

Packaging and packaging waste producer responsibility schemes and related recycling systems

in Finland, Spain, Denmark, and Poland

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Overview

Overview

This report has been written as part of EIT-Food co-funded project [InformPack](#). The report gathers packaging and packaging waste producer responsibility schemes as well as recycling systems in selected waste streams in Northern Europe (Finland, Denmark), Southern Europe (Spain) and Eastern Europe (Poland). Most of the data has been collected 2023 from publicly available sources. Some data has been gathered in 2024. Future coming SUP-D and PPWRs will most probably also affect to the producer responsibility schemes and recycling systems. Future tightening requirements for e.g., reusability targets will also change the scene in the future. This report can be utilized as a status of art summary. Authors do not take responsibility of the correctness of the data. Aim of the InformPack project (2022-2024, PoC 2021) is to explore the cross-cultural variations among consumers in terms of awareness, information gaps, issues and attitudes towards food packaging as related to product choice upon purchase and disposal patterns at home and on the go. These findings are used to create actions, tools, and strategies that can influence public behaviour and future solutions. With this, a support for a transition to a more sustainable European food-packaging ecosystem is desired. Aarhus University has been the project coordinator. Partners are VTT Technical Research Centre of Finland, Bioazul, Maspex, Eroski, Univerisy of Reading, Polish Academy of Science (PAS) and Polish Food bank.

EU's Packaging and Packaging Waste Directive (PPWD) has given flexibility for member states on how to implement the directive in national level. Currently, several different kinds of recycling and extended producer responsibility (EPR) schemes are in use in the EU. In Poland and in Spain municipalities are responsible for packaging waste management, whereas in Finland two packaging producer organizations take care of organizing EPR schemes. Currently in Denmark, only beverage bottles fall under the producer responsibility scheme. According to the provisionally accepted Packaging and Packaging Waste Regulation at least 70 % of annually generated packaging waste needs to be recycled by 2030. Furthermore, 85% of fiber-based packages and 55% of plastic packages needs to be recyclable. Currently in Finland, consumers sort different packaging waste streams into separate containers, whereas, for example in Poland and Spain, plastic and metal are sorted together. The EU-wide recycling and reuse targets can be approached through various methods and focusing on harmonized EU-wide recycling system might not be effective. Given the different population characteristics, consumer habits and geographic conditions across EU countries, there is need for several types of recycling solutions and systems also in the future. To achieve ambitious recycling targets awareness of differences in national recycling systems across the EU is important.

1. Extended producer responsibility forms a basis for packaging waste management in the EU

In the European Union, packaging and packaging waste management is based on a concept of extended producer responsibility (EPR). EPR is a policy measure that extends producers' responsibility to the full lifecycle of a product, including product design, return and reuse, recycling and waste. In practice, packaging and packaging waste is managed through European Packaging and Packaging Waste Directive (PPWD) (94/62/EC). The aim of this directive was not only to prevent and reduce the environmental impact of packaging and packaging waste but also to harmonize national measures regarding waste management¹. The directive was amended in 2018 to Directive EU/2018/852. The current directive is under revision and the proposal for Packaging and Packaging Waste Regulation is being negotiated among key EU bodies (e.g., European Parliament, European Commission, European Ministries of Environment).

The regulation was accepted by EU member states, EU parliament and EU Commission on spring 2024, and next the approval process will still take place on each member state in their parliaments. The regulation will be valid after 18 months after the final acceptance.

The current PPWD addresses both product design and waste management. Besides harmonizing national packaging and packaging waste management and providing environmental protection, the PPWD also aims at functioning of EU's internal markets, to prevent the production of waste, as well as promote reuse, recycling and recovery of packaging waste, instead of disposal. The directive also mandates the Member States to arrange systems for extended producer responsibility by 2024 to meet e.g., binding targets for packaging recycling^{2,3}, as shown in Table 1.

Table 1 Total recycling targets of EU and individual recycling targets for plastic, aluminum, glass and paper and cardboard wastes by 2025 and 2030^{2,3}

While all the EU member countries have a common PPW directive to follow, its' implementation through national laws as well as setting up recycling systems in Europe can vary significantly depending on the country. The aim of this report is to map and compare producer responsibility systems and related packaging waste recycling systems in 4 selected European countries. Poland will be an example of a Central Eastern European country, while Spain represents Southern Europe. Finland and Denmark will be handled as examples of the Northern Europe. The report will cover the following streams: glass, carton board, paper, plastic, metal, and (beverage) bottles, and will explain how the case countries currently collect and handle these fractions.

	% current targets (by weight)	% end of 2025 (by weight)	% end of 2030 (by weight)
Total recycling target	55	65	70
Plastic	70	50	55
Aluminum	-	50	60
Glass	60	70	75
Paper and cardboard	60	75	85

¹ Lorang, S., Yang, Z., Zhang, H. et al. Achievements and policy trends of extended producer responsibility for plastic packaging waste in Europe. *Waste Dispos. Sustain. Energy* 4, 91–103 (2022). <https://doi.org/10.1007/s42768-022-00098-z>

² https://environment.ec.europa.eu/topics/waste-and-recycling/packaging-waste_en

³ <https://www.statista.com/statistics/1316423/recycling-rate-targets-for-packaging-types-in-european-union/>



2. Packaging waste recovery and recycling rates in the European Union

As part of the PPWD the member countries are obliged to report their packaging waste recovery and recycling rates. In around 2016, packaging accounted for over 3% of all waste generated in the EU, as measured by weight. Packaging waste is made up of paper and cardboard (41%), plastic (19%), glass (19%), wood (16%), and metal (5%).⁴ In 2021, 64% of packaging was recycled in the EU-27, although recycling rates for specific materials varied a

great deal: 82.5% for paper and cardboard packaging; 74.8% for metallic packaging; 74.9% for glass packaging; 39.7% for plastic packaging; and 32.2% for wooden packaging.⁵ There are wide variations in recycling rates for specific packaging materials across Member States. Table 2 presents the recovery and recycling rates of 2021 for the countries covered in this report. For Denmark and Poland, data from 2021 were not available. ^{5,6}

Table 2 Recovery and recycling rate of packaging waste (2021), ^{5,6}

	Recovery rate [%]	Recycling rate [%]
EU ⁽¹⁾	79.9	64.0
Finland	94.6	72.5
Spain	74.5	70.1
Denmark ⁽²⁾	91.7	64.0
Poland ⁽³⁾	59.9	55.5

(1) Eurostat estimates, (2) 2020, (3) 2019

Figure 1 shows the amount of packaging waste generated vs. what is recycled per capita across EU from 2010 until now. ⁷

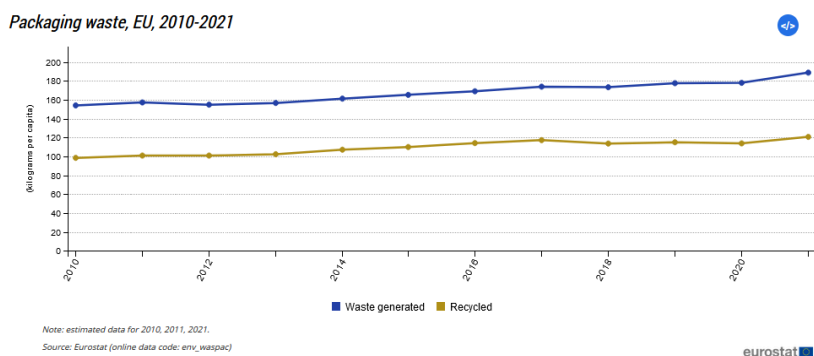


Figure 1 Changes in the generated packaging waste amount and recycling amount from 2010 until now in EU.⁷

⁴ Circular Economy | EPRS | European Parliament (europa.eu)
⁵ <https://ec.europa.eu/eurostat/databrowser/view/ten00063/default/table?lang=en>
⁶ [https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Recovery_and_recycling_rate_of_packaging_waste_2021_\(%25\).png](https://ec.europa.eu/eurostat/statistics-explained/index.php?title=File:Recovery_and_recycling_rate_of_packaging_waste_2021_(%25).png)
⁷ https://ec.europa.eu/eurostat/statistics-explained/index.php?title=Packaging_waste_statistics



3. Overview of producer responsibility in Europe

In this chapter, two key umbrella organizations for extended producer responsibility related to packaging and packaging waste are presented in more detail. These umbrella organizations aim at helping their member organizations in promoting Extended Producer Responsibility (EPR) for packaging waste and related best practices.

3.1 Extended producer responsibility alliance (EXPRA)

Extended Producer Responsibility Alliance, EXPRA, is a global, not-for-profit alliance for 32 packaging and packaging waste recovery and recycling organizations of which 19 are from EU member countries. Finland, Spain, Poland, and Denmark are members of this alliance. EXPRA acts as the authoritative voice and common policy platform representing the interests of all its packaging recovery and recycling organization members and is founded and run by or on behalf of obliged industry. The aim of the alliance is to ensure the recovery and recycling of packaging waste in the most economically efficient and ecologically sound manner. EXPRA is also pursuing to act as the authoritative voice and common policy platform representing the interests of all its packaging recovery and recycling organization members founded and run by or on behalf of obliged industry.

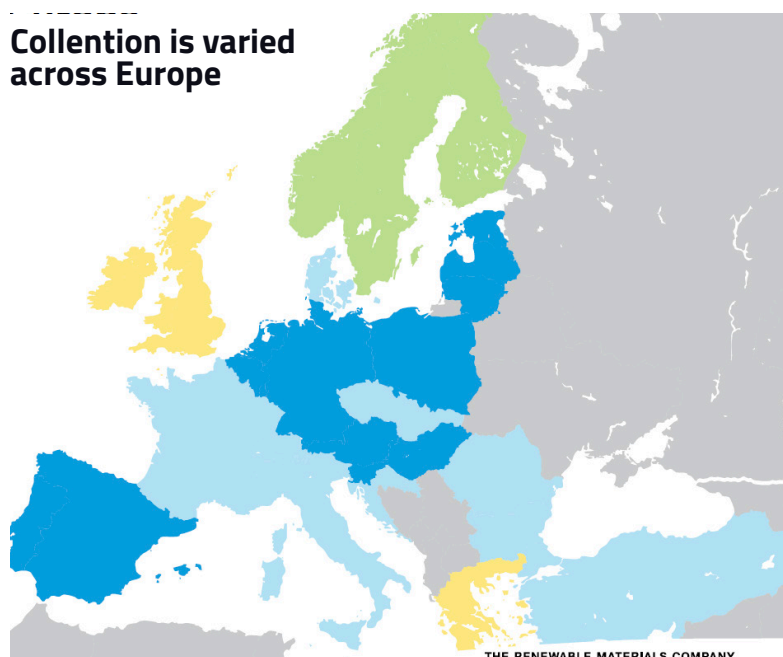


3.2 Ways to organize producer responsibilities

The producer responsibility schemes are one of the key elements in the circular economy. Producer responsibility applies to batteries, cars, packages, paper, tyres, electrical and electronic appliances. Packages and paper are included in this report as they can be related to food packaging and thus in the context of the InformPack project.⁹

Figure 2 shows the different collection models in Europe in Europe. Different collection models are taking place in different countries. In co-mingled lightweight fraction model separate collections for paper stream and for lightweight stream (included paper composites, plastics, and metals) are taking place. On the other hand, single fraction collection means that there are separate paper&newspaper stream and another collection point for paper and carton/paper stream. In mixed stream, the collection system can vary in different parts of a single country. In addition, there can be also combinations of those models in some countries taking place. In Finland, single fractions are collected, in Denmark the collection depends on the municipality and can differ depending on locations. In Poland and Spain co-mingled fractions are collected to one bin. ^{10,11}

Collection is varied across Europe



- **Co-mingled lightweight fraction:** Separate paper stream, and lightweight stream (paper composites, plastics and metals)
- **Single fraction:** Separate paper/newspaper stream and paper and carton/paper packing stream.
- **Co-mingled fraction/Mixed recycling stream**
- **Mix:** Collection system varies depending on municipality or varies from 3 models

Figure 3 Different collection models in Europe. Source: Krochak P., Critical challenges in packaging circularity Where is the missing packaging? ^{10,11}



⁸ (Overview | EXPRA)

⁹ <https://www.ely-keskus.fi/web/tuottajavastuu/kuluttajalle-ja-taloyhtiolle>

¹⁰ Krochak P., Critical challenges in packaging circularity Where is the missing packaging?, Oral presentation at PackSummit2023, 14.11.2023

¹¹ Circular Economy | EPRS | European Parliament (europa.eu)

3.3 Packaging Recovery Organisation Europe, (PRO Europe s.r.l.)

PRO Europe s.r.l. (Packaging Recovery Organisation Europe), founded in 1995, is an umbrella organization for European packaging and packaging waste recovery and recycling schemes, which mainly use the registered trademark “Green Dot” as a financing symbol. In its’ primary role, PRO Europe is the general licensor of the Green Dot trademark for Europe. Spain and Poland are members of this organization.

‘Green Dot’ systems contribute to the successful implementation of producer responsibility by obliged companies, e.g., producers and retailers. When you see the Green Dot on packaging it means that for such packaging a financial contribution has been paid to a national packaging recovery company.¹²



Figure 4 Green Dot® is a financing symbol for extended producer responsibility (EPR) - not an eco-label.¹²

¹² Who we are (pro-e.org) <https://www.pro-e.org/the-green-dot-trademark>

¹³ <https://www.finlex.fi/fi/laki/kaannokset/2011/en20110646.pdf>

4. Producer responsibility schemes (PRS) in Finland

According to Waste Act¹³ (17.6.2011/646, latest update on 19.7.2021), (food) producers, importers and remote sellers are responsible and obligated to organize waste management of their products. In addition, package companies with a turnover higher than 1 Meur annually have the same responsibility. Producer responsibility covers collection, transportation, and recycling/waste treatment of the packaging waste. a.



Aims of the producer responsibility system are to:

- prevent waste generation and promote its further utilization,
- provide extensive and dense collection network,
- provide information on collection places and waste management to the final or last holder of the product,
- belong to producer organizations or registers (for producers).

In Finland, Finnish Packaging Recycling RINKI Ltd is a non-profit service company that has been established in 1997 by Finnish Trading and Industry actors. RINKI has agreed with organization subjected to extended producer responsibility to organize recycling systems of consumer packages. In addition, RINKI takes also care of the recycling of the glass packages (agreement with Suomen Keräyslasiyhdistys ry). As well, also collection of metals, paper board and plastic package recycling is taken care by RINKI.¹⁴

After a latest update on Waste Act (19.7.2021)¹³, residential buildings/properties with five or more residencies are obligated to organize their own package collection systems. This setting is organized by the local authorities/municipalities and in practice, private transportation companies do the collecting work. This change has now also connected foreign online shopping business enterprises to the producer responsibility

system. EU member states need to ensure that online business enterprises fulfill their obligation towards producer responsibility. In Finland RINKI has conducted a project in which it has contacted over hundred different online shopping companies informing this obligation. RINKI, together with the Pirkanmaa Centre for Economic Development, Transport and the Environment (Pirkanmaa ELY Centre) (authority that supervises the implementation of producer responsibility in Finland), have developed a contract form and several companies have returned it. Monitoring process is continuous and EU member states are conducting this monitoring together.^{15,16}

RINKI also takes care of authority reporting, registers companies that fall under producer responsibility and collects the money to run the business. Their responsibilities include business is also to inform and guide consumers and companies on all producer responsibility related issues.

¹⁴ Suomen Pakkauskierrätys RINKI Oy - Rinkiin.fi

¹⁵ <https://verkkolehti.rinkiin.fi/tuottajavastuu-ulkomaiset-verkkokaupat>

¹⁶ <https://www.ely-keskus.fi/web/tuottajavastuu/-/j%C3%A4tehuollon-tuottajavastuu-laajeni-kansainv%C3%A4liseen-et%C3%A4kauppaan-hyv%C3%A4- uutinen-suomalaisille-valmistajille-ja-maahantuojille>

4.1 The role of the municipalities and environmental companies in the collection of consumer packages

There are two packaging producer organizations in Finland: Sumi Oy (formerly Finnish Plastics Recycling Ltd) and Finnish Packaging Producers Ltd (Suomen Pakkaustuottajat Oy). Both organizations are responsible for the collection and recycling of cardboard, paper, plastic, metal, glass, and wood packaging in Finland. Finnish Packaging Recycling RINKI Ltd is a service company for producer organisations in the packaging industry and for companies with producer responsibility. Producer organizations decide on packaging material-specific recycling fees, which Rinki invoices from producer-responsible companies.

Producer organizations in the packaging industry, RINKI Ltd, municipalities and environmental companies work closely together to ensure that the collection and recycling of packaging waste operates sensibly throughout Finland. The role of private and municipal environmental companies is also strong. Packaging producer organization normally buy collection services from the private companies. Municipalities address the collection points in their lands.

The separate collection of packaging from residential properties with at least five apartments is put out to tender and organized by municipalities. The municipalities do not have their own collection equipment, so the actual collection work is carried out by private transport companies. Producers are responsible for paying for the collection, and producers have the opportunity to influence the conditions for carrying out the collection.

Municipalities may, if they wish, supplement the PROs collection of consumer packaging at their own eco take-back points or with property-specific collection. The collection organized by the municipalities is paid for by the waste management fees charged by the municipalities. Suomen Kiertovoima ry represents public waste management and the 31 municipal waste facilities that carry out the waste management of 5.4 million Finns.

Private waste transport companies can also sell services to producers and residential properties if the producers or the municipality do not arrange collection from the properties. The Finnish Environmental Industries and Services Association (YTP) is a trade association of responsible environmental companies.¹⁸

The Pirkanmaa Centre for Economic Development, Transport and the Environment (Pirkanmaa ELY Centre) is the authority that supervises the implementation of producer responsibility in Finland. RINKI reports annually to the Pirkanmaa ELY Centre the packaging statistics it collects from companies. They have been drawn up on the basis of information provided by the companies that have joined RINKI. The statistics show only the total volumes of packaging materials. Rinki does not disclose the data of an individual company to third parties. The Pirkanmaa ELY Centre does not require companies that have joined RINKI to provide a report on the implementation of producer responsibility for packaging.

The Pirkanmaa ELY Centre reports annually to the EU the amount of packaging waste accumulated in Finland, as well as data on recycling and other recovery.

In the next sub chapters, different Finnish waste stream (glass, carton board, paper, plastic, metal and bottles) management systems are explained.



Figure 4 shows the package waste streams that are collected in Finland. Based on the information of World Packaging Organization's (WPO) waste stream mapping of those streams that are handled in this report, Packaging value infrastructure is available for composite beverage cartons, paper, aluminum, glass, and some plastics (PE, some PPs, some PETs)²⁰

Packing waste streams Finland

Composite beverage carton		✓
Paper		✓
Aluminum		✓
Tin Plate		✓
Glass		✓
PS	Rigid	- Mixed Plastic
	Flexible	✗
PVC	Rigid	✗
	Flexible	✗
PE	Rigid	✓
	Flexible	✓
PP	Rigid	✓
	Flexible	✓
PET	Blow moulded	- Collection but not recycling
	Thermoformed	✗
	Flexible	✗

Legend

Packing waste stream infrastructure	Rating	Description
Available	✓	There is an area-wide collection of the material (>50%). ^o
Limited available	✗	The material is collected in some regions or municipalities, but the total amount is 10-50%.
Not available	—	In this country is no waste stream for that material available or the collected waste amount for that material is <10%.
No information	n.i	No information is available for this country at the time. There will be further reasearch.

*According to Plastic Recyclers Europe
For futher information, please contact: info@worldpackaging.org

¹⁷ Suomen Kiertovoima ry

¹⁸ Ympäristöteollisuus ja -palvelut YTP ry

¹⁹ <https://worldpackaging.org/wpo/45/>

²⁰ https://worldpackaging.org/Uploads/2022-04/File6-45_1650404903.pdf



4.2 Collecting of different packaging waste streams in Finland

Collection of different waste fractions takes place in the centralized way, i.e., central recycling collection points placed in proximity to shopping center or in some other busy places (Figure 6). Typically, paper, paperboard, glass, metal, plastic, (clothes, batteries) are collected in those centralized centers. Metal, glass, and paperboard have over 1850 collection points across Finland and plastic is collected in over 600 different places.²¹

In addition, in urban areas, residential buildings with minimum five flats, need to collect mixed waste, bio waste, paper board, plastic, glass and metal packages.²² Each residential house with less than five flats is obligated to collect separately only bio waste and mixed waste in their lots.



Figure 6 An example of centralized recycling point in connection with a supermarket²³

4.2.1 Fibre-based packages

Fibre-based waste is formed of two different streams – paper stream and paperboard stream. The paper collection stream (including newspapers, magazines, adverts, printouts, mail) is not described in this report here, because in Finland paper-based packages are collected in paperboard stream. Paperboard stream includes e.g., corrugated carton board, beverage cartons (like TetraPaks), cereal boxes, biscuit boxes, pizza boxes, paper-based wrappers, egg carton, paper bags, industrial core boards, sacks, and

is collected in one container.^{24,25} Packages should not contain any food residues.

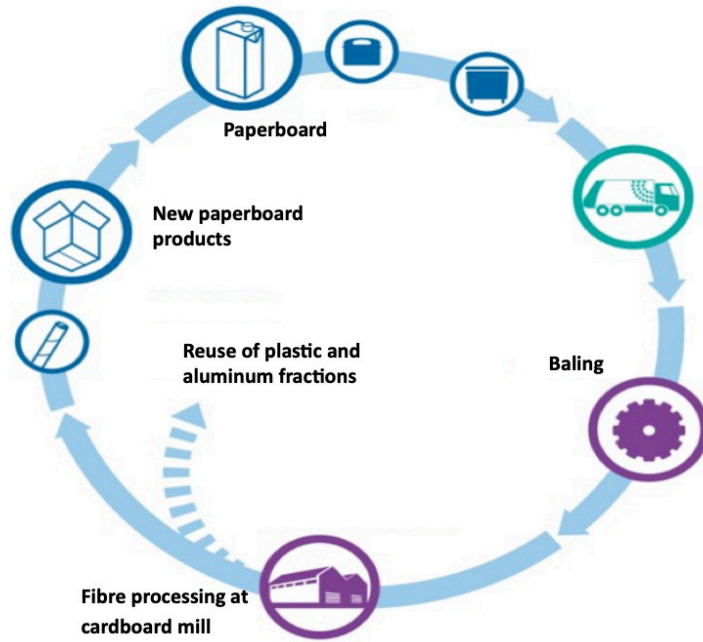
Collected paperboard bales are transported to the board mill to be recycled as fibre. The recycling process entails pulping, during which, fibre fraction, plastic fraction and possible Aluminum fraction are separated. Fibre fraction is further utilized either in e.g., a middle layer of a paperboard in the board mill. In addition, fibre fractions can further be used for e.g., toilet paper and kitchen towel sleeves or envelopes.²⁶

²¹ <https://rinkiin.fi/kotitalouksille/rinki-ekopisteet/>

²² <https://www.kiinteistolehti.fi/jatelaki-uudistuu-taloyhtiaille-velvoitteita>

²³ <https://www.sttinfo.fi/tiedote/prisma-linnanmaan-rinki-ekopiste-oulussa-avataan-jalleen?publisherId=3740&releaseId=69913230>

The scheme is presented in **Figure 7**²⁷ Currently the remaining plastic stream of beverage cartons is utilized as energy and aluminum as recycled raw material.



4.2.2 Deposit-based return system for beverage packages

Suomen Palautuspakkaus Oy PALPA organizes a separate deposit-based return system for beverage bottles (glass and plastic bottles, metal cans) that exists in Finland. Reverse vending machines for bottles and cans are included in every grocery shop/market. Over 90% of the beverage bottles and cans are recycled in Finland following this system as shown in Table 3.²⁹ For example, RVM Systems Oy, Oy Tomra Ab, and Scanding Oy provide the deposit returns lines.³⁰ When beverage products (either in glass bottles, metal cans or plastic bottles) are bought from the place of sales, a deposit of 0.10 – 0.40 euro cents is paid (depended of

the size of the bottle or can). When disposing the used package to any shop that has a vending machine, the deposited amount of money is returned to the consumer. A good and illustrative video about the deposit-based return system is presented in the following video by PALPA.³¹ Informativesummaryaboutthedepositssystem.³²

Nowadays it is also possible to return several bottles/cans simultaneously with e.g., Tomra’s R1 machine.³³

Beverage producers and importers are released from the beverage packaging taxes if they join the PALPA system.

Table 3 Recycling rates of different beverage packages in Finland³⁴

Beverage Package	2020	2021	2022
Metal Cans	98%	97%	99%
Plastic bottle	92%	90%	90%
Glass bottle	95%	98%	98%

²⁴ Kartongin kierrätys - L&T (It.fi)

²⁵ Kartongin lajittelu I Suomen Pakkauskierrätys RINKI Oy (rinkiin.fi)

²⁶ <https://www.etappi.com/jateneuvonta/jatteiden-jatkokasittely/>

²⁷ <https://www.hsy.fi/jatteen-ja-kierratys/lajittelu/kartonki-ja-pahvi/>

²⁸ <https://www.hsy.fi/jatteen-ja-kierratys/lajittelu/kartonki-ja-pahvi/>

²⁹ <https://www.palpa.fi/english/>

³⁰ http://palpa.fi/static/studio/pub/Materiaalipankki/Palautuspisteet/PALPA_PalautustenHyvittaminen_FI.pdf

³¹ <https://www.youtube.com/watch?v=dnrxNNOk-Hs>

³² FileNewTemplate (crasman.cloud)

³³ <https://www.youtube.com/watch?v=E4n620kcf50>

³⁴ <https://www.palpa.fi/juomapakkausten-kierratys/pantillinen-jarjestelma>

4.2.3 Glass

Both clear and colorful glass packages can be collected to the same recycling bin. In Finland drinking bottles made of glass belong to the deposit system and they are not thrown into these recycling bins. Drinking glass, on the other hand, is collected with the mixed waste stream because it is not recycled in practice at all.

Recycled glass can be used to produce e.g., new glass packages, glass wool or foam glass. Depending on the new target products, glass will be cleaned, sorted and crushed. Finnish glass waste is transported to Great Britain for processing to make new glass packages.³⁵ Glass wool and foam glass are made in Finland.³⁶

4.2.4 Metal

Small metal packages, such as tins, aluminum trays and foils, metal lids, and dried paint packages can be recycled in the metal containers that are in the recycling points. Metal beverage cans are part of the deposit system, and they are recycled through the deposit system for beverage bottles. Bigger metal items can be taken to the recycling sites.

Figure 8 Example of metal packages³⁷



Metal can be recycled almost perpetually. Metal recycling process entails crashing and cleaning phases during which possible materials will be removed based on e.g., their magnetism, density, and conductivity properties. The recycled metal is used as a raw material in production of new metal products. Metal packages, bicycles, car parts and spades are examples of products that can be manufactured using recycled metal.³⁷

4.2.5 Plastic

In Finland, all domestic plastic packaging wastes are disposed into one container. Plastic beverage bottles form an exception, as they belong to the deposit-based return system (this is being explained in section 4.2.2). There is also no separation between “soft” and “hard” plastics. Collected plastics include all plastic that has been in contact with food e.g., cold cut packages, butter boxes, tomato boxes, wraps, plastic bags, cups, trays, caps, and plastic hygiene product packages such as shampoo bottles. In addition, expanded polystyrene (EPS) packages etc. are collected in the same container. All packages should be cleaned before disposing them. In the waste treatment plant, a near infra-red (NIR) detector-based automatic system divides the plastic waste into different fractions, like A-PET, PP (hard PP packages and PP films to separate fractions), PE (LDPE films and HDPE packages separately) and PS-based plastic, which are then further processed separately. Other plastic materials than the above-mentioned fractions, are sent to incineration (energy is recovered). Most of the Finnish plastic waste is treated and processed in Finland but a part is sent to Europe for processing. Recycled plastic is used, for example in consumer products such as e.g., dish brushes, flowerpots, shoe horns, watering cans, components for furniture, plastic sags, and bags, and composites.³⁸

³⁵ <https://www.kierratys.info/lasipakkaukset/>

³⁶ <https://rinkiin.fi/tietoa-ringista/suomen-kerayslasiyhdistys/>

³⁷ <https://revisol.fi/metallipakkausten-kierratysta-suomen-pakkaustuottajat-oylle/>

³⁸ <https://rinkiin.fi/kotitalouksille/pakkausten-kierratys/muovipakkaukset/>



5. Recycling systems in Poland

In Poland the legislative framework regarding packaging and plastics is set by EU and national legislation. In terms of EU law, these include Directive 94/62/EC of 20 December 1994 on packaging and packaging waste and Directive (EU) 2019/904 of 5 June 2019 on the reduction of the impact of certain plastic products on the environment.

As for Polish legislation, the regulations concerning packaging and plastics waste are established in:

- Act of 14 December 2012 on waste (Journal of Laws of 2022, item 699 as amended) (PL: Ustawa z dnia 14 grudnia 2012 r. o odpadach (t.j. Dz. U. z 2022 r. poz. 699 z późn. zm.), which sets a basic regulatory framework for managing waste in Poland and implements Directive 2008/98/EC (Waste Framework Directive)³⁹
- Act of 13 June 2013 on the management of packaging and packaging waste (Journal of Laws of 2023, item 160) (PL: Ustawa z dnia 13 czerwca 2013 r. o gospodarce opakowaniami i odpadami opakowaniowymi (t.j. Dz. U. z 2023r. poz. 160), which supplements the above with a specific regulation on packaging and packaging waste and implements Directive 94/62/EC (Packaging and Packaging Waste Directive);
- Act of 11 May 2001 on the obligations of entrepreneurs on the management of certain waste and on product fees (Journal of Laws of 2020, item 1903). (PL: Ustawa z dnia 11 maja 2001 r. o obowiązkach przedsiębiorców w zakresie gospodarowania niektórymi odpadami oraz o opłacie produktowej (t.j. Dz. U. z 2020 r. poz. 1903), which currently provides for specific requirements for managing certain wastes such as oils and tyres and will be supplemented with provisions on single-use plastics.
- The Act introduces systemic solutions to reduce the amount of waste from single-use plastic products present in the environment, in particular in the marine environment. It provides for annual increases in mandatory recovery and recycling levels for packaging producers. In addition, regulations are limiting the use of disposable packaging and plastic, in accordance with the Directive 2019/904. The Act also contains penal provisions for non-compliance with its provisions, as well as provisions determining the administrative penalties imposed on entities for non-compliance with the provisions of this Act.

5.1 Extended producer responsibility schemes in Poland

Currently, the extended producer responsibility system has been implemented in Poland to a limited extent and work is underway to align these regulations with EU law. As indicated above, legislative work on the new extended producer responsibility schemes has begun and many changes are expected.

Producers, importers, or distributors of packaged products; waste producers, waste processing businesses, importers of products that become waste after use; waste carriers, waste holders, waste dealers and brokeres are obliged to register in a special database (Products, Packaging and Waste Management Database or BDO), with the exception of those distributing packaged products, exporting packaging waste and recycling packaging waste.^{40,41}

Additionally, there is a draft act amending the act on packaging and packaging waste management and some other acts. This draft act is related to the Extended Producer Responsibility. The final shape of the regulation is not known yet, the draft act has been under review since 2021. The regulation was to come into force by 1 January 2023. According to the current legislative status, the deposit return system is to be introduced on January 1, 2025. However, organizations representing the beverage industry (including water, juice, and beer) and retail support the introduction of the deposit return system for beverage packaging no earlier than January 1, 2026. They currently point to the timeframe being too short for its effective implementation across the whole of Poland. The Polish system will be the second largest in Europe to date. Therefore, it is crucial to avoid chaos during its launch.⁴⁰

The law applicable in Poland is the Act on waste management of 2001 (Dz. U./ JoL of 2007 No. 39

item 251), which - in contrast to earlier provisions - is compatible with EU law. Commitment to EU standards requires adjustment of waste management system.⁴² By 2035 Poland and other UE countries are obligate to achieve a 65% recycling rate for municipal waste.⁵⁶ The waste management system in Poland is under a transformation. According to the amendments to the Municipal Cleanliness and Tidiness Act, from 1 January 2012, citizens are no longer the legal owners of waste. The Act outlines 1) municipality's tasks and property owners' obligations for maintaining cleanliness and tidiness, 2) the conditions for collecting and managing municipal waste from property owners and 3) the conditions for granting permits to entities rendering services within the scope regulated by law. The municipality (rather than the citizen) will choose a company to be responsible for waste collection in a specific area.^{43,44}

As previously stated, municipal waste collection and disposal responsibility is nowadays again back to municipalities. They are required to organize garbage collection and the separate collection of biodegradable waste and recyclable materials such as paper (blue container/bag), metal (yellow container/bag), glass (green/white/green container/bag) and plastic (yellow container/bag). It is expected that the new law will improve waste management control measures on a local level and greatly reduce the illegal dumping and trash burning.^{45,46}

Polish company Rekopol Organizacja Odzysku Opakowań S.A belongs to extended producer responsibility alliance, EXPRA. In Poland, citizens can bin waste to containers or bags in different colours. Yellow for plastic & metals, blue for paper and cardboard, green for packaging glass, brown for organic waste. Figure 9 shows an example of recycling bins and Figure 10 recycling colors in more detailed in Poland.



Figure 9 Recycling bins for different waste streams in Poland.

³⁹ [Plastics and packaging laws in Poland | CMS Expert Guide](#)

⁴⁰ <https://cms.law/en/media/local/cms-cmno/files/news-information/brochures/waste-management-in-central-and-eastern-europe>

⁴¹ <https://dziennikustaw.gov.pl/DU/2023/1852>

⁴² <http://clf-poland.com/service/recycling/>



Figure 10 System of Separate Collection in Polish Regulation ⁴⁷

Paper - Blue bin
Glass - Green bin
Plastic - Yellow bin (incl. composite packing)
Metal - Yellow bin (with plastic)
Biowaste - Brown bin

5.2 Upcoming deposit system

Poland will launch a nationwide deposit system in early 2025 that will allow people to return used glass and plastic bottles and aluminum cans to shops without presenting a receipt. The plans initially intended to cover glass bottles up to 1.5 litres and plastic bottles up to 3 litres, will be extended to also include aluminum cans with a volume up to 1 litre. The programme will be optional for small shops – those with an area of up to 100 square metres – while larger stores will be required by law to implement the system if they stock products sold in bottles or cans.^{48,49,50}

Deposits are currently payable for glass beer bottles in Poland, although only bottles of a specific shape are covered. The new rules would be introduced as part of the EU's 2019 directive on single-use plastics, which requires member states to collect and reuse 90% of such packaging by 2030.⁴⁰

⁴³ <https://cms.law/en/media/local/cms-cmno/files/news-information/brochures/waste-management-in-central-and-eastern-europe>

⁴⁴ <https://www.trade.gov/country-commercial-guides/poland-environmental-technologies>

⁴⁵ <https://www.bioenergyconsult.com/municipal-waste-management-in-poland/>

⁴⁶ Poland Extended Producer Responsibility: Designing an EPR Scheme for Poland, Eonomia Report 2024

⁴⁷ <https://www.express.co.uk/news/world/1159101/poland-news-british-plastic-waste-importation-garbage-mafia-eu-regulations>

⁴⁸ <https://notesfrompoland.com/2022/06/03/poland-to-introduce-deposit-system-for-recycling-bottles-and-cans-next-year/>

⁴⁹ <https://www.gov.pl/web/climate/deposit-refund-system-in-poland>

⁵⁰ <https://dziennikustaw.gov.pl/DU/2023/1852>

5.3 Plastic

In Poland, over 100.000 tons of plastic bottle waste is generated annually which only 140 tons is recovered.⁵¹ In 2022, 220.0 thousand tons of PET bottles were produced and 128.0 thousand tons of PET bottles were recovered through municipal waste recycling. In 2024, the production of 233.4 thousand tons of PET bottles is forecasted and the recovery of 146.5 thousand tons of PET bottles is forecasted.⁵² In 2025, 250k tons of PET bottles and 30k of HDPE bottles for milk drinks will be introduced to the Polish market. The upcoming deposit system is supposed to help considerably to increase their chance of being recycled.⁵² PET packages can be

recycled to rPET that can be used in fibre and yarns, plastic foils, fuel oils and even furniture. Collection of PET packaging is carried out in containers marked in yellow.

According to PlasticsEurope Polska annual report 2019⁵³ about 1,9 million tons of plastics were collected in Poland in 2018 and 27.4% (525000 tons) of this amount was recycled. On the other hand, it is also reported that collection-% for PET bottles in Poland is 41%.⁵⁴ Rest of the collected plastics was used for energy recovery or landfilled. Figure 8 shows the circulation of plastics in Poland in more detailed manner.

Circular Economy for plastics in Poland (2018)

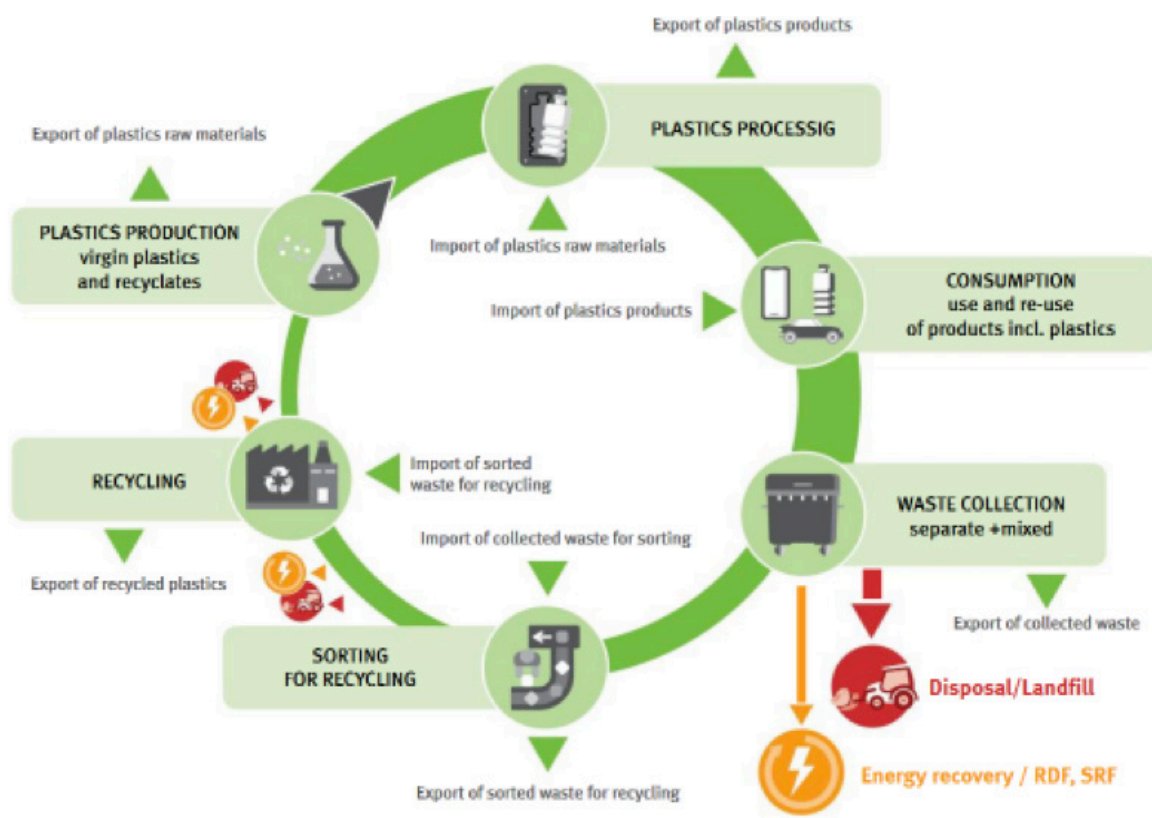


Figure 11 Circular economy for plastics in Poland.⁴²

⁵¹ Recycling – CLF Poland (clf-poland.com)

⁵² <https://rekopol.pl/>

⁵³ https://issuu.com/plasticseuropeebook/docs/pep_annual_report_2019

⁵⁴ [PET-Market-in-Europe-State-of-Play_2022-data.pdf](https://www.plasticsrecyclers.eu/PET-Market-in-Europe-State-of-Play_2022-data.pdf) (plasticsrecyclers.eu)

5.4 Glass

Glass is an excellent secondary raw material because it can be processed without losses to serve as an identical packaging as before as reused. Although glass waste does not pose a direct threat to the environment, their reuse involves environmental benefits. The application of glass cullet eliminates the emission of carbon dioxide and toxic compounds, accompanying glass packages production. It also reduces the amount of such waste in landfills. In Poland, glass is mostly collected to green containers⁵⁵, but in some areas the collection of glass is performed with the use of segregation containers, white for colourless glass and green for coloured glass.⁴²

5.5 Metal

Recycling of aluminum packaging in Poland is performed to a high standard. In 2021 the rate of recycled metal reached 79%, which is higher than required for metals and plastic materials.^{56,57,58}

As indicated by REKOPOL, in 2025, 75k tons of aluminum to be introduced on the Polish market.⁵²

5.6 Paperboard

For paperboard the correct bin/bag is blue,⁴⁴ whereas e.g., juice and milk cartons (TetraPak) go to yellow bin, together with plastics and metals.⁵⁵

Poland aims to triple the recycling capacity of beverage cartons (e.g., TetraPak bricks) with the investment of StoraEnso, TetraPak and Plastigram. Aim is to recover and separately recycle the polymers and the aluminum, using a patented separation technology. A line should be operating in the beginning of 2023.⁵⁹ The line has the potential to triple the annual recycling capacity of beverage cartons in the country - from 25,000 to 75,000 tonnes – and provides scope to absorb the entire volume of beverage cartons sold in Poland, as well as additional volumes from neighbouring countries, including the Czech Republic, Hungary, Slovakia, Latvia, Estonia and Lithuania. Featuring an annual capacity of 50,000 tonnes, the state-of-the-art line at Stora Enso's production unit in Ostrołęka (Poland) handles solely beverage carton material separation, detaching fibres from polymers and aluminium.⁶⁰



⁵⁵ <https://warszawa19115.pl/documents/20184/1342879/Flyer/4ac01b3f-3606-4aa5-bf3e-fdcb6e15b705>

⁵⁶ <https://www.products.pcc.eu/en/blog/how-should-you-sort-waste-at-home/>

⁵⁷ <https://warszawa19115.pl/documents/20184/1342879/Flyer/4ac01b3f-3606-4aa5-bf3e-fdcb6e15b705>

⁵⁸ EA-MPE_BevCan-2021-Recycling-Results_Press-Release_23-February-2024final.pdf (european-aluminium.eu)

⁵⁹ <https://global-recycling.info/archives/6585>

⁶⁰ One of Europe's main recycling hubs for beverage cartons starts operations, backed by Stora Enso and Tetra Pak

6. Packaging recycling systems in Spain

In Spain, there is a Spanish Waste Act in force that places responsibility for the collection of household waste on municipalities. Ecoembes is a non-profit organisation that takes care of the environment through the recycling and environmentally-friendly design of light household packaging in Spain. Ecoembes has operative agreements with local and regional governments.^{61,62,63}

Reclay Iberia S.L, as a part of global Reclay group, is one of the Spanish companies that are taking care of packaging waste responsibility schemes in Spain.

Recently, packaging and packaging waste regulations in Spain have been updated. Royal Decree 1055/2022 on Packaging and Packaging Waste, in force since 29 December 2022, and Law 7/ 2022 on Contaminated Waste and Soil for a Circular Economy, approved in April 2022, provide the new legal framework. They mark a turning point in the management of packaging and its circularity, establishing new obligations and targets for companies and Collective Extended Producer Responsibility Systems (SCRAP), such as Ecoembes. New responsibilities to the companies based on Royal Decree 1055/2022 says measures that companies must apply individually. New obligations and objectives aimed at to prevention (targets for reducing the weight (-13%

by 2025 and -15% by 2030) and quantity of single used packaging placed on the market (-20% by 2030)), reusing (targets for reusing the different types of packaging in different channels, totally -20% by 2030 and -30% by 2035), new packaging labelling requirements by 2025, with mandatory (e.g., which deposit to recycle, reusability and Deposit and Return System (DRS signs) and voluntary information (e.g., recyclability and EPR symbols) to include, as well as prohibitions (e.g., words environmentally friendly' or equivalent that may result in littering, use of recycled material (targets for incorporating recycled material into the different types of packaging) and Ecodesign (measures to make packaging more sustainable and reduce its environmental impact)^{64,65,66}

Nowadays registration for producer of packaging products needs to be done within three months after the marker entry by providing information of the package type. Simplified registration is needed of the companies that place less than 15 tonnes of packaging per year on the market, e-commercers platform that declares their producers (foreign producers with no authorized representative), first distributor or trader of the product in Spain when it comes from a country outside Spain and there is no authorized representative.⁵⁸



⁶¹ <https://www.ecoembes.com/en>

⁶² <https://www.ecoembes.com/en/companies/do-you-sell-packaged-goods/normative-framework-for-packaging-declaration>

⁶³ Royal Decree 1055/2022 on Packaging and Packaging Waste: https://www.ecoembesthecircularcampus.com/web/app/uploads/2023/01/Packaging-Royal-Decree_Infographic.pdf#msdyntrid=b4t_e8_E0l2F6QbrKsWXmCgFgRWA2hw53YO2zMVEPYQ

⁶⁴ Normative Framework for Packaging Declaration and Packaging Waste | Ecoembes

⁶⁵ BOE-A-2022-22690 Real Decreto 1055/2022, de 27 de diciembre, de envases y residuos de envases.

⁶⁶ Decreto envases V2 (ecoembesthecircularcampus.com)

In Spain, there are differently coloured recycling bins for different packaging waste streams, as illustrated in Figure 13. The recycling of the specific waste fractions is explained in detail in sections. Figure 12 show how waste stream collection amounts of different materials have been evolving between 1999-2023. For example, mixed waste stream of plastics, metal cans, and beverage carton, are placed in the yellow bins. These yellow bins have been in use in Spain over 20 years and there is approximately one yellow bin per 117 habitants. In 2023 each citizen separated materials on average 20.4 kg in the yellow container and 19.6 kg in the blue bin. Separately collected waste streams are industrially sorted in one of the 97 plants distributed throughout Spain. The separation is done by grouping different materials into bales and sending them to approved recyclers who are in charge of processing and transforming them into recyclates for manufacturing new packaging and products.

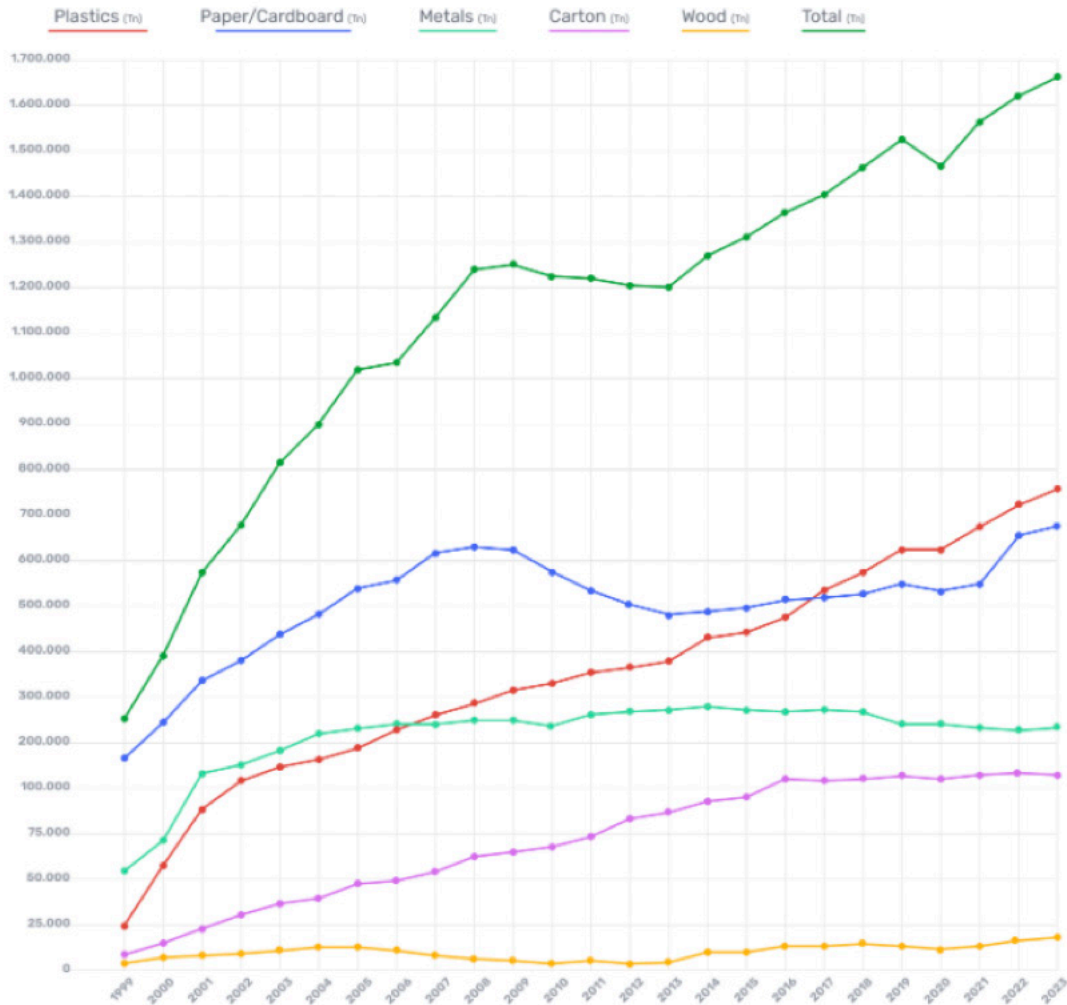


Figure 12 Collected waste stream amounts in Spain 1999-2023⁶⁹

⁶⁷ <https://www.ecoembes.com/en/the-process-of-recycling-packaging/information-on-recycling-for-household-packaging/recycling-for-household-packaging>

⁶⁸ <https://www.ecoembes.com/en/the-process-of-recycling-packaging/information-on-recycling-for-household-packaging/selective-collection-of-household-packaging>

⁶⁹ Recycling for Household Packaging | Ecoembes

⁷⁰ <https://ecoembesdudasreciclaje.es/contenedores-de-reciclaje/contenedor-amarillo/>

⁷¹ Selective Collection of Household Packaging | Ecoembes.

⁷² <https://www.ecoembes.com/en/the-process-of-recycling-packaging/recycling-process>



Figure 13 An example of different coloured recycling bins,⁷³ original photo: Lucia Grzeskiewicz / Pixabay

However, waste collection services vary depending upon the region in Spain. In several towns and cities, there are large communal bins rather than individual bins. All rubbish put in the bins must be inside of sealed bags. The bins are emptied several times per week and are cleaned regularly by the workers who empty them. The collection service is paid for by an annual tax called 'Basura' that residents pay. It is the Spanish version of council tax.⁷⁴

One region is leading the way in improving Spain's recycling statistics. The municipality of Argentona in the north of Barcelona has a private company in charge of not only waste collection and recycling, but street and beach cleaning as well. L'Arca de Maresme has provided the region with services since 1997. The service differs from the rest of Spain in that the company provides a

door-to-door collection service. Waste that can't be recycled is collected, as well as waste streams like paper, cardboard and metal packaging (tins). Organic waste is also collected and for example the city council of Malaga is running information and awareness campaigns how to recycle biobased waste at home.⁷⁵ Residents have access to a container for storage, for less than a week. Other waste streams are collected from communal collection points in each residential area. The door-to-door collection service has increased recycling rates overall, and improved the quality of the items that people recycle. The municipality achieves a 70% recycling rate, compared with only about 35-40% in other Spanish municipalities. Residents are charged for the service depending on how many people live in the household.⁷⁴

⁷³ <https://www.thelocal.es/20220405/what-are-the-recycling-rules-in-spain>

⁷⁴ <https://www.recyclingbins.co.uk/blog/recycling-around-the-world-spain/>

⁷⁵ [La orgánica es vida - Limpieza de Málaga \(limpiezademalaga.es\)](http://La.orgánica.es.vida-Limpieza.de.Málaga(limpiezademalaga.es))

Figure 14 shows the package waste streams that are collected in Spain. Based on the information of World Packaging Organization's (WPO)⁷⁶ waste stream mapping of those streams that are handled in this report, Packaging value infrastructure is available for composite beverage cartons, paper, aluminum, and glass.⁷⁷

Packing waste streams Spain

Composite beverage carton		✓
Paper		✓
Aluminum		✓
Tin Plate		✓
Glass		✓
PS	Rigid	✗
	Flefibile	✗
PVC	Rigid	✗
	Flexible	✗
PE	Rigid	n.i
	Flexible	n.i
PP	Rigid	✗
	Flexible	✗
PET	Blow moulded	n.i
	Thermoformed	n.i
	Flexible	n.i

Legend

Packing waste stream infrastructure	Rating	Description
Available	✓	There is an area-wide collection of the material (>50%). ^o
Limited available	✗	The material is collected in some regions or municipalities, but the total amount is 10-50%.
Not available	—	In this country is no waste stream for that material available or the collected waste amount for that material is <10%.
No information	n.i	No information is available for this country at the time. There will be further reasearch.

*According to Plastic Recyclers Europe
For futher information, please contact: info@worldpacking.org

Figure 14 Package waste streams in Spain

⁷⁶ <https://worldpackaging.org/wpo/45/>

⁷⁷ https://worldpackaging.org/Uploads/2022-04/File17-45_1650405082.pdf

6.1 Plastic

In Poland, over 100.000 tons of plastic bottle waste is generated annually which only 140 tons is recovered.⁵¹ In 2022, 220.0 thousand tons of PET bottles were produced and 128.0 thousand tons of PET bottles were recovered through municipal waste recycling. In 2024, the production of 233.4 thousand tons of PET bottles is forecasted and the recovery of 146.5 thousand tons of PET bottles is forecasted.⁵² In 2025, 250k tons of PET bottles and 30k of HDPE bottles for milk drinks will be introduced to the Polish market. The upcoming deposit system is supposed to help considerably to increase their chance of being recycled.⁵² PET packages can be recycled to rPET that can be used in fibre and yarns, plastic foils, fuel oils and even furniture. Collection of PET packaging is carried out in containers marked in yellow.

According to PlasticsEurope Polska annual report 2019⁵³ about 1,9 million tons of plastics were collected in Poland in 2018 and 27.4% (525000 tons) of this amount was recycled. On the other hand, it is also reported that collection-% for PET bottles in Poland is 41%.⁵⁴ Rest of the collected plastics was used for energy recovery or landfilled. Figure 8 shows the circulation of plastics in Poland in more detailed manner.

Recyclable plastic packaging in Spain are:

- Plastic bottles
- Bottles for detergent, shampoo, gel, etc.
- Bags of potatoes
- Lids and caps made of plastic
- Plastic bags (except garbage bags)
- Covers for yogurt pots
- Preserve and beverage cans



6.2 Metallic packages

Aluminum cans and beverage bottles can be recycled indefinitely. They need to be placed to the yellow bin.⁷⁸ In addition aluminum trays, metallic foils belong to the yellow bin.



6.3 Carton board and paper and Cartons and wooden packaging

Carton board and carton are two different waste streams in Spain, and they are collected to either blue or yellow bins correspondingly.

Cardboard (cardboard boxes, cereal boxes and the like cardboard, paper or cardboard packaging, folded cartons well folded, all kinds of cardboard boxes (breakfast cereals, cookies, shoes, precooked meals) are disposed of in the blue bin.^{78,79}

Beverage cartons e.g., TetraPak bricks - most commonly used for packaging liquids like milk, juice, tomato sauce and more - are collected to the yellow bin ^{78,79}

⁷⁸ <https://www.ecoembes.com/en/reduce-reuse-and-recycle/how-to-recycle-well/what-is-recyclable>

⁷⁹ [How To Recycle In Spain – What Goes In Each Bin \(almunecarinfo.com\)](https://www.almunecarinfo.com/en/how-to-recycle-in-spain-what-goes-in-each-bin)

6.4 Glass

Glass can be completely recycled an infinite number of times and can be reused by melting or a waste washing procedure. Glass must be placed to the green bin. Only following glasses can be recycled in green bin⁷⁸:

- Glass bottles (wine, champagne, etc.).
- Glass jars (like perfumes or colognes)
- Jars of food (jams, canning, etc.)



6.5 New initiatives

Recently some new initiatives regarding receiving deposit form cans or plastic bottles have been taken into use. Last year, Ecoembes created Reciclos, the Return and Reward System (SDR), which has already been implemented in all regions across the country. This means that more than 3,200,000 citizens of 43 municipalities in Spain can now receive incentives for recycling. It works by scanning the barcode of the can or plastic bottle before throwing it into the correct recycling bin. Reciclos has also installed recycling machines across the country in transport stations, hospitals, ports, shopping and leisure centres. These machines are already in operation in railway stations in the Barcelona Metropolitan Area, in markets and municipal offices in the city of Valencia, in the ports of Balària in Valencia and Denia, in the Sanitas La Zarzuela University Hospital in Madrid, in Los Arcos in Seville and Zenia Boulevard in Alicante, among others. In both cases, you will be able to earn points which you can exchange

for distinct types of rewards.⁸⁰ The user has to register in the RECICLOS app, available on Google Play Store and Appstore. The user scans the beverage cans and plastic bottles he/she consumes and deposits them in the yellow container or in the RECICLOS machines. For each container deposited in the containers or in the machines the user will get 1 RECICLOS. The user can redeem their RECICLOS for a chance to win prizes, or if they prefer, donate them to social and environmental projects.

Rezero program by Retorna aims at incentivizing consumers to returning cans and bottles to the store through a deposit of 10 cents with S.D.D.R. The goal is to reduce the daily littering in Spain to 30 million beverage containers every day.^{82,83}

⁸⁰ <https://www.ecoembes.com/en/the-process-of-recycling-packaging/reciclos>

⁸¹ [The app that rewards you for recycling - Reciclos](https://www.rezero.cat/en/campanyes/retorna/)

⁸² <https://www.rezero.cat/en/campanyes/retorna/>

⁸³ <https://www.retorna.org/mm/file/Implementing%20a%20Deposit%20Refund%20System%20in%20Spain.pdf>



7. Denmark

7.1 Packaging waste legislation in Denmark

Denmark as one of the EU Member states is bound by the provisions of the Packaging and Packaging Waste Directive. However, the transposition in national legislation took a different turn compared to other countries because Denmark already had a packaging waste management system in place, thanks to which the targets set by the Directive had already been reached in 2001.

A deposit system runs for beverage packaging, all other packaging household waste streams – for which no separate collection has been organized – fall under the responsibility of municipalities.

The overall legal framework for waste management is given by the Environmental Protection Act. However, specific Statutory Orders transposed the provisions relating to packaging and packaging waste.

There is no producer-responsibility scheme in Denmark. It will start on January 1st, 2025.⁸⁴ Denmark is the only Member State that has included the costs

of packaging waste management in prices rather than setting up an industry-run funding system.

The management of household and commercial packaging waste falls under the responsibility of private operators (recycling) and local authorities (treatment), the management of household and commercial packaging waste falls under the responsibility of private operators (recycling) and local authorities (treatment), a deposit-return system operates for one-way beverage bottles and refillable bottles. Denmark has transposed the provisions on essential requirements and heavy metals limits in a Statutory Order of 1997.⁸⁵

VANA – Dansk Emballageansvar is part of the extended producer responsibility alliance, EXPRA and it is cooperated with four trade associations: Landbrug & Fødevarer, DagSam, Dansk Erhverv and Dansk Industri. VANA takes care of the producer responsibility system of pant packages in Denmark.⁸⁶

7.2 Requirements for sorting and collection

According to Danish legislation, both household and commercial waste must be sorted and collected in fractions; glass, metal, hazardous waste, plastic, food and beverage cartons, cardboard, paper, residual and food waste. For example in Aarhus and Copenhagen areas citizens are instructed how to recycle their waste fractions.^{87,88}

The Danish Waste Association (DAF) has developed the series of pictograms that cover the sorting fractions in Denmark. The purpose is to make it easier to sort waste correctly - both at home and

in the company. It is also a requirement that the pictograms are used on the waste containers that are part of the municipalities' collection scheme.⁸⁹

Figure 14 shows the package waste streams that are collected in Denmark. Based on the information of World Packaging Organization's (WPO) waste stream mapping of those streams that are handled in this report, packaging value infrastructure is available for composite beverage cartons, paper, aluminum, and glass and several plastic types (PE, PP, most of the PETs).⁹⁰

⁸⁴ <https://www.pro-e.org/about-us/who-we-are>

⁸⁵ Denmark (pro-e.org)

⁸⁶ <https://www.vana.dk/>

⁸⁷ Er du i tvivl om sortering fra 2023? Søg i sorteringsguiden Kredsløb (kredsløb.dk)

⁸⁸ Affald | Vestforbrænding

Packing waste streams Denmark

Composite beverage carton		n.i
Paper		✓
Aluminum		✓
Tin Plate		✓
Glass		✓
PS	Rigid	✗
	Flefbile	✗
PVC	Rigid	✗
	Flexible	✗
PE	Rigid	✓
	Flexible	✓
PP	Rigid	✓
	Flexible	✓
PET	Blow moulded	✓
	Thermoformed	✓
	Flexible	✗

Legend

Packing waste stream infrastructure	Rating	Description
Available	✓	There is an area-wide collection of the material (>50%). ^o
Limited available	✗	The material is collected in some regions or municipalities, but the total amount is 10-50%.
Not available	—	In this country is no waste stream for that material available or the collected waste amount for that material is <10%.
No information	n.i	No information is available for this country at the time. There will be further reasearch.

*According to Plastic Recyclers Europe
For futher information, please contact: info@worldpacking.org

Figure 14 Package waste streams in Denmark

⁸⁹ <https://www.vana.dk/pictograms/sorterings-og-indsamlingskrav-i-danmark>

⁹⁰ https://worldpackaging.org/Uploads/2022-04/File5-45_1650404903.pdf

⁹¹ <https://ipaper.ipapercms.dk/OdenseRenovation/waste-and-recycling-in-odense-municipality-how-to-recycle-at-home/?page=1>

⁹² <https://www.retsinformation.dk/eli/retsinfo/2022/9793>

⁹³ <https://mst.dk/borger/affald-og-forurening/sortering-af-affald/kortlaegning-af-kommunale-affaldsordninger-for-husholdningsaffald>

7.3 Carton board

Clean and dry cardboard waste, such as cardboard boxes, cardboard tubes from kitchen and toilet rolls and cardboard from other packaging, is sorted as carton. To ensure efficient recycling, cardboard waste must not be wet or contain unwanted substances or materials that cause recycling problems, such as expanded polystyrene. Used food and beverage carton packages (i.e., liquid carton for e.g., milk, juice and vegetable purees) must be emptied of contents and sorted as carton in some parts of Denmark^{59,91}, whereas in some parts they are recycled with plastic waste stream. Food and beverage cartons have been collected and recycled across Europe for many years. In Denmark, there is very limited

experience with collecting and recycling this fraction, and for the vast majority of citizens in Denmark, sorting food and beverage cartons for recycling will be new, as these were previously sorted as residual waste.⁹²

At the moment 84 of 98 communes now sort their beverage cartons combined with Plastic and 14 of our 98 communes do not sort their beverage cartons only with plastic; some separate them, and a few separate them with both plastic and metal. Most of the communes have adopted this sorting approach between 2022 and 2024, so it is understandable that the availability of varied information has led to possible increased confusion.⁹³

7.4 Plastic

Packaging, which predominantly consist of plastic such as plastic bottles, plastic trays, plastic tubs as well as bags such as shopping and freezer bags, is sorted as plastic. Food packaging must be emptied and scraped clean. The plastic waste must not contain waste that could cause problems in recycling, such as packaging that has contained plant and insect poisons, PVC, plastic products with electronics or tarpaulins.⁸⁵



7.5 Glass

Packages made of glass, such as canning glasses and wine bottles, must be emptied and scraped clean of food or beverages before sorting as glass. Besides glass packaging also ordinary drinking glasses, including broken glass from the above, are sorted. Glass waste must not consist of specific types of glass that could cause recycling problems, such as refractory dishes, flat glass from windows and mirrors.⁹⁴

7.6 Metal

Products and packaging such as cans, beverage cans and smaller metal objects, consisting predominantly of metal, are sorted as metal. Metal packaging from food must be emptied and scraped clean of food or beverages. The metal packaging may have plastic coatings, but still needs to be sorted as metal. Metal waste must not contain waste that could cause problems in recycling, such as electronics, pressurised cylinders and hazardous waste packaging.⁹⁴

⁹⁴ VANA - Dansk Emballageansvar

⁹⁵ 20 years of producer responsibility across sectors - Dansk Retursystem

⁹⁶ Sustainability and recycling within the deposit system - Learn more (danskretursystem.dk)

⁹⁷ <https://danskretursystem.dk/en/sustainability/>

7.7 Deposit system for beverage packages (plastic, aluminum, glass)

Denmark has a similar beverage packaging deposit system than in Finland. It is organized by Dansk Retursystem.⁹⁵ Aluminum, glass, and plastic from returned bottles and cans are sold to companies that process the material and manufacture new packaging from it.

There are two different ways of recycling beverage packages:

- Recycling by melting bottles and cans - When one-way (disposable) bottles and cans are recycled, the original material is melted and converted into new bottles and cans. About 86% of all deposit-marked bottles and cans sold in Denmark are one-way packaging. Dansk Retursystem collects the bottles and cans and recycles them. Consumer can get refund when returning the empty refillable bottles belonging to deposit scheme.⁹⁶

- Recycling by reusing bottles - An alternative scenario is collecting, washing and refilling bottles, which is done by breweries. Almost one quarter of all deposit-marked bottles sold in Denmark are refillable. Consumer can get refund when returning the empty refillable bottles belonging to deposit scheme also on this case.⁸²

Danes excel at returning their empty bottles and cans. 92% of all bottles and cans return to the system so that the aluminum, plastic and glass can be melted and turned into new bottles and cans.⁶²

The Danish deposit and return system is based on the principle of a closed resource cycle. Bottles and cans for beverages can be returned to specific locations such as reverse vending machines in supermarkets or 'pantstations' (deposit return banks)⁹⁷, or directly to the staff of grocery store or gas station, if the location does not have a reverse vending machine.⁹⁸

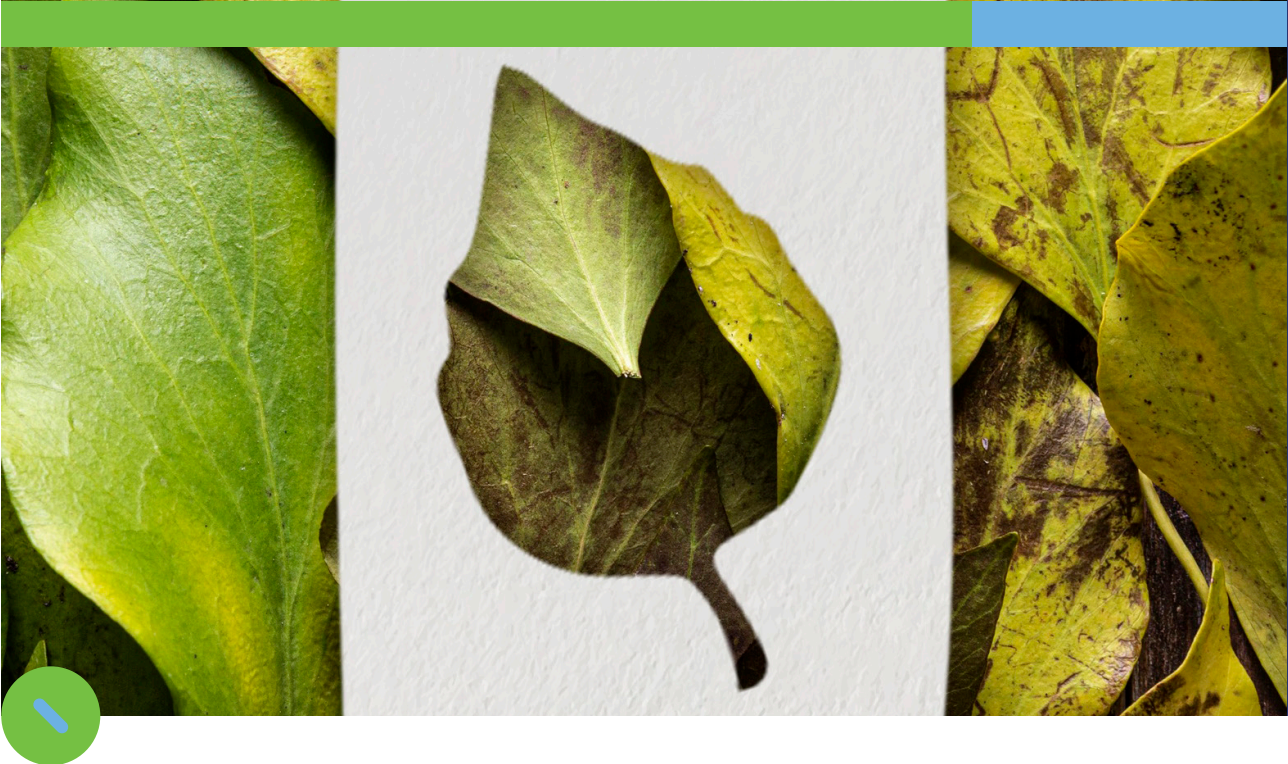
Video about Danish "pant station" with using an App and video about deposit and return system.¹⁰⁰

⁹⁸ [Where to return bottles and cans - Learn more here \(danskretursystem.dk\)](http://www.danskretursystem.dk)

⁹⁹ [Sådan bruger du Pant-app på pantstationen - YouTube](https://www.youtube.com/watch?v=5b5P4K-AEwU)

¹⁰⁰ <https://youtu.be/5b5P4K-AEwU>

¹⁰¹ [PPWR unwrapped - EUROOPEN \(europen-packaging.eu\)](http://www.europen-packaging.eu)



8. Discussion and conclusion

This report shows that current recycling systems differ in studied EU Member states of Finland, Poland, Denmark and Spain. The upcoming EU packaging regulation will affect future packaging recycling and reuse in Europe. The EU commission voted on 22.11.2023 on the new packaging regulation, and after that on 18.12.2023 the European Council adopted its General Approach on PPWR. The final decisions will be made in spring 2024.¹⁰¹ These decisions are expected to affect package waste management and related producer responsibility schemes in multiple ways, as the proposed regulations target harmonizing rules. Furthermore, the discourse of packaging reuse seems to have increased in the frames of the European circular economy. By

strengthening the role of packaging reuse, along existing recycling efforts, the European Commission aims to curb the increasing generation of packaging waste.

The idea of the regulations is to harmonize recycling practices among EU countries. At the moment, many different ways in which waste collection and recycling systems are organized can be found across EU as exemplified by the four countries studied herein. Table 4 summarizes how different packaging waste streams are collected in selected InformPack partner countries. It also shows that many different systems are taking place in such a small number of countries and if all should be harmonized in the EU level, there are still work to be done.

¹⁰² <https://yle.fi/a/74-20060350>

¹⁰³ <https://www.verkkouutiset.fi/a/henna-virkkunen-moittii-eu-komission-esitysta-saattaa-jopa-lisata-paastoja/#0b7c5f81>





¹⁰⁴ <https://www.is.fi/taloussanommat/art-2000010006901.html>

¹⁰⁵ <https://www.europarl.europa.eu/news/en/press-room/20231023IPR08128/packaging-new-eu-rules-to-reduce-reuse-and-recycle>

¹⁰⁶ [https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/745707/EPRS_BRI\(2023\)745707_EN.pdf](https://www.europarl.europa.eu/RegData/etudes/BRIE/2023/745707/EPRS_BRI(2023)745707_EN.pdf)

Waste Collection System

In selected EU countries

				
Plastic	Separate collection	Separate collection	Plastics and metals are collected together (yellow bin)	Plastics and metals are collected together (yellow bin)
Metal	Separate collection	Separate collection	Plastics and metals are collected together (yellow bin)	Plastics and metals are collected together (yellow bin)
Carton board	Separate collection	Separate collection	Cartonboard and carton are collected together (blue bin)	Cartonboard and carton are collected together (blue bin)
Carton	Separate collection	Separate collection	Cartonboard and carton are collected together (blue bin)	Cartonboard and carton are collected together (blue bin)
Glass	Separate collection	Separate collection	Separate collection (green bin)*	Separate collection (green bin)*
Beverage bottles	Deposit refund system	Deposit refund system	Deposit refund system for PET	No
Producer responsibility system	Two packing producer organizations takes care of organizing	Only for beverage bottles	Municipals	Municipals

*In some regions of Poland colorless glass is collected to white bin

System harmonizing can make waste stream collection and recycling more effectively. But also, resistance against harmonizing has been addressed because of e.g., possible higher recycling fees. Reusability could be one increasing possibility in the future.

The European Commissions plans to strengthen the role of packaging reuse, which has faced opposition, particularly among the fibre-based packaging, food and food service industries. A concern expressed particularly by industry representatives is that reusability would become compulsory without taking existing country-specific systems into account. For example, in Finland vast majority of milk and soft juices are packed in fibre-based, liquid carton packaging, which have established recycling systems in use with high recycling rates. A shift from disposable fibre-based packaging to reusable plastic and glass bottles is foreseen to require heavy investments for washing lines and collection systems and suggested to increase the use of plastics.^{102,103}

Previously it has been proposed by the European Commission that 10% of non-alcoholic beverage packaging should be reusable by 2030 and 25% by 2040. However, the Committee of the Environment has proposed shares to be 20% and 35%, respectively.⁶⁸ Furthermore, it has been proposed that by 2029 aluminum and plastic beverage bottles sold in the EU markets, needs to belong to deposit-based systems in the EU.^{104,105,106}

There is no unambiguous answer if the reusable plastic bottle or the recyclable fibre-based liquid cardboard package is the best option. Environmental sustainability of packaging systems can only be achieved through a balanced combination of re-use, material recycling and use of sustainable raw materials. None of these potential solutions should be excluded from a sustainable European-level packaging strategy. The environmental benefits of these solutions are case specific and should always be verified through comprehensive Life Cycle Assessments (LCA).^{107,68,108,109,110}

¹⁰⁷ <https://www.luke.fi/fi/documents/open-letter-to-european-policy-makers-regarding-eu-packaging-regulation>

¹⁰⁸ <https://eppa-eu.org/wp-content/uploads/2023/06/LCA-In-Store-Sudy-Ramboll.pdf>

¹⁰⁹ <https://doi.org/10.1016/j.ecolecon.2022.107455>

¹¹⁰ <https://www.reloopplatform.org/wp-content/uploads/2023/10/Packaging-Reuse-Maximising-the-Benefits.pdf>

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