roland Berger, 2008)
  - Total costs retailers (2008): M€699 (Roland Berger, 2008)
  - Total costs industry (2008): M€94 (Roland Berger, 2008)
- Total units 2008 (PET, cans and glass): 14 billion (Roland Berger, 2008)
- Total units 2020 (PET & cans): 19.24 billion

Literature & data sources:

- Roland Berger (2008) *Experience with the introduction of a mandatory deposit system in Germany.* (Report)

Germany: Deutsche Pfandsystem

Costs of the system:

The total cost of the deposit return system are carried by two stakeholders: (1) retail and (2) industry .

To make an estimation for total costs and cost per stakeholder in 2018, we used the cost per unit derived from data in the Roland Berger report from 2008. The total cost per unit amounted €0.06, with about €0.05 per unit for retail and €0.01 for industry.

Total costs therefore amounted to approximately €1.15 billion in 2020:

- Cost for retail were around €0.96 billion
- Cost for industry were around €0.19 billion

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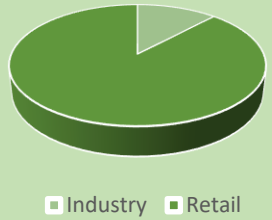


Revenues of the system:

The revenue of the German DRS consists of two elements: (1) unredeemed deposits, which go to industry, and (2) sale of recovered materials, of which the retail sector profits.

(1) **Unredeemed deposits:** About 19.24 billion PET-bottles were distributed onto the German market in 2020. As we know that the German system has a return rate of 98.2%, this means that revenue from unredeemed deposit was about €0.09 billion.

(2) **Material sales:** prices of collected material are subject to many different variables such as demand and quality of the material. Prices are therefore volatile, and calculations are based on rough estimates. Based on other case studies exercised in this report, we estimate the following prices for collected material:

Between €250-€450 per ton PET
Between €800-€1200 per ton cans

In 2020, the German DRS collected 394.6 kiloton PET and 56.2 kiloton cans (respectively 87.5% and 12.5%)

Based on this, the revenue of material sold accumulates to approximately €0.14 billion to €0.25 billion.

Financial overview:

Total costs	€ 1.15 billion
Total revenue	€0.23 billion - €0.34 billion
Net costs	€ 0.81 billion and € 0.92 billion

Financial performance:

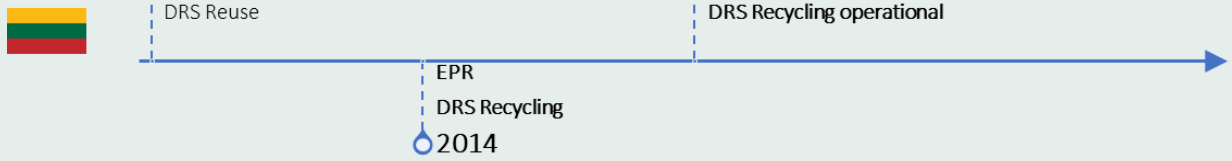
Following the calculations above, the system has a negative financial performance for 2020: between € -0.81 and -0.92 billion. With a population of 83,2 million (in 2020), this means a cost per capita between €9.74 and €11.06. With a collected amount of material of 450.8 kiloton, this means a cost per collected ton between € 1,796 and € 2,040.

Lithuania: USAD

Type of DRS:	DRS recycling (aluminum, PET, glass) 
Legal basis deposit:	Mandatory (Law on packaging and packaging waste 2001, Amendment Law on Packaging Waste, 2018)
Deposit-subjected packaging:	Beer and beer cocktails, cider and other fermented beverages, mixed alcohol and non-alcohol beverages, all types of water, juice and nectars. Fruit wines and wine-product cocktailers are included when sold in plastic and metal packaging
Mandatory participation DRS:	Yes
Date of implementation:	2016
Organization type:	Not-for-profit
Shareholders:	Industry: The Lithuanian Brewers Association, the Association of Lithuanian Trade Enterprises and the Lithuanian Natural Mineral Water Manufacturers' Association
Deposit fee:	€0.10

Implementation date:

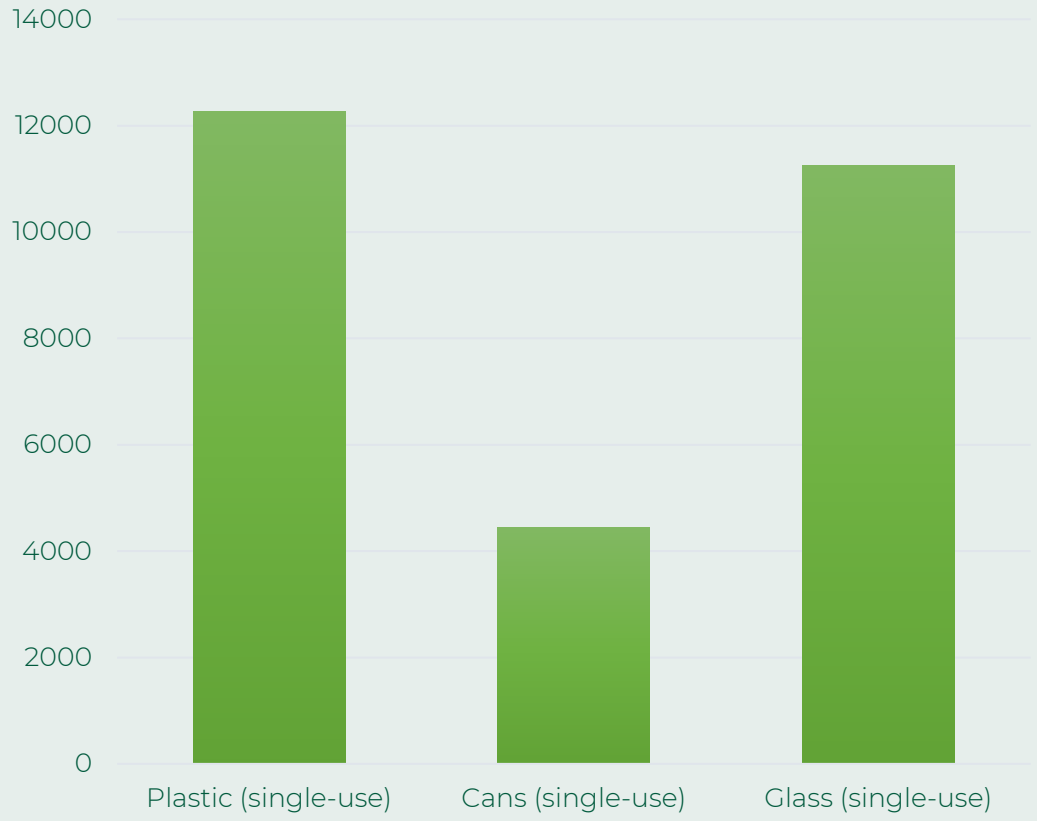
DRS is initiated and implemented around the same time as the EPR-schemes. No link exists with the EPR-schemes.



Lithuania: USAD

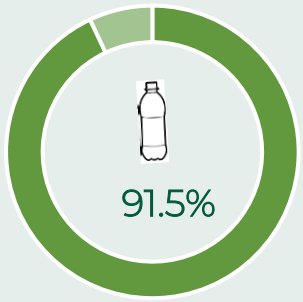
Materials (in tons) under responsibility:

*USAD has a responsibility for a total of **27,964 tons** of packaging materials (representing **14.7% of all packaging** waste generated in Lithuania (2020))*

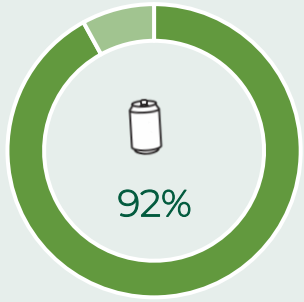


Return rates:

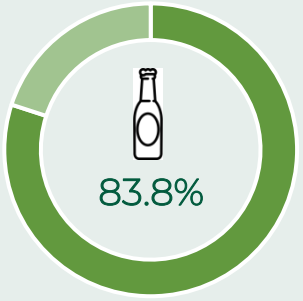
Average return rate of USAD is 89.1% (in 2021)



Plastic (single-use)



Cans (single-use)



Glass (single-use)

Lithuania: USAD

Market size of DRS (2020): tons of packaging under responsibility (versus total POM per packaging type)	tons:	% of total:
Plastic packaging:		
- *Total generated:*	86,100	100%
- *Put-on-market DRS fraction:*	12,277	14.3%
- *Collected DRS fraction:*	11,381	13.2%
Cans packaging:		
- *Total generated*	25,039	100%
- *Put-on-market DRS fraction*	4,439	17.7%
- *Collected DRS fraction*	4,064	16.2%
Glass packaging:		
- *Total generated:*	78,593	100%
- *Put-on-market DRS fraction:*	11,247	14.3%
- *Collected DRS fraction:*	9,251	11.8%

Lithuania: USAD

Journey of the deposit through the system:

1. The producer sells the packaged product to the retailer, who pays the price of the product + the deposit.
2. The producer informs the system operator on the amount of product put on market and pays the corresponding deposit (on a monthly basis). The system operator functions as the deposit holder.
3. The retailer sells the product to consumers, who pay the price of the product + the deposit for the packaging.
4. Upon return, the retailer reimburses the deposit to the consumer.
5. Packaging is transported from the retailer to the system operator (USAD), where the material is inspected and counted. Hereafter, the system operator refund the retailer for all accepted packaging.
6. USAD is the owner of the materials in the DRS. After collecting and sorting the packaging material, USAD sells it to recycling companies.

Lithuania: USAD

Board members and their responsibilities
Managed by industry representatives (brewers association, Lithuanian trade enterprises and natural mineral water manufacturers' association). Voting rights are equally divided among the representatives. USAD is responsible for the entire infrastructure of the DRS. USAD reports to the Ministry of Environment, reporting organizational, financial and public information plans.

Cooperation between EPR and DRS system for collection of packaging materials, incl. sharing of costs
There is no formal link between the DRS and the Lithuanian EPR system (Zaliasis taskas).

Waste status of packaging collected by DRS for recycling
Waste is defined by Lithuanian packaging law as "any substance or item which the holder discards or is required to discard."

Transparency
USAD has a rather transparent system, providing extensive annual reports including system management and recycling performance. USAD also provides data on costs and revenues.

Role of the DRS Operator: Operational
Collection and handling of deposit items and further operational responsibilities within the DRS System

Lithuania: USAD

Responsibilities system operator:			If not, who:
Financial:	Collect deposit and producer fees from producers (based on put-on-market)	Yes	
	Pay out redeemed deposits and handling fees to retailers (based on collected materials)	Yes	
	Pay out fee to transportation and other contractors	Yes	
	Sale of collected materials to recyclers	Yes	
Operational:	Efficient organisation of transport and sorting of collected materials	Yes	
	Baling and sorting of materials collected with RVMs	Yes	
	Counting and sorting of manual collected materials	Yes	
	Administration and handling of invoicing	Yes	
	Reporting statistics to responsible authority	Yes	

Lithuania: USAD

Financial overview (details next slides):

Relevant costs and revenues for system operator

Type of operating costs:	*Relevant?*
Handling fees	*V*
Transportation costs	*V*
Admin & marketing costs	*V*
Other operating costs	*V*

Type of revenues:	*Relevant?*
Unredeemed deposit fees	*V*
Sale of collected materials	*V*
Producer and registration fees	*V*
Other operational revenues	*V*

Lithuania: USAD

Total operating costs

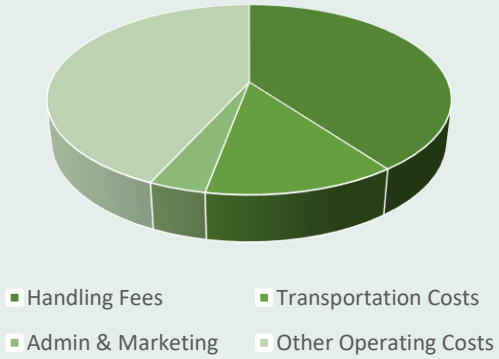
(total, per inhabitant, & per tons)

	DRS recycling
Total costs	M€ 30.79
Costs / inhabitant	€ 11
Costs / collected tons	€ 1,246

Total operating costs

(break-down per cost item)

System Operating Costs



	DRS recycling
Handling fees	M€ 12.29
Transportation costs	M€ 4
Admin & marketing costs	M€ 1.19
Other operating costs	M€ 13.31

Lithuania: USAD

Total deposit fees

(deposit received, paid, & unredeemed)

DRS recycling

Total deposit fees received	M€ 19.63	€7	per capita
Total deposit fees paid	M€14.47	€5.17	per capita
Total unredeemed deposit fees	**+ M€ 5.16**	**€1.84**	per capita

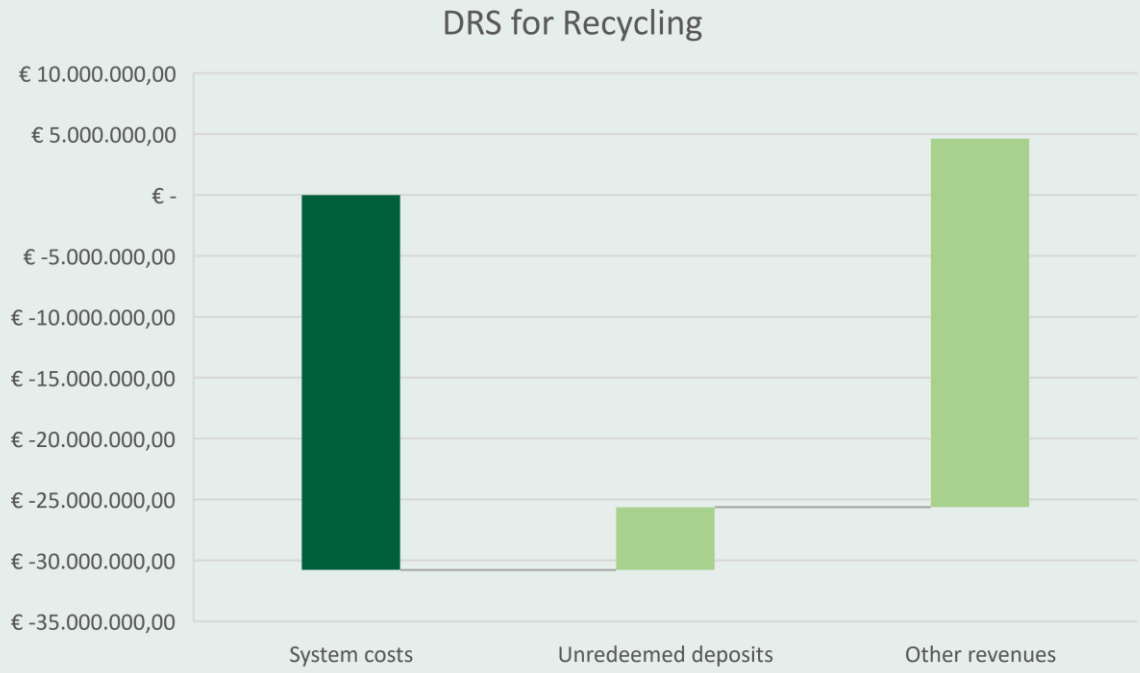
Other revenues

(producer fees & sales of materials)

DRS recycling

Sale of collected materials	M€ 10.55	
Producer & administration fees	M €19.63	
Other operational revenues	M€ 0.065	+
Total other revenues	**+ M€30.24**	

Share of system costs covered by unredeemed deposits and other revenues

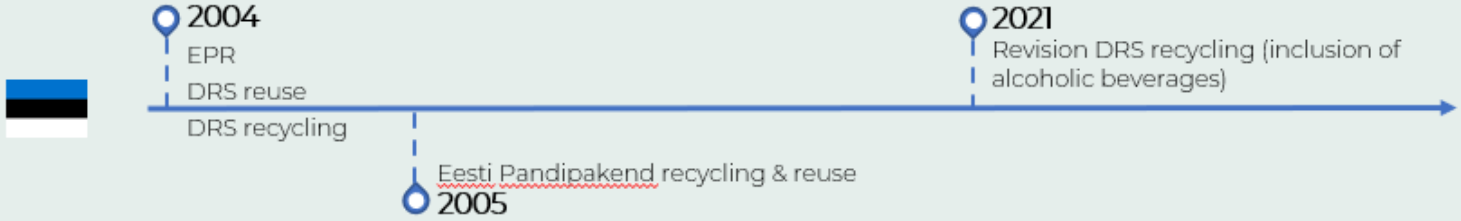


Estonia: Eesti Pandipakend

Type of DRS:	DRS recycling (aluminum, PET, glass) 
Legal basis deposit:	Mandatory (Packaging Act 2004, Packaging Act latest update 2021)
Deposit-subjected packaging:	Soft drinks, water, juice, juice concentrates, nectars, beer, cider, perry, alcoholic beverages
Mandatory participation in DRS:	Yes
Date of implementation:	2005
Organization type:	Not-for-profit
Shareholders:	Industry: the Association of Producers of Soft Drinks (25%), The Association of Importers of Soft Drinks and Beer (25%), The Estonian Retailers Association (25%), The Estonian Association of Brewers (25%)
Deposit fee:	€0.10

Implementation date:

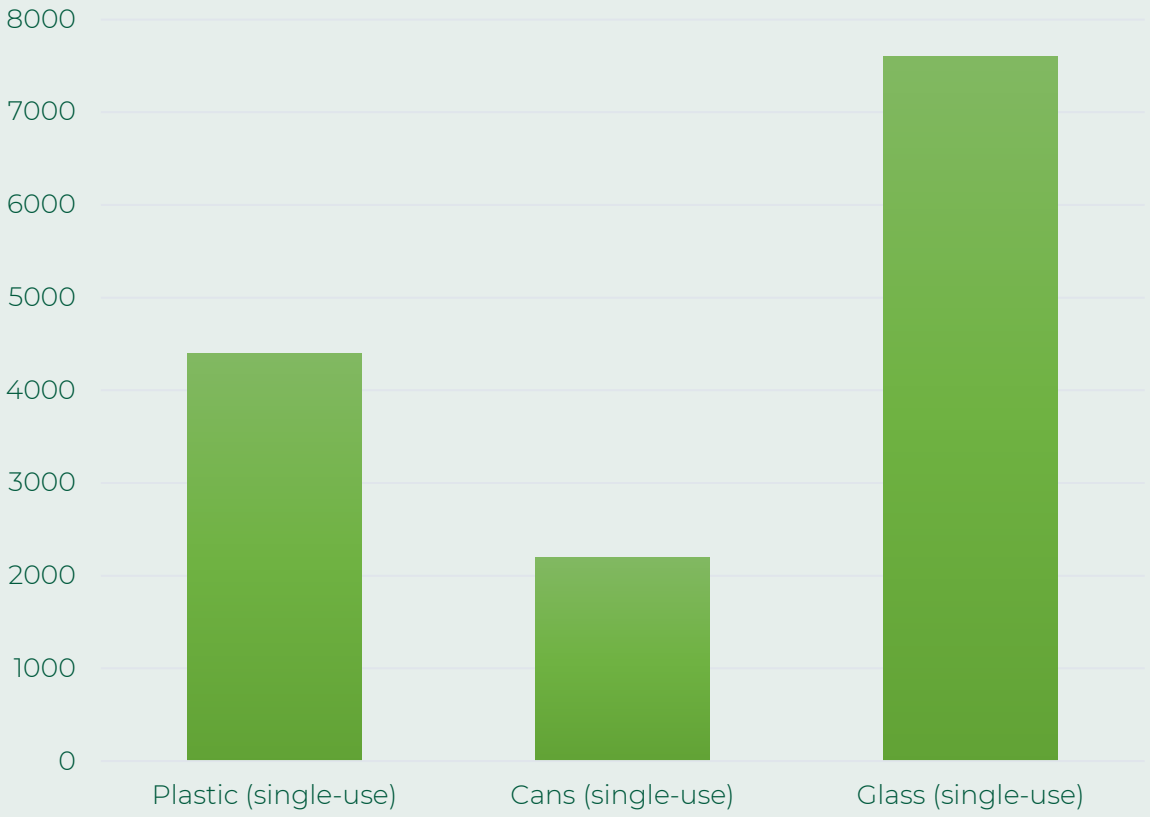
DRS is initiated and implemented around the same time as the EPR-schemes. No link exists with the EPR-schemes.



Estonia: Eesti Pandipakend

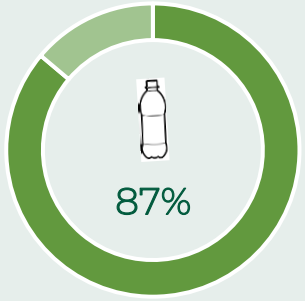
Materials (in tons) under responsibility:

*Eesti Pandipakend has a responsibility for a total of **14,200 tons** of packaging materials for recycling (representing 14.8% of all packaging waste generated in Estonia (2020))*

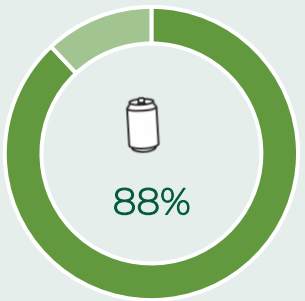


Return rates:

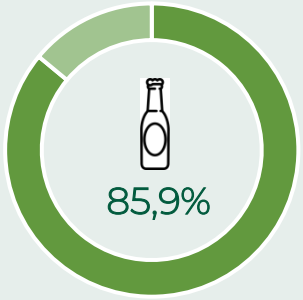
Average return rate of Eesti Pandipakend (refillable excluded) is 87% (in 2021)



Plastic (single-use)



Cans (single-use)



Glass (single-use)

Estonia: Eesti Pandipakend

Market size of DRS (2020): tons of packaging under responsibility (versus total POM per packaging type)	tons:	% of total:
Plastic packaging:		
- *Total generated:*	53,602	100.0%
- *Put-on-market DRS fraction:*	4,400	8.2%
- *Collected DRS fraction:*	4,000	7.5%
Cans packaging:		
- *Total generated*	2,359	100%
- *Put-on-market DRS fraction*	2,200	93.3%
- *Collected DRS fraction*	2,100	89%
Glass packaging:		
- *Total generated:*	39,795	100%
- *Put-on-market DRS fraction:*	7,600	19.1%
- *Collected DRS fraction:*	6,600	16.6%

Estonia: Eesti Pandipakend

Journey of the deposit through the system:

1. When a producer puts a product on the market, deposit money is paid to the system operator, Eesti Pandipakend. Eesti Pandipakend, from that moment on, functions as a deposit holder
2. The beverage is sold, from the producer to the retailer, for the price + deposit money, paid by the retailer
3. The retailer sells the product for the price + deposit
4. Packaging is returned to the retailer, upon which the deposit is paid back to the consumer.
5. Material is collected and sent to Eesti Pandipakend's handling center Tallinn where it is counted and sorted and prepared for recycling. Based upon the counted amount of packaging, a monthly payment is made to the retailer by Eesti Pandipakend.
6. Eesti Pandipakend remains the owner of the material throughout the entire process. When packaging is returned, the system operator sells it: all collected cans to other EU countries (mainly France and England); plastic bottles & transparent call auctioned to Estonian recyclers; and coloured glass to recyclers abroad

Estonia: Eesti Pandipakend

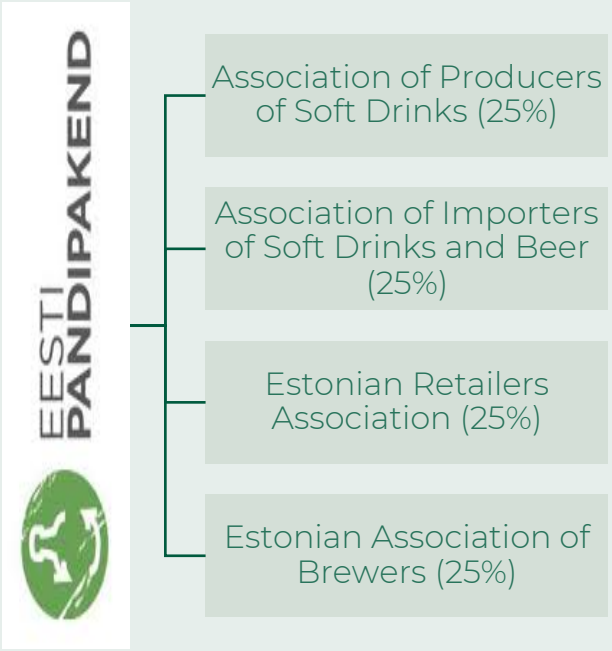
Board members and their responsibilities
Managed by industry associations (the Association of Producers of Soft Drinks (25%), The Association of Importers of Soft Drinks and Beer (25%), The Estonian Retailers Association (25%), The Estonian Association of Brewers (25%). The industry thus holds a large majority of the shares, accumulating to 75%.

Cooperation between EPR and DRS system for collection of packaging materials, incl. sharing of costs
No formal link exists between the DRS and EPR scheme. There is a clear division between the target material groups for either the DRS or EPR.

Waste status of packaging collected by DRS for recycling
Waste is defined in Estonia as “any movable property or registered ship which the holder discards, intends or is required to discard.”

Transparency
Eesti Pandipakend provides a good level of transparency for their data on financial and operational performance of their DRS for recycling. Eesti Pandipakend provides thorough annual reports which are publicly accessible.

DRS Shareholders* Division



Role of the DRS Operator: Operational
Collection and handling of deposit items and further operational responsibilities within the DRS System

Estonia: Eesti Pandipakend

	Responsibilities system operator:	If no, who is responsible:
Financial:	Collect deposit and producer fees from producers (based on put-on-market)	Yes
	Pay out redeemed deposits and handling fees to retailers (based on collected materials)	Yes
	Pay out fee to transportation and other contractors	Yes
	Sale of collected materials to recyclers	Yes
Operational:	Efficient organisation of transport and sorting of collected materials	Yes
	Baling and sorting of materials collected with RVMs	Yes
	Counting and sorting of manual collected materials	Yes
	Administration and handling of invoicing	Yes
	Reporting statistics to responsible authority	Yes

Estonia: Eesti Pandipakend

Financial overview (details next slides):

Relevant costs and revenues for system operator

Type of operating costs:	*Relevant?*
Handling fees	*V*
Transportation costs	*V*
Admin & marketing costs	*V*
Other operating costs	*V*

Type of revenues:	*Relevant?*
Unredeemed deposit fees	*V*
Sale of collected materials	*V*
Producer and registration fees	*V*
Other operational revenues	*V*

Estonia: Eesti Pandipakend

Total operating costs

(total, per inhabitant, & per tons)

DRS reuse & recycling

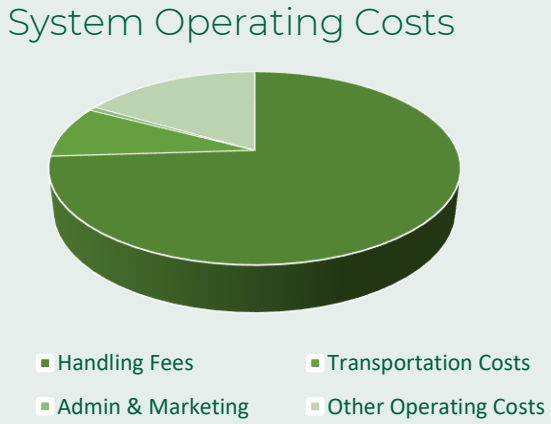
Total costs 2021	M€ 13.51
Costs / inhabitant	€ 10.15
Costs / collected tons	€ 986

Total operating costs

(break-down per cost item)

DRS reuse & recycling

Handling fees	M €10
Transportation costs	M€ 1.18
Admin & marketing costs	M€ 0.09
Other operating costs	M € 2.24



Estonia: Eesti Pandipakend

Total deposit fees 2021

(deposit received, paid, & unredeemed)

DRS reuse & recycling

Total deposit fees received	M€ 34.98	€26.39	per capita
Total deposit fees paid	M€ 29.56	€22.30	per capita
Total unredeemed deposit fees	**+ M€5.42**	**– €4.09**	per capita

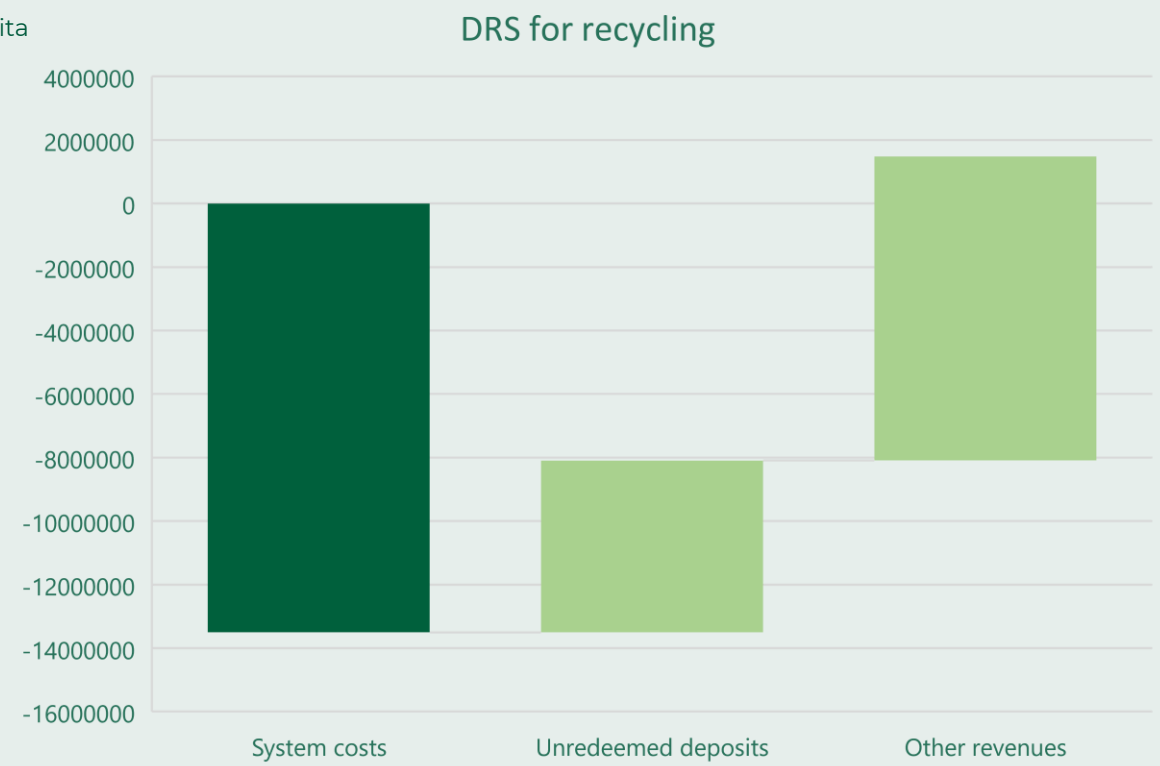
Other revenues 2021

(producer fees & sales of materials)

DRS reuse & recycling

Sale of collected materials	M€ 6.44
Producer and registration fees	M €2.81
Other operational revenues	M€0.32
Total other revenues	**+ M€9.57**

Share of system costs covered by unredeemed deposits and other revenues

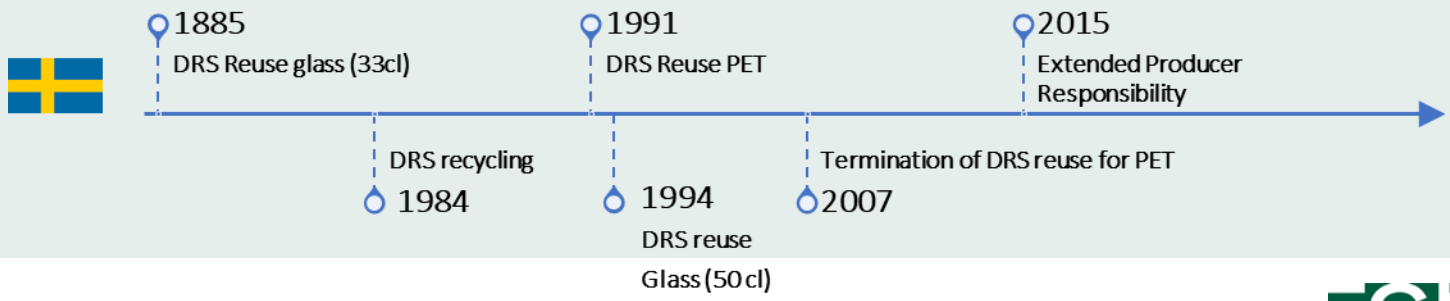


Sweden: Returpack

Type of DRS:	DRS recycling (aluminum, PET)
Legal basis deposit:	Mandatory (Packaging Act, i.e. Förordning om producentansvar för förpackningar 1994, latest update Enhetlig och effektiv marknadskontroll 2020)
Deposit-subjected packaging:	All ready-to-drink beverages including beer, soft drinks, cider, bottled water
Mandatory participation DRS:	Yes
Date of implementation:	1984; 1994
Organization type:	Not-for-profit
Shareholders:	Industry: Sveriges Bryggerier (50%), Svensk Dagligvaruhandel (25%), Livsmedelshandlarna (25%)
Deposit fee:	€0.096 to €0.19

Implementation date:

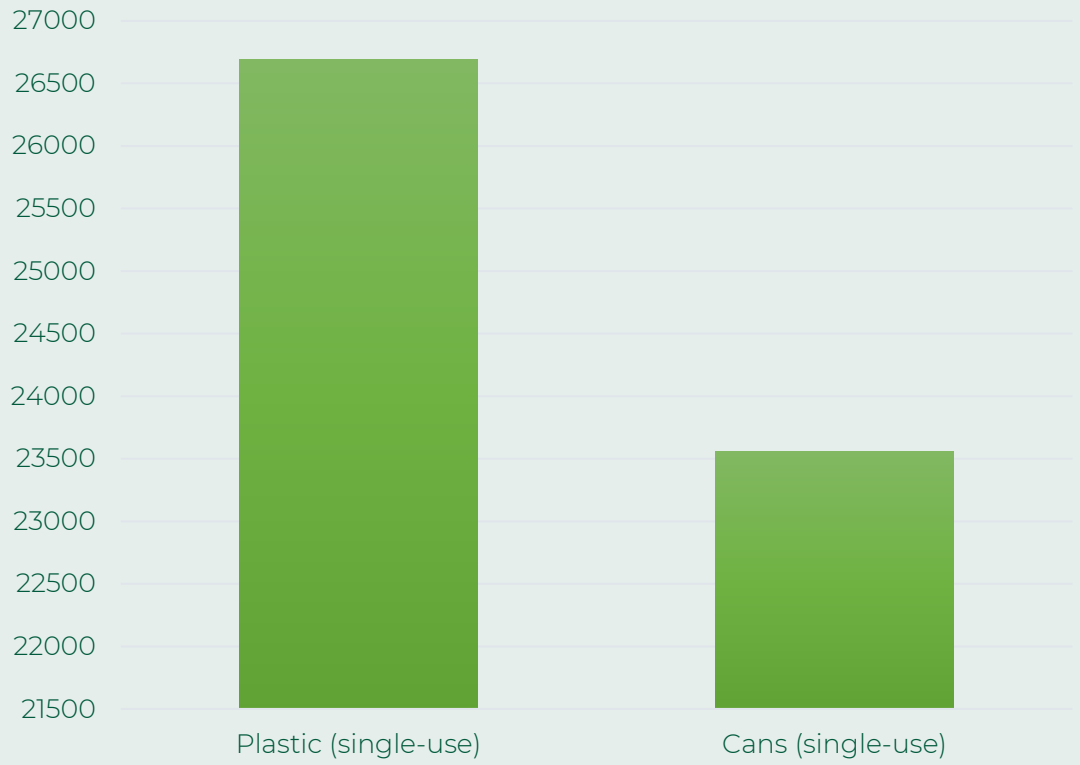
DRS was initiated and implemented before the implementation of the EPR-scheme. No link exists with the EPR-schemes.



Sweden: Returpack

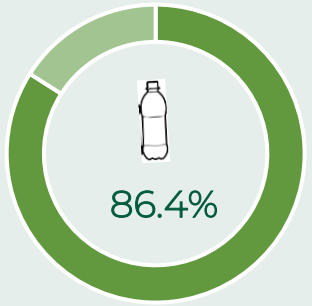
Materials (in tons) under responsibility:

*Returpack has a responsibility for a total of **50,251 tons** of packaging materials (2020)*

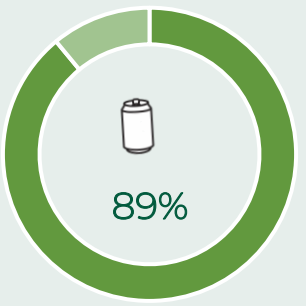


Return rates:

*Average return rate of Returpack is **87.7%** (in 2021)*



Plastic (single-use)



Cans (single-use)

Sweden: Returpack

Market size of DRS (2020): tons of packaging under responsibility (versus total packaging)	tons:	% of total:
Plastic packaging:		
- *Total generated:*	248,841	100%
- *Put-on-market DRS fraction:*	26,690	11%
- *Collected DRS fraction:*	22,927	9.1%
Cans packaging:		
- *Total generated*	31,208	100%
- *Put-on-market DRS fraction*	23,561	75.5%
- *Collected DRS fraction*	20,993	30.8%

Sweden: Returpack

Journey of the deposit through the system:

1. When producers bring packaging to the market, they report the amount to the system operator, Returpack. Returpack then sends out an invoice based on this amount – this covers the deposit fee of the packaging brought onto the market.
2. The producer then adds the deposit to the price of the product, when selling it to retailers, so the producer receives the deposit when selling their product to the retailer.
3. Then, the retailers put a deposit price on the products and sell them: when the products are returned, the consumers will receive the deposit back.
4. The materials are collected by Returpack; and subsequently sorted and counted at their facilities.
5. Following the counting, Returpack pays to the store the amount of the total deposit that was paid to the consumer for their returned packaging.
6. Returpack remains the owner of the material throughout the entire process. When packaging is returned, Returpack sells it to recyclers in Sweden (mainly PET) and abroad (mainly aluminum to France or Germany as Sweden has no melting plants). Revenues from the sold materials are used to keep the producer fees as low as possible.

Sweden: Returpack

Board members and their responsibilities

Svenska Returglas (50%), Retail (25%) and Returpack (25%) are represented in the board. The board determines the overall strategy as well as deposit values.

The voting rights are distributed equally amongst the shareholders. The system is governed by multiple entities, based on the different material groups. The board is responsible for determining strategies, setting boundaries and determining key focus areas for the organization. Deposit amounts are determined in cooperation with the board. Other operational decisions are made solely by Returpack.

Cooperation between EPR and DRS system for collection of packaging materials, incl. sharing of costs

The deposit system is the EPR system. There are two separate systems (PET and Metal). There is no further collaboration or sharing of costs.

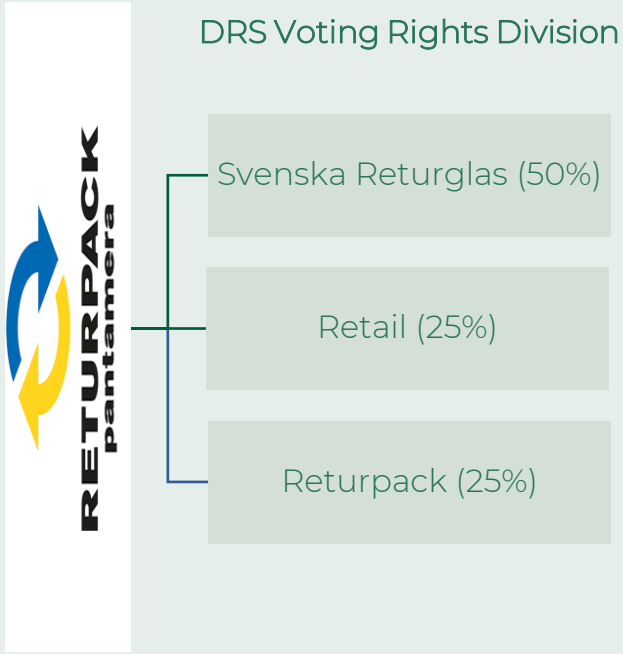
Waste status of packaging collected by DRS for recycling.

The packaging material is classified as waste from the moment it is consumed and returned by the consumer, through our collection and sorting, until the material has been recycled. The legal definition of waste defines it as “any matter or object that the bearer disposes of, intends to dispose of, or is obligated to dispose of.”

Transparency

Returpack provides an average amount of transparency, compared to other case studies. While the organization publishes comprehensive reports on sustainability performance and recycling performance, it provides limited insights in its financial status.

DRS Voting Rights Division



Role of the DRS Operator: Operational

Collection and handling of deposit items and further operational responsibilities within the DRS System

Sweden: Returpack

PANTAMERA

Operational and financial responsibilities:

Role of the system operator

	Responsibilities:	System operator:	If not, who:
Financial:	Collect deposit and producer fees from producers (based on put-on-market)	Yes	
	Pay out redeemed deposits and handling fees to retailers (based on collected materials)	Yes	
	Pay out fee to transportation and other contractors	Yes	
	Sale of collected materials to recyclers	Yes	
Operational:	Efficient organisation of transport and sorting of collected materials	Yes	
	Baling and sorting of materials collected with RVMs	Yes	
	Counting and sorting of manual collected materials	Yes	
	Administration and handling of invoicing	Yes	
	Reporting statistics to responsible authority	Yes	

Sweden: Returpack

Financial overview (details next slides):

Relevant costs and revenues for system operator

Type of operating costs:	*Relevant?*
Handling fees	*V*
Transportation costs	*V*
Admin & marketing costs	*V*
Other operating costs	*V*

Type of revenues:	*Relevant?*
Unredeemed deposit fees	*V*
Sale of collected materials	*V*
Producer and registration fees	*V*
Other operational revenues	*V*

Sweden: Returpack

Total operating cost:

The detailed financial costs of the Swedish DRS for recycling are not publicly available. In their sustainability report, it is only mentioned that the total purchasing cost is 412 million Swedish Krones (M€ 36.45) per year. This excludes other operating costs like labor costs and handling costs.

The share of the most important purchasing costs are as follows:

- Transport and logistics: 54%
- Information and marketing: 18%
- Production machines & RVMs: 17%

Sweden: Returpack

PANTAMERA

Total deposit fees

(deposit received, paid, & unredeemed)

DRS recycling

Total deposit fees received	M€331.24	€32.00	per capita
Total deposit fees paid	M€293.81	€28.39	per capita
Total unredeemed deposit fees	**M€37.43**	**€2.62**	per capita

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Overview table DRS for recycling

Key characteristics DRS for Recycling

	Not-for-profit	Legal Basis deposit	Type of packaging	Average return rate	Introduction of the Extended Producer Responsibility			System Operator Responsibilities		Transparency
					Prior	After	Same time	Financial	Operational	
Statiegeld NL *The Netherlands*	X	X		84%		X			X	Limited
USAD *Lithuania*	X	X		89%			X		X	Clear
Eesti Pandipakend *Estonia*	X	X		87%			X		X	Clear
Returpack *Sweden*	X	X		88%		X			X	Limited
Deutsche Pfandsystem *Germany*	X	X		98%	X				Shared	Limited

	Packaging Volumes (Tons p/y)				Deposit Value	Handling Fee €/T****				Producer Fee €/T****				Total Deposit Fee		Total Deposit Fee Paid		Total Unredeemed Deposit	
	Plast	***Glass***	***Metal***	***Total***		***Plast***	***Glass***	***Metal***	***Total***	**Plast**	**Glass**	**Metal**	**Total**	€/Ton	€/cap	€/Ton	€/cap	€/Ton	€/cap
Statiegeld NL *The Netherlands***	*39,600*	-	-	*39,600*	*€0.25 or €0.15*	*934.34*	-	-	*934.34*	*656.57*	-	-	*656.57*	*€7,197*	*€16.26*	*€6,053*	*€13.67*	*€1,144*	*€2.58*
USAD *Lithuania*	*12,278*	*11,247*	*4,439*	*27,964*	*€0.10*	*540.49*	*67.02*	*1,106.13*	*439.85*	*861.27*	*106.79*	*1,762.61*	*700.90*	*€702*	*€7*	*€517*	*€5.17*	*€185*	*€1.84*
Eesti Pandipakend *Estonia*	*4,400*	*7,600*	*2,200*	*14,200*	*€0.10*	*1,015.78*	*125.95*	*2.078.81*	*704.23*	*284.42*	*35.26*	*582.07*	*197.18*	*€2,463*	*€26.39*	*€2,082*	*€22.30*	*€382*	*€4.09*
Returpack *Sweden****	*26,690*	-	*23,561*	*50,251*	*€0.088 or €0.18*	*843.57*	-	*2,146.99*	*1,454.70*	*685.47*	-	*1,744.61*	*1,182.07*	*€6,591*	*€32*	*€5,847*	*€28.39*	*€745*	*€3.62*
Deutsche Pfandsystem *Germany*	*394,548*	-	*56,216*	*450,764*	*€0.25*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*NA*	*€10,671*	*€55.76*	*€10,479*	*€56.80*	*€192*	*€1.04*

** Producer fee contains the amount that is paid for each beverage packaging item that is put on the market and excludes any system contributions or taxes for international packaging (e.g., as used in the Netherlands or Estonia).*
*** Handing fees for the Netherlands concerns handling fees for obligatory retail take-back points. A differentiated fee system is used in the Netherlands: A different handling fee is provided to obligatory and voluntary take-back points. Furthermore, a distinction is made between manual, RVM (with or without compacting) and counting center collection systems. A comprehensive overview is provided in the Analysis of European DRS for recycling (word document).*
**** In Sweden, a higher handling fee is received for materials that are collected by RVMs and which are directly transported by resellers (recycling organisations).*
***** The handling and producer fee in €/T are calculated by multiplying the average handling or producer fee per individual item with the number of items per ton of specific material streams. As such, a relative low amount of costs is allocated to heavy weight material streams (i.e., glass) which has a low number of items per ton in comparison with plastic and metal packaging.*